



VERIFICATION & IMPLEMENTATION

**A collection of analysis on international
agreements for security and development**

2019





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INTRODUCTION

Verification and national health insecurity

Ian Davis

The five essays that make up this short collection of analyses on verification and implementation of international agreements for security and development were all written in 2019. Authored by five leading practitioners and experts in nuclear safeguards, biological and chemical threats and the regulation of fishing, the articles explain and appraise the verification and national implementation mechanisms that make the selected international arrangements work in practice. The essays also throw light on how emerging developments in technology, industry, society and geopolitics may impact these fields, both in terms of new risks to international agreements and new opportunities to strengthen them.

Since the essays were completed the world has changed in a way that nobody anticipated. At the time of writing this introduction, the world is in the midst of an unprecedented global public health emergency on a scale not seen since the 1957-1958 influenza pandemic – as at late-June 2020, over 10 million cases of infection and over 500,000 deaths – requiring a global response with far-reaching economic, social and political consequences. Although the scale of the impact from COVID-19, the pathogen associated with the coronavirus outbreak, has taken most governments by surprise there were ample prior warnings of the risks of a new global pandemic. Severe Acute Respiratory Syndrome (SARS-Cov) during 2002-04, Middle East Respiratory Syndrome (MERS-Cov) since 2012 and ongoing, and the World Health Organization has been listing coronaviruses among the leading viral threats for many years.¹

According to the current state of knowledge about coronavirus and its origin, it is thought to be a natural disease that was first detected in Wuhan, China, and reported to the World Health Organization (WHO) on the last day of 2019. When China first detected cases of pneumonia of unknown cause, and when the virus jumped from its intermediate host to people, remain open questions.² It also remains possible that the virus originated from a leak of material from a laboratory or the accidental infection of a technician in the course of research either in a lab or in the field.

Irrespective of the origins of COVID-19, as Alex Lampalzer and Valeria Santori point out in chapter 2 of this volume, many states and several international organisations have undertaken various measures to prepare for and respond to infectious disease outbreaks, whether natural or deliberate in origin. While the authors' focus is on responses to a deliberate event under the framework of the Biological Weapons Convention (BWC),

many of the mechanisms also apply to a natural disease outbreak, such as COVID-19. However, the level of preparedness as well as the actual public health strategies adopted in many countries appear to have been inadequate or deeply flawed.

Towards the end of 2019, the Global Health Security Index—the first comprehensive assessment and benchmarking of health security—ranked the United States and the United Kingdom as first and second in the world respectively for pandemic readiness.³ Although the Index carried the caveat that “no country is fully prepared for epidemics or pandemics, and every country has important gaps to address”, broadly speaking, in both states the necessary systems were thought to be in place—although the weaknesses in the UK preparations were revealed in a 2016 pandemic simulation, called Exercise Cygnus.⁴ However, both countries have been among the worst affected by COVID-19. This raises at least two possibilities: (1) that the gaps in the US and UK systems were far greater than anticipated by the Index or that important parts of those systems were inadequate or flawed; and/or (2) that the systems were not deployed in a timely or an effective manner. The first suggests mainly a failure of science, while the second a failure of politics.

It is too soon to say with any certainty where the US and UK policy failures lie—epidemiologists and historians will study this for decades—but initial indications strongly suggest that they mainly fall within the realm of politics. In the United States this is clearly aligned with the myriad and well-documented failures of the Trump administration.⁵ In the UK the case is less clear cut, although there is growing evidence that the UK ignored early warnings and acted too late.⁶

Lampalzer and Santori refer to the UK Public Health Rapid Support Team—a specialist team of public health experts, scientists and academics on stand-by to deploy in response to outbreaks of infectious diseases around the world before they develop into health emergencies—as an example of a mechanism with a potential dual-use role (in terms of assisting with either a deliberate or natural disease outbreak). The UK Government deployed personnel from this team to several countries in March 2020 to help with the international coronavirus effort. However, the news release about the team’s overseas deployments dated 17 March (i.e. six days after the World Health Organization (WHO) declared a pandemic), also concluded that the “risk of COVID-19 to the UK population remains moderate”.⁷ If this UK risk assessment seems rather complacent (at that stage the UK had only recorded a handful of coronavirus-related deaths), it appears to be in line with growing criticism of the UK Government’s handling of the crisis, which at one point saw the number of deaths rise to the highest recorded in Europe.

More broadly, the virus has revealed fundamental flaws in the strategies many states employ to provide security for their people. In the ‘new normal’, will old concepts of national security be abandoned in favour of cooperative approaches to address public health threats? Will we see significant re-balancing in strategic thinking

and allocation of resources, for example in US spending where the annual budget for the US Centres for Disease Control and Prevention is less than \$7 billion, while the US defence budget is over \$700 billion?

The coronavirus pandemic also underscores the importance of effective global governance and international cooperation, especially as regards the role of the WHO. The international health regulations adopted by the WHO in 2005 enable the organisation's director-general to request states to verify information about diseases on their territory, to declare a public health emergency and to make recommendations about how states should respond. In exercising these powers, however, the WHO is reliant on the ongoing cooperation of the states involved, which has not always been forthcoming.

International organisations like the WHO are only as effective as national governments allow them to be, and the pandemic arrived when multilateralism was already under immense pressure, undermined by the great powers' (principally the United States, China and Russia) attempts to use international institutions for geopolitical competition rather than cooperation.⁸ The pandemic has amplified a global trust deficit and further divided other global decision-making bodies, such as the United Nations Security Council.

It remains uncertain as to whether states will be willing to strengthen the WHO or to increase their financial contributions to address the organisation's regular funding shortages. Some practical small-scale reforms may be possible, including greater transparency within the committee that advises the director-general on whether to declare an emergency. One developing trend is the rise of civil society as a major contributor to shaping global dialogues around biological threats and appropriate responses to them. Independent civil society verification of national implementation of international health regulations and 'whistle-blower' networks for earlier identification of new diseases may be one way forward.

Since biological agents and toxins continue to be considered as possible instruments of war, agreeing verification and inspection capabilities for the BWC ought to be another goal. Despite an earlier initiative to equip the BWC with a verification protocol being opposed by the United States at the 2002 BWC Review Conference, the idea should be revisited at the next Review Conference in 2021. The precedents in Iraq (UNSCOM and UNMOVIC) demonstrated the feasibility of bio- and other WMD verification and the present pandemic could be the required catalyst for strengthening the BWC. As Lampalzer and Santori argue in chapter 2 this would include enhancing the international community's assistance, response and preparedness capacities under Article VII of the BWC. The authors describe the Article as an "expression of international solidarity" and highlight several ongoing initiatives to support and strengthen its operationalization.

While the world's attention is fixed on the COVID-19 pandemic, another urgent existential threat has come to the fore: the lapsing of nuclear arms control treaties

between the United States and Russia and the absence of new arms control negotiations. Of the collection of treaties that emerged during the Cold War only one treaty limiting nuclear weapon stockpiles—the New Strategic Arms Reduction Treaty (New START) remains extant, and even this is scheduled to expire in February 2021. If New START expires without extension, revision or replacement, there is a growing risk of a new arms race in an already unsure post-COVID-19 world.

Among the many arms control events cancelled or postponed due to the pandemic was the Review Conference of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), due to take place in New York at the end of April 2020. (It has now been rescheduled to a date no later than April 2021). As Jenni Rissanen points out in chapter 1, this gathering of all NPT states parties (all UN states except India, Israel, North Korea, Pakistan and South Sudan) was due to celebrate the 50th anniversary of entry into force of this important treaty that limited the spread of nuclear weapons.

However, international divisions—between the supporters of nuclear deterrence and the vast majority of states pressing for progress towards nuclear disarmament, as originally promised in the NPT—meant that the outlook for the Review Conference was not favourable. The risk of nuclear war is now estimated by many experts as higher than during the Cold War.⁹ In addition to the demise of the ABM Treaty (1972-2002) and the Intermediate-Range Nuclear Forces Treaty (1987-2019), the 2015 Joint Comprehensive Plan of Action (Iran nuclear deal) is now largely non-functional (although there are some ongoing IAEA inspections), following US withdrawal in 2018 and the subsequent re-imposition of US sanctions on Iran.¹⁰ The limited remaining confidence-building measures are also now at risk, especially those linked to New START and to the 34-nation Open Skies Treaty—the latest international agreement for which the Trump administration has commenced a formal withdrawal process.¹¹

Within this rather regrettable context, Rissanen details the foresight and strategic planning activities of the IAEA Department of Safeguards. The independent verification work of the IAEA remains indispensable in preventing the spread of nuclear weapons by verifying that states are honouring their international legal obligations to use nuclear material and technology only for peaceful purposes. As the chapter argues, safeguards concepts will also require new competencies and strengthened partnerships—perhaps even more so in the light of the gradual dismantlement of other parts of the arms control framework.

Broad geopolitical tensions are also impacting on global, multilateral and regional efforts to strengthen the prohibition on chemical weapons. As Ralf Trapp argues in chapter 3, the Chemical Weapons Convention (CWC) is a cornerstone multilateral arms control and disarmament agreement that enjoys almost universal adherence. The CWC verification system is generally regarded as a ‘gold standard’, but now faces challenges as its implementing body, the Organisation for the Prohibition of Chemical Weapons (OPCW), transitions “from eliminating state CW programmes

world-wide, to ensuring that chemical weapons will not be re-acquired by anyone—state or non-state actors—and that advances in chemistry will not be diverted for chemical weapons purposes”. Trapp identifies some of the existing shifts in OPCW verification objectives and methodologies and those that may still need to be made.

Two very different recent cases—allegations of CW use in Syria and Iraq (2014-2019, and the use of a toxic chemical from the novichok nerve agent family in the UK (March 2018)—highlight the importance of looking again at the effectiveness of the CWC verification system with regard to providing assurances about the completeness of CW declarations. In chapter 4, Brendan Whelan provides an OPCW inspector’s perspective, through the lens of a seasoned trainer. Having joined the OPCW as an inspector in 1998 shortly after its formation and with a career spanning 21 years, he is well-placed to discuss how inspector training in the OPCW has adapted to ever changing operational needs.

In the case of Iraq and Syria, this not only required swift and radical action to prepare inspectors to conduct tasks in non-permissive environments, the shift from verification to investigation calls for many specialist competencies that cannot be acquired through training alone. With the newly acquired mandate to assign culpability for chemical attacks, Whelan suggests that the “repercussions and political fallout from such pronouncements are potentially colossal” —as they have been in practice. The creation of a new attribution mechanism to identify the perpetrators of the use of chemical weapons in Syria—the OPCW’s Investigation and Indication Team—and some of the OPCW’s findings in Syria, have proved controversial and exacerbated existing international divisions. Moving forward, Ralf Trapp concludes that the OPCW and its member states will need to strike a balance between “technical sophistication, procedural rigidity, operational robustness and political acceptability”, while Brendan Whelan calls on inspectors to “conduct their work not only with competence, professionalism and scientific rigor, but just as importantly, with integrity, independence and impartiality”.

The final chapter by Judith Swan moves away from arms control to discuss important developments in international efforts to regulate fishing.¹² International treaties and agreements cover a diverse set of aims and issues, and the activities they control are therefore similarly diverse. Cooperative security also depends on sustainable development, and the maintenance of the complex natural resource systems on which states rely. Implementing the international initiatives that aim to repair or prevent damage to these natural resource systems, and demonstrating this through effective monitoring and verification is crucial. Judith Swan highlights the massive changes in fisheries compliance and enforcement that are underway, driven by a 2009 UN Food and Agriculture Organization agreement to prevent, deter and eliminate illegal, unreported and unregulated fishing. The chapter showcases key international and regional implementation activities, with a particular focus on port State measures

and other tools for fisheries monitoring, control and surveillance. Swan describes the benefits to sustainable fishing and the blue economy as “limitless”, although she cautions that the implementation activities remain work in progress.

‘Work in progress’ also neatly encapsulates the international response to identify all the lessons to be learned from the COVID-19 crisis. As indicated above, there are likely to be many correlations between the pandemic and verification and implementation of international agreements at the intersections of health, climate and peace. These will need to be considered in the coming weeks, months and years. Arguably, above all else, new international efforts are needed to reduce the chances of nuclear war and to strengthen defences against future pandemics.¹³

Finally, VERTIC would like to extend very warm thanks to all the authors for their dedication when contributing chapters to this volume and for their forbearance over the subsequent delay to publication. In addition, we wish to express our gratitude to Rick Jones, designer and typesetter, for his efforts in producing this book.

Endnotes

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CHAPTER 1

IAEA safeguards: Emerging challenges and opportunities

Jenni Rissanen¹

Introduction

“The future influences the present just as much as the past.”

—Friedrich Nietzsche

Year 2020 marks an important juncture for the global nuclear non-proliferation regime. The Treaty on the Non-Proliferation of Nuclear Weapons (NPT) turns 50 years old and it has been 25 years since the treaty was extended indefinitely. Every five years, NPT States Parties review the treaty’s operation. The next opportunity to do so is at the NPT Review Conference in April-May 2020.

The past five decades have contained major developments, both with respect to nuclear non-proliferation and overall security developments in the world. The world has seen a nuclear arms race reach its peak at some 70,000 warheads in 1986 followed by reductions to today’s approximately 14,000 warheads.² Two nuclear weapon States, France and China, have acceded to the NPT. Five nuclear weapon free zone treaties have been concluded. The NPT itself has become near universal and was extended indefinitely in 1995. Some States have voluntarily – or under international pressure – given up their nuclear weapons programme while others (North Korea) have continued to develop theirs and even withdrawn from the NPT. More recently, new security tensions have been building up, as the world enters a more multipolar stage. Moreover, with globalization, the risk of the spread of sensitive know-how and technology has increased. Such developments have had significant implications on the nuclear non-proliferation regime as a whole as well as on IAEA safeguards.

While there has been, and is likely to be, much discussion and debate among the NPT community about the past and the current state of the treaty, seemingly less attention is being devoted to thinking about its future. What will be the forthcoming key challenges and opportunities for this global nuclear non-proliferation norm that has helped to keep proliferation in check for the past 50 years? What challenges and opportunities will the next 5, 25 or 50 years bring? And what will this mean for IAEA safeguards?

The pace of change is picking up speed, especially when it comes to technology. Increasing complexity in turn is making the direction of change ever more unpredictable. At the same time, globalization is making the impacts of change even more ubiquitous. This is being felt also by the United Nations (UN) system and other inter-governmental organizations. In 2018, in the context of the 2030 Sustainable Development Goals, a coordination body of the Chief Executives Board for Coordination (CEB), made up of the heads of organizations within the UN system, started taking steps towards better preparedness for the future through strategic foresight.³ The body recognizes that future paths are not going to be linear and there will be disruptions along the way, and therefore, those who incorporate foresight techniques in their working methods will “be better prepared and more resilient in the face of uncertainty and disruption”.⁴ To this end, the CEB is engaged in exploratory work on how to promote and support foresight capacities across the UN system and foster cross-agency and system-wide collaboration on foresight.

The IAEA Department of Safeguards has been conducting such activities for a number of years. To be prepared for the future, it carries out strategic foresight⁵ and planning activities. The Department developed its first long-range strategic plan a decade ago (in 2010). While the Department’s foresight and planning methodologies have developed over the years, the central aim has remained the same: being prepared for, and ensuring that safeguards remain effective and efficient into the future. The Department’s strategic foresight and planning activities are described below, and this chapter also elaborates on some of the findings’ implications in terms of e.g. safeguards concepts, approaches and methodologies, technologies, workforce competences and partnerships.

Department of Safeguards: Strategic foresight and planning

The Department’s strategic planning framework includes a suite of planning documents: a departmental Strategic Plan,⁶ a Research & Development (R&D) Plan,⁷ as well as a Development and Implementation Support (D&IS) Programme for Nuclear Verification.⁸ The framework is an important internal management tool through which the Department—together and aligning with IAEA (corporate-level) planning documents⁹—sets its priorities, puts in motion organizational improvement initiatives and advances ‘results-based management’, which IAEA Member States increasingly expect. It is also an important means to mobilize extrabudgetary and in-kind resources worth some €30 million annually. This support is becoming ever more important in the era of tightening budgets and is vital for further developing the IAEA’s verification capabilities.

Underpinning these strategic planning documents are the Department's foresight activities: the monitoring of the environment in which the IAEA operates and analysing the impact of trends and developments on safeguards. This is to understand and prepare for forthcoming challenges and opportunities. For some years now, the Department has regularly conducted analyses of the external environment. These studies examine the wider trends and global drivers (e.g. energy demand) of significance to the nuclear landscape and the Agency's verification mission. The analysis includes IAEA projections about the growth of global nuclear power generation and the numbers and types of nuclear facilities, and assessments of their impact on e.g. the IAEA's verification workload. The analysis also includes monitoring views expressed by Member States in the IAEA's policy-making organs in order to track stakeholder perceptions, concerns and interests. The Department also holds workshops on emerging technologies to prepare for the associated challenges and seize the promising opportunities they will present.¹⁰

Some trends identified as dominant in recent years have included (moderately) growing nuclear energy production; a diversifying nuclear technology landscape in terms of types of facility and their geographical supplier base; a weak global economic outlook and resulting tightening budgets of international organizations; the expansion of 'big data' and associated information management challenges; and a changing security context.¹¹ For the Department, some of these trends have translated into the strategic challenges of, for example, coping with a widening gap between IAEA verification workload and resources; keeping up with the pace of technological change; protecting against cyber threats; and experiencing challenges in gaining in-field access to certain parts of the world.

In 2016, with the help of external experts, the Department introduced a new foresight tool into its planning toolkit: scenarios. It was motivated by the increasing overall unpredictability of the future and the desire to be better prepared for the different ways in which the future could unfold. The Standing Advisory Group on Safeguards Implementation (SAGSI), which advises the IAEA's Director General, had also recommended the use of scenarios. Scenario planning, which has been successfully used in the private sector (e.g. by Royal Dutch Shell Corporation), and increasingly also in the public sector, offered a way to enhance such strategic thinking in the Department. It is one of the foresight methods that the CEB is now looking to promote in the wider UN system.

The result of its introduction by the Department was a set of scenarios that explored the potential broader policy, security and technology environments in the future. For example, one of the scenarios envisaged what the nuclear industry in general, and facilities in particular, might look like by 2030. The implications resulting from, for

example, transportable reactors to the IAEA's verification work were analysed in order to inform preparedness. This analysis highlighted the associated legal challenges and sparked thinking of the kinds of safeguards approaches that will be needed. Another two scenarios also related to technology. In one scenario, the Department explored a world fundamentally changed by non-nuclear technologies, such as artificial intelligence, sensors and robotics – a world of automation and digital dependency where keeping up with technologies is not only a question of organizational effectiveness and efficiency, but also of its continued relevance. This scenario also raised questions about the Department's future workforce and the kinds of competencies that will be required. Another scenario explored the potential darker side of technologies: when technologies such as additive manufacturing lower proliferation barriers, and cyber threats endanger sensitive information assets, challenging the organization to stay ahead of the game.

Although the Department's scenario experience is still young, scenario planning helped strengthen awareness about the impact of the broader operating environment, elevate strategic thinking and question existing assumptions, thereby deepening existing analyses of the external environment and associated risks. Including scenario planning into the planning methodologies has also helped the Department to move to more 'living' plans that are more responsive to the signals the operating environment sends – thereby enabling earlier decision-making and helping to increase organizational agility, with better awareness of, and preparedness for, a greater variety of futures.

One tangible outcome from the scenarios work was the realization that more needed to be done to monitor and understand the impact of emerging technologies, given their growing defining role. This was especially true with regard to technologies outside the nuclear area, such as artificial intelligence and machine learning. In 2017, therefore, the Department explored these in an internal workshop, entitled Emerging Technologies Workshop (ETW), with the help of external experts – the insights of which were presented to Member States in a side-event at the 2017 NPT Preparatory Committee meeting in Vienna.¹² The aim of the workshop was to strengthen the Department's awareness of emerging nuclear and non-nuclear technologies, identify the types of challenges and opportunities these pose to the Department, and enhance its preparedness.¹³

The ETW outcomes informed the development of the Department's latest Research & Development (R&D) Plan released in 2018. More recently, some of the themes identified in the scenarios and the ETW were further explored at the IAEA's 2018 Safeguards Symposium, under the theme of 'Building Future Safeguards Capabilities'.¹⁴ The implications of the Department's foresight work to safeguards concepts, approaches, methodologies, technologies, workforce competencies and partnerships with others, are elaborated below.

Safeguards concepts, approaches and methodologies

State-level concept

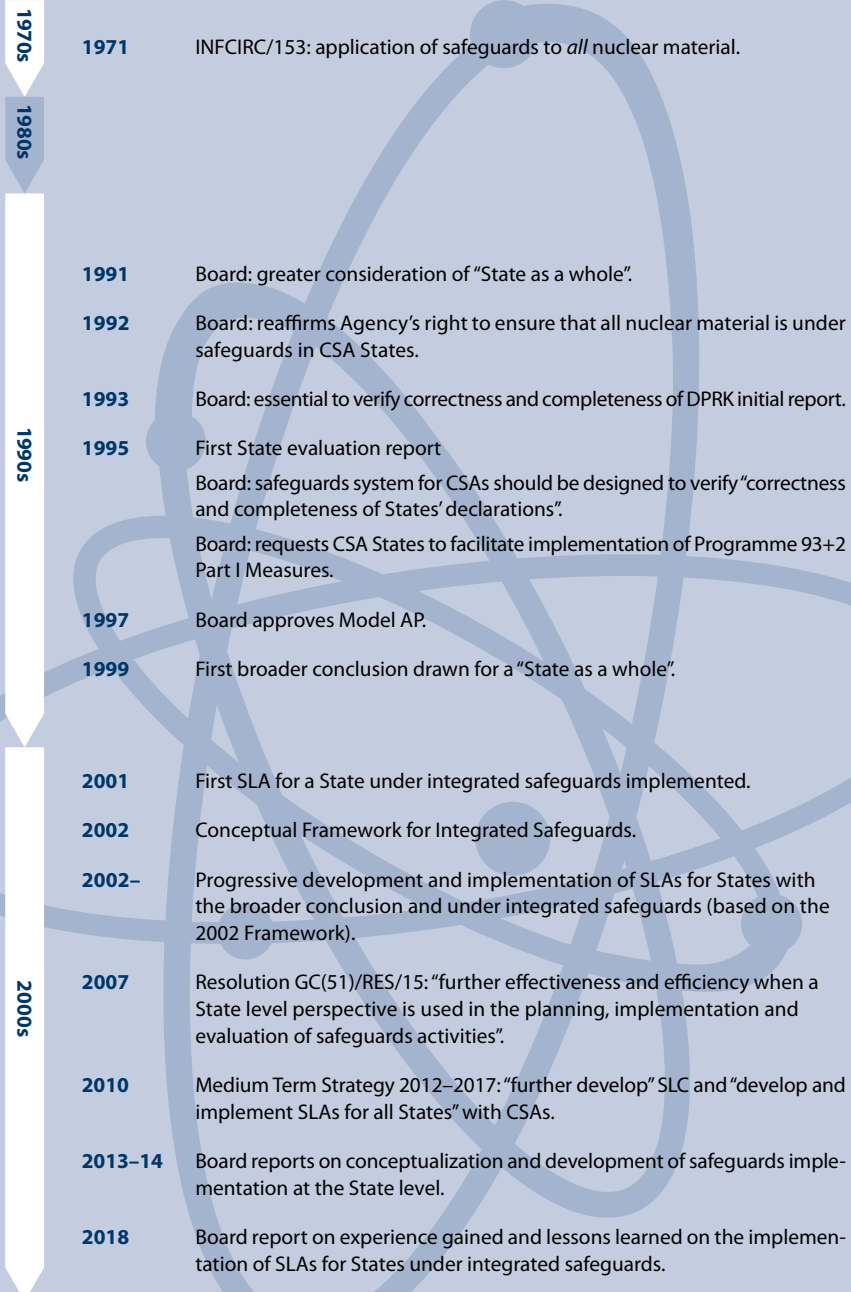
In the previous issue of this publication¹⁵ Craig Everton described developments surrounding the so-called State-level concept (SLC)¹⁶ for safeguards. Indeed, if there has been one constant strategic direction for safeguards in the past three decades, it has been the development and implementation of safeguards at the level of the State as a whole. Long gone are the days when safeguards conclusions used to be reported in a generic manner, covering all nuclear material placed under safeguards anywhere in the world.¹⁷ Indeed, the types of conclusions drawn today are reported by States.¹⁸

The move towards State-level safeguards started following some important lessons learned from the discovery of undeclared nuclear material and activities in Iraq and North Korea in the early 1990s. As is well known, these led to important steps, such as the development and adoption of a new legal instrument, the additional protocol (AP), to strengthen safeguards. This in turn led to the development and implementation of the so-called ‘integrated safeguards’; i.e. the integration of the measures under a State’s comprehensive safeguards agreement (CSA) and AP under a State-level safeguards approach (SLA) – which can be considered as the first form of State-level safeguards.

It is perhaps this long history (see figure 1) and the association with the lessons learned regarding undeclared nuclear material and activities that partly explain some of the more recent challenges in communicating and ensuring all States’ understanding of the concept. One contributing factor has to do with the misunderstanding regarding the IAEA’s legal authorities to verify the correctness and completeness of non-nuclear-weapon States’ declarations, both of which the IAEA has *always* had the right and obligation to do under comprehensive safeguards agreements (CSAs) – with or without the additional protocol which provides the Agency with more *measures* for the detection of undeclared nuclear material and activities (i.e. the completeness), and to draw the broader conclusion that all nuclear material remained in peaceful activities. Somewhat worryingly, this misconception has been resurfacing recently.

Another factor has been the suspicion that the SLC, which in practice is implemented through SLAs, would be used as a ‘backdoor’ to implement AP measures for States that have not brought an AP into force – which the IAEA has clearly stated it certainly is not. Another (related) factor contributing to confusion may have to do with the term ‘State-level’ that some associate with referring to applying safeguards to the State’s entire territory. While true for CSA States,¹⁹ this does not apply to the nuclear weapon States (NWS) with voluntary offer agreements (VOAs) nor States with item-specific safeguards agreements, where the coverage of their agreement is more limited.

Figure 1 Key developments in safeguards implementation for the 'State as a whole'²⁰



Indeed, the IAEA defines an SLA as ‘a customized approach to implementing safeguards for an individual State’, which is implemented strictly within the scope of that State’s safeguards agreement, whatever type it is.

Implementing State-level safeguards remains the IAEA’s conceptual strategic direction. This has been stated, and progress made reported, in various IAEA planning and reporting documents throughout many years, such as the IAEA’s Medium Term Strategy (MTS) 2012-2017²¹ and MTS 2018-2023, annual Safeguards Implementation Reports (SIRs) and reports to the General Conference on the implementation of the safeguards resolution.²² By mid-2019, SLAs had been developed for 130 States with CSAs (which hold 97% of all nuclear material under IAEA safeguards in States with CSAs) as well as for one nuclear weapon State with a VOA.²³

Advancing and implementing State-level safeguards has been no small task, as it has required changes in safeguards processes and procedures, tools and staff competences – learning along the way. Adjustments are still underway to take into account the experience gained and lessons learned²⁴ in implementing SLAs in States under integrated safeguards, and to consolidate, calibrate and advance the implementation of State-level safeguards in all aspects.²⁵ The longer term aim is to develop and implement SLAs for all States with safeguards agreements.²⁶

The impact of globalization

While work towards the full consolidation and implementation of State-level safeguards continues, it is important not to lose sight of the possible conceptual challenges some of the recent and emerging developments may bring. One such trend has been the deepening global integration and growing international trade – or globalization. As some non-proliferation experts have pointed out, the globalization of the supply chain of sensitive items, and the ease at which goods travel across international borders can add to the challenge of detecting (at least early) violations of safeguards obligations.²⁷ Also, the internet can facilitate the spread of sensitive nuclear know how. While the IAEA’s conclusions about States’ adherence to their safeguards obligations will continue to be drawn for an individual State, more thought should be given as to how to keep up and address challenges arising from growing cross-border nuclear cooperation, spread of sensitive know-how and other globalization related factors.

One obvious answer is the universalisation of the AP that – besides providing the IAEA with important additional measures for the detection of undeclared nuclear material and activities – requires States to provide the IAEA with useful information on certain nuclear-related manufacturing activities and exports and imports of items especially designed or prepared for nuclear use.²⁸ While the AP’s importance is often

recalled in the past context of lessons learned from the discovery of undeclared nuclear material and activities in Iraq and North Korea in the early 1990s, its strategic importance should be better understood in *today's and the future* context of providing necessary transparency about nuclear transactions and programmes, thereby laying the necessary foundation for nuclear cooperation. Indeed, already some 20 years ago the 2000 NPT Review Conference recognized AP measures “as an integral part of IAEA’s safeguards system”.²⁹ As of June 2019, 49 States had yet to bring into force APs to their safeguards agreements.³⁰ Moreover, the AP’s Annex II, which contains the list of specified equipment and non-nuclear material for the reporting of exports and imports, is in need of updating to provide greater coverage of items based on today’s technologies, as have been pointed out by a number of experts.

Another solution is for States to provide to the IAEA on a voluntary basis (as some States already do) information on export denials and other unfulfilled nuclear procurement requests that can provide vital clues to early detection of indications of undeclared nuclear material and activities. Indeed, the drafters of the IAEA Statute already recognized that Member States “should make available such information as would, in the judgment of the member, be helpful to the Agency”.³¹ The voluntary provision of trade related information was encouraged already in 2005³² but the number of States doing so is still limited. Information on denied exports and unfulfilled procurement requests help the IAEA trace covert procurement and potential indicators of undeclared nuclear activities, thereby providing early warning of potential nuclear proliferation.³³

While growing nuclear cooperation and trade represent the ‘known knowns’ of globalization, there are also other aspects of globalization. The increasingly free movement of goods across borders, when coupled with the increased risk of the spread of sensitive know-how through the ‘dark web’ could prove a combustible mix—or, in the words Singapore’s Peter Ho, the “black elephant”³⁴ of nuclear proliferation. Crime is increasingly moving into cyberspace, so those wanting to proliferate are also likely to turn to the dark web in search of sensitive know-how, equipment and materials. In such a world, the lines between nuclear safeguards and nuclear security—as known today—will be increasingly blurred, requiring a more holistic approach to deterring and detecting nuclear proliferation, by State and non-State actors.

The challenge of emerging technologies

Other developments requiring attention are emerging technologies, as identified by the Department’s 2017 ETW. In the nuclear field, potential verification challenges will result from the development of new and more diverse types of reactors, including

small modular reactors, some of which may be particularly challenging to safeguard. Transportable nuclear power plants (e.g. barges) would present entirely new safeguards challenges, given the potentially difficult-to-access materials in remote locations never reached by the IAEA before.

Challenges are likely to emerge also from technology fields not directly relevant to safeguards. For example, the 2017 ETW heard from experts of the potential of additive manufacturing to lower technical barriers to nuclear proliferation if high-strength structures, such as centrifuge parts or advanced materials (e.g. diffusion barriers), can be manufactured indigenously using additive manufacturing techniques. While the associated proliferation risks at present are still considered limited, additive manufacturing could pose challenges in the future as the technology matures and if the associated technologies remain lightly controlled.³⁵ The IAEA will need to keep a close eye on any developments that could alter the assumptions underpinning its acquisition path analysis, which in turn informs the development of the technical objectives that guide the IAEA's verification activities in the field and at headquarters.³⁶

It was also recognized at the 2017 ETW that commercial laser systems are becoming increasingly compact, affordable, powerful, easy to operate and energy efficient. When applied to enrichment, they could pose proliferation risks due to their dual-use nature and widely available expertise, as well the potentially lower cost, space and energy requirements when compared to centrifuge technologies.

Moreover, the 2017 ETW recognized that the use of electronic devices and collection of data from them can reduce privacy and increase transparency. It was pointed out that in today's world it is much harder to hide something than discover it – something that would appear to benefit the IAEA. However, at the same time, the advancement of, for example, face recognition could pose challenges to the IAEA inspectors' ability to conduct safeguards activities at a short-notice.

Moreover, technological advancements pose information security challenges: the IAEA needs to continue ensuring that the data it receives is valid, so that it can be trusted and not be altered. Block chain technology was highlighted as one solution and one which can also help build transparency. In the recent Symposium, the potential of blockchain technology was further explored, with one author concluding that the technology could have potentially "far-reaching value for the way safeguards information is collected, processed and analysed", while also acknowledging that the biggest hurdle to its adoption will be acceptance by States.³⁷

In short, while continuing to implement State-level safeguards, the conceptual side of safeguards will need to take into account emerging trends and the associated challenges, opportunities and threats, and be able to evolve with such developments through new or adjusted safeguards concepts, approaches and methodologies.

Technical capabilities

Besides challenges, technological developments offer valuable opportunities for the way IAEA conducts its verification work. Keeping up with technological developments is in fact a legal requirement: INFCIRC/153, on which CSAs are based, states that “in implementing safeguards. . .the Agency shall take full account of technological developments in the field of safeguards”.³⁸ Given the ever faster pace of technological change, it is also a matter for organizational success and even survival, for any organization.

In recent years important technology modernization projects have been undertaken in the Department. In 2015, for example, the IAEA completed the so-called ‘Enhancing the capability of the Safeguards Analytical Services’ (ECAS) project, which helped ensure that the Agency is able to conduct sample analysis in safe, secure and modern facilities. In May 2018, the Department concluded an IT modernization project called ‘MOSAIC’ – a major overhaul of the software applications that serve the planning, implementation and evaluation of safeguards activities in the field and at headquarters.³⁹ Preceding this, the Department had moved from a mainframe computer based IT system to one that is server based. The MOSAIC project has provided staff with not only more modern and user-friendly applications, but also laid the foundation for a more integrated manner in which to manage all safeguards-relevant information.

The Department’s foresight activities indicate that such integration is becoming ever more important, given the volume of safeguards data from the field and other sources. In 2018, the Agency received 1,000,000 nuclear material accounting entries in reports submitted by States, acquired 936 commercial satellite images, collected 481 environmental samples and 487 nuclear material samples, remotely monitored 137 facilities and maintained 1586 surveillance cameras.⁴⁰ Safeguards-relevant information available through open sources is growing at an even faster rate. As identified at the ETW in 2017, the world is undergoing an explosion in the amount, speed and variety of available information – a big data revolution. The key challenge will be to identify and process what is safeguards-relevant, detect relevant signals from the information ‘noise’, and leverage data ‘smartly’. Artificial intelligence and machine learning were identified as ways to enable IAEA analysts to focus on value-added tasks, through automation and by reducing repetitive tasks. Data visualization in turn could help analysts to better understand data, see patterns and recognize anomalies, and clearly present and communicate information.

The workshop recognized that the modalities and mechanisms for collecting, integrating, analysing and processing information are constantly being refined and improved. Over the years, the IAEA has already taken steps to better cope with ‘big

data'. The collection and processing of open source information is increasingly automated, taking advantage of off-the-shelf commercial search engines and machine learning.⁴¹ Software has also been introduced to enable analysts and inspectors to make connections and visually link different data and information, thereby supporting the evaluation of all safeguards-relevant information. All this helps facilitate comprehensive and collaborative information analysis which is at the heart of the evaluation activities to assess a State's compliance with its safeguards obligations.

The ETW recognized that important potential may lie in the integration of multiple data streams, technologies and methods. In that regard, one rising challenge and/or perhaps also opportunity is that information increasingly comes in non-text based formats. The IAEA has launched a project to better exploit multimedia information (e.g. images, videos) to complement other information in the IAEA's databases.⁴² It will be important that the IAEA have the capability to use these new sources of openly available information to the fullest extent. The IAEA also has deployed a Geo-based Data Integration (GDI) platform for information integration, analysis, and safeguards activity planning involving geospatially-related information used for nuclear verification. The GDI platform provides a working platform for accessing IAEA databases and open source multimedia information, such as photographs, video footage, site map and floorplans, and process flow sheets related to the nuclear fuel cycle activities.⁴³

Workforce competencies

The Department's foresight activities have also pointed to possible additional needs in workforce competencies. Some years ago, the Department's scenarios work identified the growing strategic importance of information in the future – as well as the risks when information is misinterpreted, misrepresented or even falsified. Understanding this challenge is crucial for a verification organization like the IAEA. It also has implications for the kinds of competencies needed.

The ETW 2017 concluded that visual literacy is key to avoiding misrepresenting and misunderstanding facts. It identified that the main prerequisite for IAEA analysts to use visualization tools is to acquire a basic level of visual literacy, i.e. knowledge of good visualization practices combined with a sound critical sense to avoid accidentally misrepresenting facts. Some early research by Sandia Laboratories pointed out that the growing availability of potentially safeguards-relevant information is not necessarily helpful as it can result in information overload. Experiments conducted by Sandia Laboratories indicate that different visualizations have an impact on the timeliness of task completion.⁴⁴

In an age where data and information can also be digitally manipulated, it will also be important that the IAEA have the capabilities to deter and detect such acts, be it through critically evaluating information or having information forensics technologies and competencies. Indeed, determining whether data or information is authentic has long been a key step before it can be assessed for safeguards relevance and incorporated into the State evaluating process. However, doing so could become increasingly challenging when methods to digitally manipulate data become increasingly sophisticated.

The 2017 ETW recognized that while emerging technologies will provide great opportunities they would not replace inspectors or analysts. With the advancement of State-level safeguards, the role of the so-called State evaluation groups (SEGs) has grown in the last decade. Such groups have been set up for each State with a safeguards agreement. These consist of staff responsible for developing the SLA for their State, evaluating all the safeguards relevant information for that State, including the results of verification activities, and for annually recommending to IAEA leadership safeguards conclusions to be drawn by the IAEA for that State.

In recent years, the IAEA has paid more attention to the importance of collaborative work of SEGs. Ideally, such groups are made of interdisciplinary experts from diverse backgrounds and with the necessary nuclear fuel cycle expertise and good analytical skills. Indeed, external research has shown that ethnically, racially and gender diverse groups make better decisions and lead to better organizational performance. Diverse teams have been found more likely to constantly re-examine facts and remain objective—something that is very important for an organization like the IAEA that evaluates compliance on a continual basis. Breaking up homogeneity also increases awareness of human bias.⁴⁵

The IAEA encounters similar challenges to other organizations in terms of human performance in information processing (decision making, judgement and perception). Therefore, the role of cognitive or behavioural science should be further emphasized, to sensitize staff members to implicit biases that all humans inherently have. More specifically, this could mean (1) introducing proven concepts from behavioural science and an appreciation of their purpose and value (e.g. recognizing human disposition to see patterns in data, even where none statistically exist); (2) incorporating aspects of cognitive/behavioural science into training for SEGs and managers for greater awareness of their impact and for more effective learning (e.g. different learning styles and ways of understanding information); and (3) further integrating analytical techniques into the State evaluation process and associated guidance. Doing so could enable better awareness of how cognitive biases and assumptions can impact decision-making. Moreover, incorporating behavioural science through the greater application

of analytical techniques could strengthen the State evaluation process by enhancing analytical rigour and mitigating the effects of cognitive bias.

Partnerships

In 2015, the IAEA issued new guidelines on partnerships and resources mobilization. Recently, enhancing partnerships has become a key focus for the Agency. At the corporate level, the IAEA Mid-Term Strategy 2018-2023 considers partnerships as a ‘strategic enabler’ and directs the IAEA to “intensify work to establish and facilitate new partnerships with all relevant partners and traditional and non-traditional donors, including from the private sector. . .”⁴⁶

The Department’s Strategic Plan also contains an objective to ‘Leverage and establish partnerships’. Its earlier scenario work had recognized that while the IAEA has a unique mandate, new actors (empowered by new technologies and providing significant services and resources) are becoming increasingly active in global affairs and are emerging alongside, or as potential competitors to, intergovernmental organizations. One such example is the Bill and Melinda Gates Foundation, which is a considerable player in the health sector. While the same has not (yet) happened in the international security realm, funds provided for the IAEA’s Nuclear Fuel Bank by the US-based Nuclear Threat Initiative, which provided some €50 million for the establishment of the Nuclear Fuel Bank, demonstrates that no field is immune from the emergence of new actors.

Strengthening partnerships is also a strategic necessity for the Department. Given the already widening gap between the safeguards workload and budget, regular budget funds are being prioritized to conduct essential (and legally obligated) core safeguards activities, leaving less funds available for ‘non-mandatory’ developmental activities. Therefore, since 2019 the Department has been exploring how to further advance partnerships, especially with actors not customarily working in the field of safeguards. To this end, advice was sought from the Director General’s Safeguards Advisory Group on Safeguards Implementation (SAGSI) in 2019.

Partnerships were also a major theme at the IAEA’s latest international symposium on safeguards. This is a unique event of its kind, held every four years, that brings together the global safeguards community to address safeguards implementation issues, showcase research and share ideas for advancing safeguards. For the IAEA, it represents an occasion to draw on the collective perspectives, creativity and dedication of the wider community to help address its safeguards needs. The most recent Symposium was held in November 2018 under the theme of ‘Building Future Safeguards Capabilities’. The Symposium built on the 2017 ETW, exploring some of its

themes, such as leveraging artificial intelligence and distributed ledger technologies for safeguards benefit.

The 2018 Symposium had three objectives: to innovate, partner and improve. The role of partnerships, besides being an objective itself, was a major theme at the 2018 Symposium. Partnerships were explored in the sense of advancing safeguards capabilities through R&D; cooperation between the IAEA Secretariat and State/regional safeguards authorities in the daily implementation of safeguards; as well as in new areas (e.g. communication), and with partners not traditional to safeguards (e.g. communication professionals).

Non-traditional partnerships

The IAEA's report of the Symposium offers seven 'sets of ideas' for action for the safeguards community as a whole.⁴⁷ One of these is to "expand and leverage non-traditional partnerships". Over the last two decades, the Department has benefited tremendously from 21 Member State Support Programmes (MSSPs) that have provided the coordinated provision of expertise, technology and other extrabudgetary support. However, its partnerships with stakeholders other than States have been more limited and ad hoc. The Symposium showed that there is a clear willingness on the part of the broader safeguards and non-proliferation community to support the IAEA's verification mission, demonstrating that not all potential has yet been tapped.

The Symposium report concludes that the IAEA should gain additional insight into the wealth of opportunities that might be seized from engaging with a broader set of stakeholders. Closer engagement with the wider technical, social and academic communities, as well as with new non-traditional sectors, could provide opportunities to strengthen the political, financial and technical support for the safeguards mission. The report suggests that the IAEA explore means of expanding and leveraging non-traditional expertise and partnerships, including by: (1) developing means for broadening engagement with non-traditional partners, drawing upon the IAEA's experience and best practices from other relevant sectors; (2) developing and setting up a framework for mobilizing and directing support from a range of non-traditional partners towards the IAEA's strategic priorities and needs; and (3) further developing crowdsourcing pilot outreach projects, such as the recent IAEA robotics challenge, to mobilize expertise and research that address specific IAEA needs.

Indeed, the IAEA 2017 Robotics Challenge to develop robotic systems to help with inspections demonstrated the benefits of opening up to 'crowd or expert sourcing' for safeguards benefit.⁴⁸ In 2016, the Department concluded its first crowdsourcing exercise which led to the identification of methods applicable to enhancing the quality of the Cerenkov viewing device, which is used to verify spent fuel after its removal

from the reactor core and transfer to underwater storage.⁴⁹ At the 2018 Symposium, one participant proposed the IAEA to further engage with ideas from the so-called ‘maker movement’, suggesting that such engagement “could generate new impulses for research and development and give access to a broader community of experts”.⁵⁰

Partnering with the industry on ‘safeguards-by-design’

Partnership with the nuclear industry should also be strengthened. The supplier base of nuclear reactors and technologies is diversifying, adding to the importance of ensuring that both suppliers and importers of nuclear technologies are fully aware of IAEA safeguards requirements – just like safety requirements – and incorporate them already at the early design phases into their nuclear projects (i.e. ‘safeguards by design’), instead of retrofitting them at a later stage.

Indeed, this will be of great strategic importance, not least to accommodate the IAEA’s safeguards work, avoid unnecessary costs, and reduce the burden both on the IAEA and the nuclear facility operators. Therefore, another idea for action resulting from the 2018 Symposium was to “proactively engage industry to ensure the early incorporation of safeguards requirements into nuclear projects”.⁵¹ Advancing such ‘safeguards-by-design’ is also an objective in the Department’s Strategic Plan. Accelerating and strengthening interactions with the industry is of increasing strategic importance in light of the growing number of actors entering the nuclear scene. It would be an investment that would pay off dividends for decades to come.

Conclusions

As can be seen from the IAEA’s history, the field of nuclear verification has always evolved according to the changing operating environment, associated challenges and opportunities, and stakeholders’ expectations. More often than not, some of the biggest changes in safeguards have come about in response to – rather in anticipation of – developments of significant impact, such as the discovery of undeclared nuclear material and activities post-facto. A more anticipatory and proactive stance is needed. This is now being recognized by the CEB’s coordination committee which is promoting strategic foresight across the UN system. This is ever more important, given the faster pace of change, growing complexity and unpredictability. The future is unlikely to evolve in a linear way, so agility and flexibility will be needed.

The foresight and strategic planning activities of the IAEA Department of Safeguards enable it to take a more anticipatory posture and better address future challenges and seize opportunities. The trends and development identified will have implications for safeguards concepts, approaches, methodologies and technologies

that need to be acted upon. They will also require new competencies and strengthened partnerships. Indeed, although the IAEA is often portrayed as the ‘nuclear watchdog’, safeguards is a cooperative effort by nature. To this end, as recognized by the NPT Review Conference, for continued success, the IAEA needs States’ political, technical and financial support. In rendering that support, States should not only consider the past and present, but also the future. In the words of Friedrich Nietzsche: “The future influences the present just as much as the past”. An anticipatory and strong IAEA is in the interest of all NPT States and the international community at large.

Endnotes

- 1 The views expressed in this article do not reflect the views of the IAEA or its Member States, but are those of the author only.
- 2 Status of World Nuclear Forces, Federation of American Scientists. See: <https://fas.org/issues/nuclear-weapons/status-world-nuclear-forces/>
- 3 High-Level Committee on Programmes of the Chief Executive Board for Coordination (CEB), <<https://www.unsystem.org/content/ceb>>.
- 4 Chief Executives Board for Coordination, Report of the High-Level Committee on Programmes at its thirty-six session, CEB/2018/6, 26 November 2018, <<https://www.unsceb.org/CEBPublicFiles/CEB-2018-6-HLCP36.pdf>>.
- 5 *Foresight Manual: Empowering Futures for the 2030 Agenda*, UNDP’s Global Centre for Public Service Excellence (GCPSE), January 2018 defines foresight as a “distinct process of monitoring prospective oncoming events, analyzing potential implications, stimulating alternative courses of action, asking unasked questions, and issuing timely warning”.
- 6 The Strategic Plan is an overarching plan setting directions with regard to (1) the implementation of the core verification activities and development of supporting technical capabilities; (2) sustaining the safeguards workforce and managing critical institutional knowledge; (3) cooperating and communicating with stakeholders; and with regard to (4) enhancing the Department’s organizational capacity and preparedness.
- 7 The R&D Plan identifies and communicates to stakeholders the Department’s R&D needs; i.e. activities designed to advance and sustain its capabilities and for which it needs external support. See IAEA, Research and Development Plan: Enhancing Capabilities for Nuclear Verification, STR-385, January 2018, <<https://www.iaea.org/sites/default/files/18/09/sg-str-385-research-and-development-plan.pdf>>.
- 8 The D&IS Programme is a shorter term (2 year) programme detailing the scope of the Department’s development and implementation activities through a series of more specialized projects. See IAEA, Development and Implementation Support Programme for Nuclear Verification 2018-2019, STR-386, January 2018, <<https://www.iaea.org/sites/default/files/18/09/sg-str-386-development-support-programme.pdf>>.
- 9 The Agency’s 6-year range Medium Term Strategy and the Agency’s 2-year Programme and Budget. The IAEA’s Medium Term Strategy 2018-2023 is available at: <<https://www.iaea.org/about/overview/medium-term-strategy>>.
- 10 This is addressed in more depth later in this article.
- 11 See for example the IAEA Medium Term Strategy 2018-2023 which is available at: <<https://www.iaea.org/about/overview/medium-term-strategy>>.

- 12 IAEA, Emerging Technologies Workshop: Trends and Implications for Safeguards, Workshop Report, 13-16 February 2017, IAEA, Vienna, <<https://www.iaea.org/sites/default/files/18/09/emerging-technologies-130217.pdf>>.
- 13 The Department is holding another ETW in 2020.
- 14 IAEA, 'Report, Symposium on International Safeguards: Building Future Safeguards Capabilities, 5-8 November 2018', STR-392, July 2019, <<https://www.iaea.org/sites/default/files/19/07/cn-267-symposium-report.pdf>>.
- 15 *Verification & Implementation: A biennial collection of analysis on international agreements for security and development, 2015*, VERTIC, 2015, <<http://www.vertic.org/media/assets/Publications/Verification%20and%20Implementation%202015.pdf>>.
- 16 The State-level concept refers to the general notion of implementing safeguards in a manner that considers a State's nuclear and nuclear-related activities and capabilities as a whole, within the scope of the State's safeguards agreement.
- 17 The last Safeguards Implementation Report to do so was for 2002. The Safeguards Statement for 2002 read: "In fulfilling the safeguards obligations of the Agency in 2002, the Secretariat – having evaluated all the information acquired in implementing safeguards agreements and all other information available to the Agency – found no indication of the diversion of nuclear material placed under safeguards. On this basis, the Secretariat concluded that, with the exception of the Democratic Republic of Korea (DPRK), the nuclear material and other items placed under safeguards remained in peaceful nuclear activities or were otherwise adequately accounted for." From 2003 onwards, safeguards conclusions were reported per groups of States, based on the type of safeguards agreement and protocols thereto.
- 18 See for example, the 'Safeguards Statement 2018 - Statement, Background' available at: <<https://www.iaea.org/sites/default/files/19/06/statement-sir-2018.pdf>>.
- 19 INFCIRC/153, on which CSAs are based, refers to "...all source or fissionable material... within its territory, under its jurisdiction or carried out under its control anywhere. . .".
- 20 Adopted from *Supplementary Document to the Report on The Conceptualization and Development of Safeguards Implementation at the State Level (GOV/2013/38)*, 13 August 2014, (GOV/2014/41).
- 21 MTS 2012-2017 called for the IAEA to "...develop and implement State-level approaches for all States with [CSAs] in force. . .". The MTS 2018-2023 calls for the IAEA "...to continue to develop and implement safeguards in the context of the State-level concept within the scope of the State's safeguards agreement. . .".
- 22 See for example, the latest IAEA General Conference report, Strengthening the Effectiveness and Improving the Efficiency of Agency Safeguards, Report by the Acting Director General, GC(63)/13, 31 July 2019, <<https://www.iaea.org/sites/default/files/gc/gc63-13.pdf>>.
- 23 Ibid.
- 24 These were described in a report to the IAEA's Board of Governors in July 2018, entitled Implementation of State-level Safeguards Approaches for States under Integrated Safeguards – Experience Gained and Lessons Learned (GOV/2018/20).
- 25 See the latest developments described in 'Implementation of Safeguards at the State level – Developments Based on Recent Experience' by Massimo Aparo and Therese Renis available (behind pay wall) at <https://www.inmm.org/INMM/media/Archives/Annual%20Meeting%20Proceedings/2019/a232_1.pdf>.
- 26 *Supplementary Document to the Report on The Conceptualization and Development of Safeguards Implementation at the State Level (GOV/2013/38)*, 13 August 2014, (GOV/2014/41).
- 27 See for example 'Emergence of Dual-use Technologies and Global Supply Chain Compliance', F. Sevini, C. Charatsis, Z. Arnes Nouveau, E. Stringa, J. Barrero, A.S. Lequarre, P. Colpo, D. Gilliland, W. Janssens, and Q. Michel, available at: <https://media.superevent.com/documents/20181109/8f69660c6877a-27468249829713be243/id324-sevini_paper.pdf>.

- 28 Annex II of the Model Additional Protocol (INFCIRC/540), on which APs are based, contains a list of specified equipment and non-nuclear material for the reporting of exports and imports according to Article 2.A.(ix).
- 29 Paragraph 20 of the Final Document of the 2000 Review Conference of the Parties to the Treaty on the Non-proliferation of Nuclear Weapons.
- 30 See Op. Cit., 'Strengthening the Effectiveness and Improving the Efficiency of Agency Safeguards'.
- 31 Article VIII (Exchange of information) of the IAEA Statute, available at: <<https://www.iaea.org/about/overview/statute>>.
- 32 IAEA General Conference resolution GC(49)/RES.13.
- 33 See M. Ardhammar, J. Baute and M. Tarvainen, 'Responding to Verification Challenges Caused by Increasing Nuclear-Related Trade', IAEA, 6 November 2018, <<https://media.superevent.com/documents/20181107/80d86c178dbba297c705fa9c7ac54cee/id258-ardhammar.pdf>>.
- 34 "Peter Ho, Senior Advisor to Singapore's Centre for Strategic Futures, describes a black elephant as "a cross between a black swan and the proverbial elephant in the room" that goes ignored. The black elephant is a significant threat, risk or issue that is obvious to everyone (or the experts who give warnings), but no one wants to address or deal with it. When it becomes a full-blown problem with a high impact, people are surprised and act as if it were an unpredictable black swan event." From 'Future Beasts And Where to Find Them', 7 Oct. 2017, <<https://www.psd.gov.sg/challenge/ideas/feature/future-beasts-and-where-to-find-them>>.
- 35 See G. Christopher, 'Additive Manufacturing: The Future for Safeguards', IAEA International Safeguards Symposium, 5-9 November 2018, <https://media.superevent.com/documents/20181030/cd-03b797aa994805942475c96c6ef3b8/id143_christopher_paper.pdf>.
- 36 Acquisition path analysis is a structured method used to analyse the plausible paths by which, from a technical point of view, nuclear material suitable for use in a nuclear weapon or other nuclear explosive device could be acquired. Each path is made up of the steps that would be required to acquire nuclear material and process it into a form suitable for use in a nuclear weapon or other nuclear explosive device. Acquisition path analysis is used to establish technical objectives for a State with a CSA. An acquisition path analysis does not involve judgements about a State's intention to pursue any such path.
- 37 See C. Vestergaard, 'Blockchain and Safeguards Information Management: The Potential for Distributed Ledger Technologies', IAEA International Safeguards Symposium, 5-9 November 2018, <https://media.superevent.com/documents/20181031/8071185be476b92fa90a7cb2c59311a9/ido41_vestergaard_paper.pdf>.
- 38 INFCIRC/153(Corrected).
- 39 MOSAIC stands for Modernization of Safeguards Information Technology.
- 40 See 'IAEA Safeguards in 2018: Verifying the peaceful use of nuclear material', available at: <<https://www.iaea.org/sites/default/files/19/07/sg-implementation-2018.pdf>>.
- 41 See T. Skoeld, F. Courbon and K. Spence, 'OSIS 2.0: Optimizing Analyst-driven Automation of Open Source Information Collection and Processing for Safeguards State Evaluation', IAEA International Safeguards Symposium, 5-9 November 2018, <https://media.superevent.com/documents/20181030/oc98adb085f34db27ceaff2468a60b72/ido59_skoeld_paper.pdf>.
- 42 Ibid
- 43 See M. Barletta, A. Yeoh, A. Marques-Patricio, N. Sumarakov, S. Robb, M. Fowler, M. Carey, 'Geo-based Data Integration (GDI) in the IAEA Department of Safeguards', IAEA International Safeguards Symposium, 7 November 2018, <https://media.superevent.com/documents/20181115/53d2627304d0575b3a7bc70f46559e15/id392_barletta_slides.pdf>.
- 44 See Z.N. Gastelum, L.E. Matzen, H.A. Smartt, M.C. Stites, 'Human Performance Testing for Cognitive Science-Informed Provision for International Nuclear Safeguards Inspectors', IAEA International

- Safeguards Symposium, 5-9 November 2018, <https://media.superevent.com/documents/20181103/ea41864df931f2061e3641f6ef811988/id115_gastelum_paper.pdf>.
- 45 D. Rock and H. Grant, 'Why Diverse Teams are Smarter', *Harvard Business Review*, 4 November 2016, <<https://hbr.org/2016/11/why-diverse-teams-are-smarter>>.
- 46 See IAEA, 'Medium-Term Strategy', <<http://www.iaea.org/about/overview/medium-term-strategy>>.
- 47 Op. Cit., IAEA, 'Report, Symposium on International Safeguards: Building Future Safeguards Capabilities'.
- 48 See K. Robertson, C. Everton and R. Stohr, A. Elfes, P. Flick, D. Finker, 'IAEA Robotics Challenge – Demonstrating Robots for Safeguards Inspections', IAEA-CN-267/215, <https://media.superevent.com/documents/20181030/d748927377729791b3cf7374d2ffd22c/id_215_robertson_paper.pdf>.
- 49 See Margot Dubertrand, 'Robotics in Nuclear Verification: Sparking Innovation Through Crowdsourcing', IAEA News Release, 19 September 2018, <<https://www.iaea.org/newscenter/news/robotics-in-nuclear-verification-sparking-innovation-through-crowdsourcing>>.
- 50 See M. Kütt, 'Building Safeguards Technologies Using Open Source Software and Hardware – Learning from the Maker Movement', IAEA International Safeguards Symposium, 5-9 November 2018, <https://media.superevent.com/documents/20181030/bede541c16d60851dfe0be9c612fc30b/ido18_kuett_paper.pdf>.
- 51 Op. Cit., IAEA, 'Report, Symposium on International Safeguards: Building Future Safeguards Capabilities'.

CHAPTER 2

The operationalization of Article VII of the Biological Weapons Convention: Efforts to enhance assistance capacities in response to deliberate bio-events

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Introduction

In his new Agenda for Disarmament, issued in May 2018, the Secretary-General of the United Nations, noted that ‘concerns regarding the increasing risk of biological weapons have continued to grow as developments in science and technology lower barriers for their acquisition, access and use, including by non-State actors’.²

The fact that the threat posed by biological weapons is not an abstract one, but falls within the realm of the possible, was highlighted, for example, in June 2018 when German authorities uncovered an alleged terrorist plot in Cologne involving the production of ricin. A terrorist suspect was found to have produced 84.3 milligrams of ricin and possessed 3,150 castor beans, from which ricin is produced, the vast majority of which he had purchased via the internet.³ This case demonstrates a continued interest by non-state actors in developing biological weapons. It also underscores the need for concerted efforts at the domestic, regional and international level to prepare for an effective response to biological weapons use either by terrorists and other criminal individuals or groups, or by states.

Many states have undertaken various measures to prepare for and respond to biological threats. International organizations with a mandate to provide assistance to states in case of a disease outbreak have also been considering the question of responding to a deliberate event and some have started to gear up for such an occurrence. However, capacities at the international level under the Biological Weapons Convention (BWC), which is the primary international instrument prohibiting biological weapons, are completely lacking. While Article VII of the Convention provides a tool for States Parties to request and receive assistance in case of use of biological weapons against them, the operationalization of this provision presents a number of major challenges, which this chapter sets out to describe.

In this context, the 2014-2015 Ebola Virus Disease (EVD) outbreak in West Africa, albeit of natural origin, served as a stark reminder of the potentially dramatic conse-

quences that could be caused through the deliberate release of biological agents by state or non-state actors. It also brought to light some major gaps that existed in response mechanisms and coordination at the national, regional and international levels. Not least in light of these developments, there has been a renewed interest over the last few years by States Parties to enhance the international community's assistance and response capacities under the BWC.

This article aims to describe the issues raised by Article VII and its (lack of) operationalization, as well as some of the current efforts undertaken to strengthen this key provision of the Convention. First, it provides a brief overview of the negotiating history of Article VII, and the relevant understandings and agreements reached by the States Parties in the context of the Convention's review process. Second, it highlights some of the complexities relating to the interpretation and operationalization of Article VII of the Convention, including as regards the steps required to activate an assistance process according to this provision. Third, it describes ongoing initiatives to support and strengthen the operationalization of Article VII and the assistance, response and preparedness related aspects of the Convention with a particular focus on the current 2018-2020 intersessional programme. Finally, some concluding remarks are presented.

Article VII of the BWC

Article VII of the BWC states that 'Each State Party to this Convention undertakes to provide or support assistance, in accordance with the United Nations Charter, to any Party to the Convention which so requests, if the Security Council decides that such Party has been exposed to danger as a result of violation of the Convention'. This provision addresses assistance to States Parties that might have been exposed to danger as a result of a violation of the Convention's provisions, but provides no procedures for requesting assistance nor for the international community to deliver it. At the same time, Article VII has never been invoked, hence no relevant practice exists relating to its implementation.

Article VII was introduced in the first version of the draft convention text submitted by the United Kingdom to the Conference on Disarmament in 1969.⁴ It 'was restored to the draft Convention late in the negotiating process, in September 1971, having dropped out earlier, with a considerably diluted draft text. It was intended to add a further disincentive to contravention of the BWC and an expression of solidarity'.⁵ When the text of the Convention was adopted in 1971, Article VII was included as it currently appears, without undergoing extensive discussions.⁶

Since the entry into force of the Convention, States Parties have reached a number of additional understandings and agreements on Article VII at the eight Review Conferences held between 1980 and 2016. As Sims noted, '[f]or much of the Convention's history, Article VII was seldom discussed in the review process'. While the first signs of interest in this provision came during the Third Review Conference in 1991, it gradually received more consideration from the Sixth Review Conference in 2006. Article VII is now one of the parts of the BWC that receives the most attention.⁷ Indeed, Article VII was the only area on which States Parties could reach new additional understandings and agreements at the most recent Eighth Review Conference in 2016.

Such additional understandings and agreements relate broadly to the issues of implementation of this Article and of global health security. Topics addressed cover *inter alia*, aspects related to response preparedness both at national and international level; capacity building to strengthen the States Parties' ability to detect and respond to the use of biological weapons; the question of the provision of assistance pending a decision by the UN Security Council; the possible role of the UN in this context, and coordination with other international organizations; the required assistance measures and the need for procedures for the provision of assistance; the lessons deriving from the international response to the EVD outbreak in 2014-2015; and the relationship between health and security.⁸ Details about these issues will be provided in the following sections.

The increasing importance attached by States Parties to Article VII, moreover, is reflected in the selection of topics related to this provision for discussion at the various intersessional programmes. States Parties considered the topic of 'enhancing international capabilities for responding to, investigating and mitigating the effects of cases of alleged use of biological or toxin weapons or suspicious outbreaks of disease', at both the Meeting of Experts and the Meeting of States Parties in 2004.⁹ During the intersessional programme from 2007 to 2010, States Parties considered the topic of 'Provision of assistance and coordination with relevant organizations upon request by any State Party in the case of alleged use of biological or toxin weapons, including improving national capabilities for disease surveillance, detection and diagnosis and public health systems,' at the Meeting of Experts and the Meeting of States Parties in 2010.¹⁰ The topic of 'How to strengthen implementation of Article VII, including consideration of detailed procedures and mechanisms for the provision of assistance and cooperation of States Parties,' was then an agenda item at both the Meetings of Experts and the Meetings of States Parties in 2014 and 2015. Finally, in December 2017, the Meeting of States Parties decided to allocate annually a two-day Meeting of Experts (MX4), in the context of the intersessional programme (ISP) from 2018 to 2020, specifically to the issue of 'Assistance, Response and Preparedness'.¹¹

Challenges related to the operationalization of Article VII

As mentioned above, the text of Article VII is quite brief and leaves room for interpretation. With very limited negotiations on this provision, no clear indications emerge from the preparatory works either.¹² It is not the purpose here to give full account of all the interpretative complexities that arise from the Article or the status of the debate about them among States Parties and scholars.¹³ The following paragraphs aim to highlight some of those complexities and challenges, by taking a chronological approach based on the key steps of an Article VII assistance process, while referring to the indications emerging from the additional understanding and agreements that have been reached among States Parties in relevant areas.

Requirements for triggering Article VII

Some preliminary interpretative questions relate to the threshold for triggering assistance, which Article VII seems to set quite high. The undertaking by each State Party to provide or support assistance to a State Party that so requests pursuant to Article VII, only arises if two conditions are fulfilled: a State Party makes a request for assistance; and the UN Security Council decides that that State Party has been exposed to danger as a result of violation of the Convention.

What could be understood as a ‘violation of the Convention’ that could trigger the provisions of this Article? The BWC does not include an explicit ban on the use of biological weapons, instead making reference to the prohibition on use contained in the Protocol for the Prohibition of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare, signed at Geneva on 17 June 1925 (‘1925 Geneva Protocol’). While the prohibition on the use of biological weapons was included in the British draft text of 1969, it was omitted in the final text of the Convention based on the argument that such a prohibition ‘would distract from the authority of the Geneva Protocol as regards chemical warfare if the ban on use of bacteriological methods of warfare were repeated and extended *erga omnes* without doing the same simultaneously with regard to chemical warfare’.¹⁴ However, States Parties, most recently at the Eighth Review Conference, have reaffirmed that ‘the use by the States Parties, in any way and under any circumstances of microbial or other biological agents or toxins, that is not consistent with prophylactic, protective or other peaceful purposes, is effectively a violation of Article I’.¹⁵ At the same time, a violation of the Convention could be interpreted to refer also to other breaches, such as development or transfer of biological weapons.

Article VII, moreover, refers to the exposure to danger as a result of violation of the Convention, which in turn theoretically offers a range of scenarios broader than

actual use, in the presence of which a State Party might be entitled to request assistance. In principle, it could be argued that the wording ‘exposed to danger’ suggests that the scope of Article VII might go beyond actual use, apparently to include also situations short of use, such as a threat of use as a result of a violation of the Convention, which could pose a danger to humans, animals or plants. However, to date, no further details have been agreed upon by the States Parties with regard to interpreting this wording in Article VII.¹⁶

In terms of the perpetrator of a violation of the Convention, an additional understanding and agreement reached by States Parties at the Sixth Review Conference on the issue of implementation seems to support a broad interpretation that would see eligible Article VII assistance scenarios as to include use both by States Parties, as well as by other actors such as states not party (signatory or non-signatory states) or non-state actors. The Sixth Review Conference noted ‘the willingness of States Parties, where appropriate, to provide or support assistance to any State Party which so requests, when that State Party has been exposed to danger or damage as a result of the use of bacteriological (biological) agents and toxins as weapons *by anyone* other than a State Party’ (emphasis added).¹⁷ This language was reiterated thereafter until 2016, when the Eighth Review Conference seemingly inadvertently omitted it.¹⁸

Invoking Article VII

As mentioned above, the first step for Article VII to be triggered is that a State Party, believing itself to be the object of an attack with biological weapons, raises a request for assistance. While apparently a quite straightforward decision, this step would likely entail significant political implications and also present a set of complexities and uncertainties.¹⁹

Invoking Article VII would imply a serious allegation of use and would lead to the involvement of the UN Security Council, which could consider the situation under Chapter VII of the UN Charter.²⁰ Triggering this provision would therefore be a highly political decision with major implications that would need to be considered by the requesting State Party, and which would need to be well sustained. In light of these political sensitivities, diverging interpretations of this provision and the absence of clear procedures, it has been further argued that invoking Article VII may create political and legal uncertainties, which could in fact complicate the assistance process.²¹

However, while there are some drawbacks to triggering Article VII, there are also clear benefits. The decision to invoke Article VII could be seen as a strong political message by a State Party to the international community to uphold the norm against biological weapons. Such an approach would also ensure that the situation is referred

in the first place to all BWC States Parties, thus informing them of the alleged breach of the Convention and requesting assistance from them, while at the same time enabling them to take necessary decisions. In this context, Article VII could also be leveraged to encourage cooperation by States Parties and ensure that assistance is channelled where it is most needed. For example, to ensure that specific types or items of assistance going beyond typical humanitarian assistance (such as logistical assets often in the domain of the military) be provided, or to overcome operational hurdles.

Requesting assistance under the Convention could also act as an empowering element, focusing attention and resources on the response operation and encouraging cooperation and support by other States Parties. Parallels may be drawn with the decision to establish the UN Mission for Ebola Response (UNMEER) in September 2014, which ‘played a catalytic role in mobilizing the necessary financial and human resources to scale up the response’.²²

Submitting an Article VII request

The formulation of Article VII seems to indicate that a request for assistance needs to be brought to the attention of both the other States Parties whose assistance is sought, and the UN Security Council for the purpose of deciding whether the requesting State Party has been exposed to danger. However, no guidelines, templates or procedures exist for the submission of a request under Article VII.²³ Some proposals in this regard have been put forward in the context of the review process, which are mentioned below. However, no agreement on these proposals has been reached to date. Pending the adoption of an agreed procedure, choosing how to bring a request to the attention of other States Parties and the UN Security Council is the prerogative of the requesting State Party. However, some possible pathways are considered in the following paragraphs.

a) Bringing a request to the attention of the other States Parties

Through the Implementation Support Unit (ISU)

Although the ISU has not been formally mandated to receive requests pursuant to Article VII, it ‘forms the core of the Secretariat of meetings of the BWC’.²⁴ The Sixth Review Conference decided that the ISU, as part of its administrative support to the Conference, should facilitate ‘communication among States Parties and, upon request, with international organizations’ as well as serve ‘as a focal point for submission of information by and to States Parties related to the Convention’.²⁵ The question arises whether this could be sufficient basis for the ISU to be able to receive and simply distribute to all States Parties an Article VII request, and whether this would meet the States Parties’ understanding of the Unit’s role.

Through the depositary states

Unlike more recent treaties under which the UN Secretary-General is the depositary, the BWC in its Article XIV designates the governments of Russia, United Kingdom and the United States as its depositaries.²⁶ This article provides that the:

‘Depositary Governments shall promptly inform all signatory and acceding States of the date of each signature, the date of deposit of each instrument of ratification or of accession and the date of the entry into force of this Convention, and of the receipt of other notices’.

Pursuant to the 1961 Vienna Convention on the Law of Treaties, the functions of the depositary states include informing the parties to a treaty of acts, notifications and communications relating to it.²⁷ In the practice of the UN Treaty Section, the relevant Vienna Convention’s provisions are interpreted restrictively, to include exclusively acts, notifications and communications relating to ratifications, accessions, etc. However, within the review process, BWC States Parties have agreed that requests for the convening of a consultative meeting pursuant to Article V should be addressed to the depositaries, who should in turn immediately inform all States Parties of the request.²⁸ This was the procedure followed on the occasion of the 1997 formal consultative meeting of BWC States Parties convened at the request of Cuba.²⁹ Hence, States Parties might be inclined to conceive for the depositaries, and the depositaries might be willing to consider taking upon themselves, a similar function also for the purposes of Article VII. Indeed, this was suggested in a working paper submitted by Russia at MX4 in August 2018,³⁰ which understands this task as falling within the scope of Article XIV of the BWC.

Elected officer-holders

The BWC Rules of Procedure were originally drafted for Review Conferences but they also apply *mutatis mutandis* to the Meetings of States Parties during the intersessional periods.³¹ Receiving Article VII requests and forwarding them to all States Parties is not currently among the explicit tasks of the Chairperson of the Meetings of States Parties, nor does it seem to be generally a task for similar officers in multilateral conferences. States parties could in principle agree that this could be a task for the Chairperson of the current Meeting of States Parties to perform, with the support of the ISU. While relevant practice indicates that amendments to the rules have not been frequent, this option could possibly be considered by States Parties in their negotiations within the review process. On the other hand, this office rotates annually with, on occasion, time passing between an outgoing Chairperson leaving the office and the following one taking up his or her duties.

b) Bringing a request to the attention of the UN Security Council

As regards communications with the UN Security Council, a situation can be brought to the attention of the Council by any of its members.³² As the depositary states of the BWC are also permanent members of the UN Security Council, they could offer a direct channel to refer a request for assistance to the Council.

UN member states that are not members of the UN Security Council can also bring a situation (or dispute) to its attention if that situation is likely to endanger international peace and security. Alternatively, UN member states that are not members of the Security Council can also submit the request to the Secretary-General for forwarding to the Council. The Secretary-General may bring to the attention of the Council any matter which in his/her opinion may threaten the maintenance of international peace and security.³³ The Secretary-General is also obliged to immediately bring to the attention of all Council members all communications from *inter alia* states and organs of the UN concerning any matter for the Council's consideration.³⁴ However, the Secretary-General would routinely first engage in consultations with the requesting member state before referring a situation to the Security Council.

Non-members of the Security Council could also opt to bring an Article VII request to the attention of the UN General Assembly, if the question at stake relates to the maintenance of international peace and security. The General Assembly in turn may call the attention of the Security Council to the said question, if it requires action or if the Assembly determines that the question amounts to a situation likely to endanger international peace and security.³⁵ This option, however, might imply a lengthier process.

If the requesting state is not a member of the UN, it could bring to the attention of the Security Council (or the General Assembly) a dispute to which it is a party that is likely to endanger international peace and security.

c) Possible actions by the UN Security Council

As regards routine UN Security Council practices, following receipt of an Article VII request, the President of the Council is in principle required to call for a meeting. In current practice, however, he or she consults with the members of the Council. This implies that, absent an agreement among its members, an item brought to the Council's attention could either fail to be taken up, delayed pending further informal consultations on the issue, or taken up but adjourned with no further action. Therefore, the Security Council could reject the consideration of an item further to a procedural vote if it were to find a lack of clarity or information in the proposal for a meeting or determine that no dispute or threat to international peace and security exists. A well substantiated and serious allegation of the use of biological weapons would most probably not be rejected on these grounds. This underlines the importance of how a

request under Article VII is formulated. On the other hand, the Security Council might have the issue under consideration already before receiving an Article VII request. In addition, thematic agenda items can remain under consideration by the Security Council over a period of time. Non-proliferation of weapons of mass destruction has become a standing item on the Council's agenda.³⁶ This might simplify the process, as an Article VII request might be considered as falling within that existing agenda item and not as a new one.

Finally, it should be noted that the UN Security Council regularly convenes for emergency meetings, and that also could be done for an allegation of the use of biological weapons and an Article VII request, and would probably be the most likely occurrence.

If the members of the UN Security Council agree to take up consideration of an Article VII request, actions that the Council could take include either issuing a presidential statement or adopting a resolution. Not all meetings of the Security Council, however, result in an action. Article VII does not dictate how the Security Council should decide whether the requesting State Party has been exposed to danger as a result of a violation of the Convention. The Security Council could in principle decide to undertake an investigation into the allegation of use, or it could reach a decision simply based on the information provided by the requesting State Party. To that end, it could request additional information, either from the concerned State Party or from other sources. Either way, if the Security Council were to find that the concerned State Party has indeed been exposed to danger, an obligation would arise on the other BWC States Parties to provide assistance.

A decision by the Security Council pursuant to an Article VII request might be delayed for several reasons, chiefly due to the politically charged situation that an allegation of use of a biological weapon by a state, possibly against another state, would likely bear. Relevant practice shows that, on several occasions, the Security Council has been unable to take action on important matters, including in connection with WMD issues, for example and most recently in relation to the repeated use of chemical weapons in Syria.³⁷

Indeed, at the Third Review Conference in 1991, BWC States Parties began considering this scenario and wording was introduced accordingly, which has been confirmed and further developed at successive review conferences.³⁸ The Eighth Review Conference in 2016 agreed that 'should a request for assistance be made, it should be promptly considered and an appropriate response provided', while, 'in view of the humanitarian imperative', the Conference 'encourages States Parties in a position to do so to provide timely emergency assistance'.³⁹ Providing emergency assistance in such an (interim) situation would not be an 'undertaking', but a voluntary endeavour by States Parties with the required capability and resources.

d) Provision and coordination of assistance

There has long been an understanding that the negotiators of the BWC intended assistance pursuant to Article VII to be humanitarian in nature. Some indications as to what type of assistance would be provided to a requesting State Party have emerged in the additional understandings and agreements developed within the review process. The Eighth Review Conference mentioned three different types of assistance: emergency assistance; humanitarian assistance; and other assistance—without specifying what each of them might imply, and without providing a definition.⁴⁰

The Eighth Review Conference also listed some specific assistance items to ‘include expertise, information, protection, detection, decontamination, prophylactic and medical and other equipment that could be required to assist the States Parties. . .’, without clarifying in which of the three categories above they belong, but defining them as elements of the provisions of ‘appropriate assistance’.⁴¹

As mentioned above, there are no indications in the BWC as to the modalities for either requesting or delivering assistance pursuant to Article VII. States Parties have expressed the need for procedures for raising a request for assistance pursuant to Article VII and for this assistance to be delivered in coordination with international organizations.⁴² However, the Convention provides no mechanisms for coordinating this assistance—as compared, for example, to the mechanisms established pursuant to Article X of the Chemical Weapons Convention (CWC). States Parties’ offers of assistance could also be coordinated through other mechanisms, such as the World Health Organization (WHO) or, as regards humanitarian assistance, the well-established assistance coordination methodology and tools used by the UN Office for the Coordination of Humanitarian Affairs (OCHA).

In their negotiated common understandings on the interpretation of Article VII, BWC States Parties stated that they would look at the UN and other relevant international organizations for support in coordinating and delivering assistance. At the Eighth Review Conference, States Parties specified that the UN could play ‘an important role in coordinating, mobilizing and delivering the required support and assistance, when required and upon request of the concerned State Party’, with the help of States Parties, as well as the appropriate international organizations, ‘in accordance with their respective mandates’.⁴³ States Parties referred specifically to the WHO, the World Organisation for Animal Health (OIE), the Food and Agriculture Organization of the UN (FAO), and the International Plant Protection Convention (IPPC) (Secretariat) and noted that ‘the capacities and experiences of UN and relevant international organizations should be identified and used, within their mandates, when required and upon request of the concerned State Party’.⁴⁴ However, little attention has been given to a more detailed consideration of what this ‘important coordinating role’ by the UN could

entail, and which parts of it would be involved. Concurrently, while several UN offices, departments and funds would have a role in a disease outbreak, none of them, nor any other international organization has been mandated to ensure the overall coordination of a major deliberate disease outbreak.

Efforts to operationalize Article VII

Various efforts continue to be undertaken by States Parties, international organizations and civil society to strengthen Article VII, both as regards its interpretation, and as regards preparedness to respond to the deliberate use of disease at the national and international level, both in general, and possibly in connection to an Article VII request.

The 2018-2020 Intersessional Programme

As mentioned above, in December 2017, the Meeting of States Parties reached consensus on an Intersessional Programme (ISP) for the period from 2018 to 2020.⁴⁵ This programme includes the allocation annually of a two-day Meeting of Experts (MX4) specifically to address the issue of ‘Assistance, Response and Preparedness’ and to discuss, and promote common understanding and effective action on the following six topics:

- Practical challenges facing the implementation of Article VII, and possible solutions;
- A set of guidelines and formats to assist a State Party, if required, when submitting an application for assistance in the framework of Article VII;
- Procedures, including the establishment and use of the assistance database, to improve the prompt and efficient response without preconditions to a request of assistance by a State Party under Article VII, and coordination and cooperation among States Parties and with relevant international and regional organizations such as WHO, OIE and FAO, as appropriate;
- Examination of how the concept of mobile biomedical units might contribute to effective assistance, response and preparation with a view to enhancing implementation of the Convention;
- Exploration of approaches by which States Parties, individually or collectively, might contribute to the strengthening of international response capabilities for infectious disease outbreaks, whether natural or deliberate in origin; and
- Exploration of means to prepare for, respond to and render assistance in case of the possible hostile use of biological agents and toxins against agriculture, livestock as well as the natural environment.

The first MX4 during the 2018-2020 ISP was held on 14 and 15 August 2018, at the Palais des Nations in Geneva, Switzerland, under the chairmanship of Daniel Nord from Sweden.⁴⁶ The meeting saw constructive, in-depth expert discussions on all of the six topics. A total of 100 States Parties, two signatories, one state neither a party nor a signatory, three UN organizations, seven other international organizations and 26 non-governmental organizations, as well as research institutes, attended the meeting, which benefitted from a mix of different approaches that encouraged discussions. For example, States Parties delivered statements and technical briefings and took part in interactive discussions, while several also submitted working papers.⁴⁷ Additionally, NGOs were provided with the opportunity to take the floor and present key action points, which were also outlined in a joint NGO Position Paper.⁴⁸ The Chairperson of MX4 circulated a detailed summary of the discussions, which he drafted under his own responsibility and initiative.⁴⁹ The following paragraphs reflect the most salient issues that delegations considered during the meeting.

The meeting considered various national working papers.⁵⁰ The discussion first addressed practical challenges facing the implementation of Article VII, especially its lack of operationalization. While there was general support for the need to develop a framework or procedure to operationalize this provision, different views were expressed on its modalities. One general question in this connection related to 'whether, faced with the current lack of institutional and operational structures to give effect to Article VII, existing mechanisms and resources could be used without duplicating efforts, or whether a specific mechanism should be conceived in view of the nature of this Convention's provision'.⁵¹ Some delegations believed that, while having recourse to the current capabilities of relevant international organizations within their mandate, the Convention should also be endowed with its own unique mechanism including all aspects of Article VII. Other delegations argued that the existing 'tool-box' represented by the current capabilities of relevant international organizations should be referred to, while focusing on developing measures for invoking and operationalizing Article VII.

The complexities of determining whether an outbreak is deliberate or natural, and at which point in the phases of an outbreak a deliberate event would be recognized as such, were mentioned together with logistical challenges for assistance operators in a possibly non-secure and contaminated context. The importance of command and control was also noted as a critical capability in ensuring effective coordination of response efforts. A response to a disease outbreak, either natural or deliberate, is first and foremost a national endeavour. It was noted, therefore, that an effective response begins with ensuring the availability and maintenance of a national capability for effective surveillance, detection and diagnosis of, and response to, infectious disease outbreaks.

In this connection, various delegations shared information about their national capabilities, referred to measures and initiatives undertaken domestically to ensure an effective response, and stressed the importance of capacity building in this context. Many also referred to the experiences during the EVD outbreak in West Africa in 2014-2015. While of a natural origin, this outbreak brought to light some critical challenges in mounting an international response and helped identify some important lessons, which would also be valid for addressing a deliberate event.

In situations where the requirements for a response exceed one or more states' capabilities, other states and international organizations with a relevant mandate might support national response efforts upon request. In this connection, various delegations stressed, on the one hand, the importance of strengthening cooperation between the BWC and other relevant international organizations such as the WHO, OIE and FAO. On this issue, States Parties noted the fact that the new Agenda for Disarmament adopted by the UN Secretary-General mandated the UN Office of Disarmament Affairs (UNODA) to work with relevant UN entities for the purposes of 'developing a framework that ensures a coordinated international response to the use of biological weapons'.⁵² On the other hand, delegations stressed the need to connect, as appropriate, efforts within the BWC domain, with initiatives undertaken in contexts external to it at the national, regional and inter-governmental level, as well as to create synergies with efforts within the 2005 International Health Regulations and the Global Health Security Agenda.⁵³

Delegations also addressed the question of developing a 'set of guidelines and formats to assist a State Party, if required, when submitting an application for assistance in the framework of Article VII'. During 2014-2016, South Africa took the initiative to develop guidelines on information that could accompany a request for assistance pursuant to Article VII.⁵⁴ Taking into account comments received from other States Parties, at MX4 South Africa presented its revised proposal, which was based on its earlier working papers. There was widespread support among delegations both for the need to develop such guidelines and the South African proposal, in as much as it spells out the type of information that states would have to provide when submitting a request pursuant to Article VII. However, some delegations felt that further discussion would be needed to fine tune this proposal and to address some remaining technical issues. It was suggested that the assistance provisions in the CWC, as well as to the guidelines developed by the Technical Secretariat of the Organisation for the Prohibition of Chemical Weapons (OPCW) for requesting a rapid response and assistance mission, might provide useful ideas for this purpose.⁵⁵

In a separate working paper, the South African delegation also suggested that requests for assistance could be considered without the involvement of the Security

Council.⁵⁶ However, some delegations conveyed their views that a request for assistance independent of the Security Council's consideration would raise some practical questions that would require further thought.⁵⁷

In a joint working paper tabled in 2015 and revised in 2016, France and India proposed the development of an Article VII assistance database, which would be used to match specific offers and requests for assistance.⁵⁸ The Eighth Review Conference supported the establishment of such a database but did not formally instruct one to be developed.⁵⁹ While discussions on this item at MX4 indicated widespread support, many delegations also underlined the need for further discussion on operational, financial and technical aspects of the proposed database.⁶⁰ To this end, delegations benefited from a technical briefing made by the Technical Secretariat of the OPCW on its Assistance and Protection Database, established pursuant to Article X, paragraph 5 of the CWC, and on its future development plans for the database.⁶¹

The Russian Federation tabled a revised proposal (originally submitted in 2016) to establish a ready-to-use multipurpose national bio-medical unit, which would serve to support the implementation of Articles VI, VII and X of the BWC.⁶² In support of this proposal, Russia described the experience of its specialised anti-epidemic teams (SPEB), which are an integral part of its national anti-plague system. Delegations raised some 'practical questions such as the aspect of interoperability among national teams, how to ensure operational readiness, or the overarching framework in which these teams would operate'.⁶³ Other delegations also presented their national experience with deployments in the context of the response to the EVD outbreak in West Africa. The United Kingdom presented its 'public health rapid support team' concept, which consists of teams of public health experts, scientists and academics on stand-by to deploy in response to outbreaks of infectious diseases at source.⁶⁴

The question of investigations of alleged use of biological weapons was also raised by delegations and briefly discussed in regard to the possible recourse to the UN Secretary-General's Mechanism (SGM). While some delegations referred to the 2006 Review Conference which noted that the SGM represents an international institutional mechanism for investigating cases of alleged use of biological and toxin weapons, others expressed the need for a specific mechanism and capacities under the Convention.⁶⁵ In the context of this discussion, some States Parties shared information about SGM related training and exercise activities.

Delegations further addressed the question of a possible hostile use of biological agents against livestock, agriculture and the natural environment. Delegations heard a presentation by the OIE, which highlighted the importance of giving increased attention to this crucial sector. Similarly, delegations pointed to the fact that considerable economic and human damage could be caused with the deliberate introduction

of plant pests, while underlining the difficulties involved in ensuring effective containment measures in this sector.

Overall, MX4 saw very active and constructive discussions. However, at the Meeting of States Parties in December 2018⁶⁶ it was not possible to reach common understandings on issues such as the South African proposal on the guidelines or the French/Indian proposal on the database, which was tabled again at the Conference.⁶⁷ A conference room paper was circulated by the Chairman of MX4 which proposed some wording on issues where a common ground seemed to have emerged among delegations.⁶⁸ Nevertheless, no consensus was reached on this draft either.

Discussions on these and other proposals for operationalizing Article VII-related provisions of the Convention continued at the second MX4 meeting in August 2019, which concluded as this volume went to press, on 7 August 2019, after two days of discussion under the chairmanship of Mr. Usman Iqbal Jadoon of Pakistan.⁶⁹ Participation was high also at this meeting, with 96 delegations of States Parties, as well as three Signatory States and one State not party, 13 among UN offices, entities and other international organizations, as well as 31 NGOs and research institutes.

Exchanges were constructive and revolved around the same above-mentioned six topics along similar considerations and positions, with some new proposals on the table. The debate opened on the question of the practical challenges relating to the implementation of Article VII, around the question of the lack of leadership, at international level, of a response to the deliberate use of biological weapons. This discussion was triggered by a proposal put forward by the United Kingdom, which stressed the need for a coordinating body at international level, and suggested that the UN Secretary-General could develop a plan to ensure a coordinated response by all relevant partners, particularly by the member states and the United Nations system as a whole, to include the appointment of a special representative of the Secretary-General for that purpose.⁷⁰ While some delegations agreed on the need for coordination and conveyed support for the British proposal, others voiced concern about this suggestion. They warned against duplicating the existing regime under the Convention, and reiterated their position that an independent mechanism should be established within the BWC, given its specific nature.

Discussions on the issue of guidelines and formats relating to submitting an application for assistance continued on the basis of the above-mentioned working papers submitted by South Africa on the subject. Reference was also made to a working paper presented by the Russian Federation at the 2018 Meeting of States Parties.⁷¹ Again this year, no major disagreements emerged on such proposals, however some delegations continued to feel that more discussion was needed, particularly as regards South Africa's suggestion relating to a request for assistance independent of a Security Council's consideration.

The establishment of an Article VII assistance database received again this year broad support, though some delegations cautioned that more careful consideration would be needed as to what extent such a database might contribute to the effective provision of assistance pursuant to a request under Article VII. Exchanges continued based on the proposal presented by France and India in 2015-16 and began to focus on some practical aspects of its implementation, while also benefiting from a presentation on the EU's Civil Protection Mechanism and experience within that context with responding to disease outbreaks worldwide.⁷² Considerations were also made regarding the specific assistance items that could feature on an Article VII assistance database as well as its management, with the suggestion that it could be administered by the BWC-ISU. The proposal for the establishment of a voluntary fund for assistance under Article VII was also addressed.

The Russian proposal on the concept of mobile biomedical units continued to be on the table at the 2019 MX4, and a technical presentation was delivered on the possible use of such unit in support of different areas relevant for the BWC as well as to enhance State's preparedness, such as training of national personnel.⁷³ Along the same lines as in 2018, various expressions of support for the usefulness of rapidly deployable units were accompanied by questions as to some operational aspects relating to their use within a BWC situation, including as an assistance item within the proposed Article VII database. National units could be listed in the Article VII database, with some delegations suggesting that the model of the Emergency Management Teams established under the auspices of the WHO could be followed. Delegations also presented their relevant national experiences in this regard.

One working paper was introduced by Australia⁷⁴ and two by Japan⁷⁵ on the topic relating to approaches by States Parties towards strengthening international response capabilities. Three technical presentations were also delivered by States Parties to share their experiences in strengthening response capabilities at national level, as well as to report on some regional capacity building activities. These covered *inter alia* national laboratories, communication strategies, national response plans, specialized response units, as well as the organization of table-top and field exercises to test preparedness. In one of its working papers Japan also presented an update on the activities carried out in the context of a UNODA project supporting the operationalization of Article VII of the Convention, which they fund and the BWC-ICU coordinates (which is described more in detail below). The International Centre for Genetic Engineering and Biotechnology, INTERPOL and the European Union also took the floor under this agenda item to present their relevant mandates and activities, particularly those supporting the development of capabilities at national level.

Greater focus was placed this year on the question of the means to prepare for and response in case of hostile use of biological agents and toxins against agriculture, livestock and the natural environment. Two working papers were introduced. The United States described their experience at national level in enacting measures and practices to effectively be prepared for and respond to a deliberate event, such as surveillance systems, laboratory networks, inter-agency collaboration at national level and training.⁷⁶ The paper also covered assistance provided in this area to the international community, either directly to partner nations and through international organizations, such as FAO. Canada introduced a working paper on the roles of relevant international organizations such as FAO, OIE, INTERPOL and WHO in case of zoonoses, in supporting States in such circumstances.⁷⁷ The paper further described relevant cooperation mechanisms among these institutions and the challenges that would derive for these institutions' work from the circumstances of a deliberate event and how Canada is supporting them in their preparedness efforts. A presentation was delivered by the Secretariat of the International Plant Protection Convention describing the tools that the treaty provides for States to prevent and address outbreaks of plant pests.⁷⁸ The OIE and INTERPOL also took the floor: the former to describe the Organization's relevant mandate in promoting transparency.⁷⁹ INTERPOL referred to a joint project with the OIE and FAO aimed at building resilience against agro-terrorism and agro-crime. Other States Parties also shared their national experiences in this area. A suggestion was put forward to promote continued dialogue with the above-mentioned organizations as well as other relevant actors on this topic, as well as to focus on plant health issues in next year's meeting of experts, as a contribution to the celebrations of 2020 as the International Year of Plant Health.

Further ongoing efforts to strengthen Article VII provisions

Besides the current lack of mechanisms or procedures to activate assistance under Article VII of the Convention, as mentioned above, major gaps currently also exist at the international level regarding coordinated response capabilities to a potential deliberate use of biological agents. There is neither a lead organization nor comprehensive international mechanisms that would ensure the overall coordination among relevant actors—although previous BWC Review Conferences have clearly acknowledged the potential role that the UN and international organizations, such as the WHO, OIE, FAO and the IPPC Secretariat, could play in providing and delivering under the BWC.⁸⁰ The issue is high on the agenda of the UN and of the international community as a whole. As the UN Secretary-General acknowledged in his disarmament agenda in May 2018, '[t]he Office for Disarmament Affairs will work with all relevant

United Nations entities to contribute to developing a framework that ensures a coordinated international response to the use of biological weapons'.⁸¹

In order to address such gaps, and to contribute towards understanding what a 'coordinating role' by the UN could entail, Canada provided funding through its Weapons Threat Reduction Programme to the UNODA for a multi-year project. This activity was initiated in August 2017 with the objective of strengthening international mechanisms and capabilities to respond to the deliberate use of disease (human, animal or plant) by both state and non-state actors. It addresses these issues particularly through the lens of Article VII of the Convention. The project builds upon existing multilateral initiatives and mechanisms and will develop a non-legally binding International Bio-Emergency Management Framework for Deliberate Events to contribute to a coordinated and harmonized international response among relevant international organizations.⁸²

Close collaboration has been established between the UNODA and WHO regarding the latter's recent work on the Health Security Interface (also financed by Canada), as well as with relevant Article VII related initiatives undertaken by France and the Fondation pour la Recherche Stratégique. Furthermore, synergies have also been established with a project implemented by the Working Group on Preventing and Responding to Terrorist Attacks with Weapons of Mass Destruction (WMD Working Group) of the UN Counter-Terrorism Implementation Task Force (CTITF), which, since 2017, has been subsumed within the new UN Office of Counter-Terrorism (UNOCT).⁸³ Bringing together 18 UN offices and agencies, as well as other relevant international organizations operating in the area, the project aims to address the UN Global Counter-Terrorism Strategy's call for improved coordination in response. In December 2017, UNOCT published the main results of the first two phases of the project.⁸⁴ The project's third phase, aimed at implementing those recommendations, is in the process of being launched.

Moreover, in early 2018 Japan provided a major voluntary contribution to UNODA for a two-year project, which aims to improve the preparedness of the UN and relevant international organisations in case of the potential deliberate use of biological or chemical weapons. Complementing the other above-mentioned projects, this project has a particular focus on strengthening respective national and (sub)-regional capacities in Asia.⁸⁵ Two regional workshops were already conducted in Thailand and Kyrgyzstan and two more regional events will be held in Malaysia and the Philippines. Furthermore, two thematic seminars on different Article VII related issues were held in Geneva in the course of the project with two more to be carried out. Those seminars already held were considered useful, having stimulated related discussions among States Parties in an informal setting.⁸⁶

Also France provided a voluntary contribution for two table top exercises in 2019 in Togo and Switzerland, which looked at the underlying decision-making processes by States Parties for triggering Article VII or other Conventions provisions in case of use of biological agents against them.

With its Council Decision 2019/97, finally, the European Union, provided funding in support of the BWC. One project will provide funds for preparing BWC States Parties to prevent and respond to attacks involving biological agents through a series of training courses, table-top exercises, and/or national or sub-regional workshops to examine cross-government decision making and promote information exchanges and provision of assistance between relevant national and international organisations.⁸⁷

The above initiatives are complementary and mutually beneficial, as they look at the Article VII process and operationalization from different and strictly intertwined perspectives – from a State’s possible decision to request assistance under Article VII, to the ensuing processes in relation to the assistance to be provided by States and by international organizations, including in the framework of the UN.

Conclusions

Article VII of the BWC can be viewed as an expression of international solidarity. Moreover, the effective implementation and operationalization of this provision could help to deter a potential aggressor. The provision of effective international assistance and the mitigation of the effects of such use on the targeted communities and states would diminish the military or other perceived utility of biological weapons use.⁸⁸ Not least as a result of the potentially dramatic consequences of a deliberate bio-attack, States Parties have recently devoted more attention to the operationalization of Article VII. Currently, there are neither assistance related procedures nor mechanisms in place for a State Party to use in cases of exposure to danger as a result of a violation of the Convention. However, States Parties have reached a number of additional understandings and agreements at Review Conferences as well as common understandings during intersessional programmes that provide some guidance.

The current intersessional programme (2018-2020) offers the opportunity to make progress by promoting common understanding and effective action on the six sub-topics identified. In addition, there has been heightened interest and support by individual States Parties on the topic, including the provision of voluntary contributions to UNODA for strengthening capacities at the national and international level to prepare for and respond to the use of biological weapons. Finally, it is hoped that the action item in the UN Secretary-General’s disarmament agenda could serve as another tool to contribute to developing a framework that ensures a coordinated international response to the use of biological weapons.

Endnotes

- 1 The views expressed in this chapter are those of the authors and do not necessarily reflect the views of the United Nations. The findings presented in this chapter reflect part of an analysis carried out under a project on 'Strengthening global mechanisms and capabilities for responding to deliberate use of disease' of the United Nations Office of Disarmament Affairs, which the BWC-ISU coordinates with funds from Canada
- 2 *Securing our Common Future: An Agenda for Disarmament*, Office for Disarmament Affairs, New York, 2018, <<https://www.un.org/disarmament/sg-agenda/>>, p. 27.
- 3 See Florian Flade, 'The June 2018 Cologne Ricin Plot: A New Threshold in Jihadi Bio Terror', CTC Sentinel, August 2018, Volume 11, Issue 7, pp. 1-4, <<https://ctc.usma.edu/june-2018-cologne-ricin-plot-new-threshold-jihadi-bio-terror/>>.
- 4 Jean-Pascal Zanders, 'The Meaning of "Emergency Assistance": Origins and negotiation of Article VII of the Biological and Toxin Weapons Convention', Working paper, 10 August 2018, p. 13, <<http://www.the-trench.org/btwc-emergency-assistance/>>.
- 5 For a detailed analysis of the interpretation issues raised by this provision and its negotiating history, see Nicholas A. Sims, 'The Evolution of Biological Disarmament', Oxford University Press/ Stockholm International Peace Research Institute, 2001; Nicholas A. Sims, 'BWC Article VII: Its Limitations and Boundaries', presentation at an expert meeting, Geneva, 11 September 2017; Jean-Pascal Zanders, 'BWC Article VII: Preparing for Operationalization', presentation at an expert meeting, Geneva, 11 September 2017; and Jean-Pascal Zanders J (note 4).
- 6 See Jean-Pascal Zanders (note 4), p. 34.
- 7 See Nicholas A. Sims, BWC Article VII: Its Limitations and Boundaries (note 5), pp.2-3.
- 8 The full text of these additional understandings and agreements can be found in Annex I of document BCW/MSP/2018/MX.4/2: Background information document on assistance, response and preparedness. Submitted by the Implementation Support Unit. 26 July 2018, <<http://undocs.org/en/BWC/MSP/2018/MX.4/2>>.
- 9 The common understandings reached on this topic by States Parties in 2004 can be found in document BWC/MSP/2004/3: Report of the Meeting of States Parties, 14 December 2004, <<https://documents-dds-ny.un.org/doc/UNDOC/GEN/Go4/643/00/PDF/Go464300.pdf?OpenElement>>.
- 10 The common understandings reached on this topic by States Parties in 2010 can be found in document BWC/CONF.VII/INF.6: Common understandings reached by the Meetings of States Parties during the Intersessional Programme held from 2007 to 2010, Background information document submitted by the Implementation Support Unit. 28 September 2011, <<https://documents-dds-ny.un.org/doc/UNDOC/GEN/G11/638/89/PDF/G1163889.pdf?OpenElement>>.
- 11 The 2018-2020 intersessional programme consists of annual Meetings of States Parties over four days, which are preceded by five thematically different annual Meetings of Experts with a total duration of eight days. See BWC/MSP/2017/6, paragraph 19, <<http://undocs.org/en/bwc/msp/2017/6>>.
- 12 This seems to be the main conclusion of the analysis of the negotiations on Article VII carried out by Jean-Pascal Zanders (note 4).
- 13 For a detailed analysis of the interpretation issues raised by this provision and its negotiating history, see Nicholas A. Sims, 'The Evolution of Biological Disarmament' (note 5); Nicholas A. Sims, 'BWC Article VII: Its Limitations and Boundaries' (note 5); and Jean-Pascal Zanders, 'BWC Article VII: Preparing for Operationalization' (note 5).
- 14 Nicholas A. Sims, 'The Evolution of Biological Disarmament' (note 5), pp. 152-153.
- 15 See BWC/CONF.VIII/4, Final Declaration, A. Article I, para. 3.
- 16 In a working paper tabled in 2014, the United Kingdom proposed a text to include the notion of threat of use, based on the model of Article X of the Chemical Weapons Convention. BWC/MSP/2014/MX/

- WP.1, 2 July 2014, para. 3. In this connection, it is also interesting to note that the reference in Article VII is to a Party that ‘has been exposed’ to danger. The use of the past tense could be understood as to exclude situations where a Party is currently being exposed to danger.
- 17 See BWC/CONF.VI.6: Final Document. Sixth Review Conference of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction (Geneva, 20 November- 8 December 2006). Part II. Final Declaration. Article VII, paragraph 38, p.14. <<https://documents-dds-ny.un.org/doc/UNDOC/GEN/G07/600/30/PDF/G0760030.pdf?OpenElement>>.
 - 18 See Nicholas A. Sims, ‘BWC Article VII: Its Limitations and Boundaries’ (note 5), p. 5.
 - 19 This emerged from a table-top exercise organized in 2016 by United Nations Institute for Disarmament Research (UNIDIR) and the Fondation pour la Recherche Stratégique (FRS) principally aimed at reflecting on the decision-making processes that could lead to a State Party invoking Article VII. Report Prepared by Jean-Pascal Zanders, Elisande Nexon and Ralf Trapp, ‘Tabletop Exercise (TTX) on the Implementation of Article VII of the Biological and Toxin Weapons Convention (BTWC) 8-9 November 2016, Palais des Nations, Geneva’, UNIDIR and FRS, 2017, <<https://www.frstrategie.org/web/documents/publications/autres/2017/2017-nexon-btwc-report.pdf>>.
 - 20 *Ibid.*, p. 9.
 - 21 *Ibid.* Article VII is just one of the possible options for a State Party that believes itself to be have been the object of an attack with biological weapons. Others include prior consultations pursuant to Article V. Furthermore, a state could opt to lodge a complaint with the UN Security Council, which may in turn decide to carry out an investigation. In this context, while investigation and assistance operations are inextricably linked, the latter is not contingent upon the former. Possible scenarios have been outlined in Jean-Pascal Zanders (note 4), p. 36.
 - 22 See ‘Lessons learned exercise on the coordination activities of the United Nations Mission for Ebola Emergency Response. Report by the Secretary-General’, A/70/737, dated 4 March 2016, p. 5, para. 16, <<https://documents-dds-ny.un.org/doc/UNDOC/GEN/N16/061/27/PDF/N1606127.pdf?OpenElement>>.
 - 23 South Africa has prepared a number of Working Papers with proposals for guidelines on the subject matter, which are addressed in more detail below.
 - 24 See ‘Role of the Implementation Support Unit’, ‘Administrative Support’, <[https://www.unog.ch/80256EE600585943/\(httpPages\)/F8521A510F455706C12573A6003F49F2?OpenDocument](https://www.unog.ch/80256EE600585943/(httpPages)/F8521A510F455706C12573A6003F49F2?OpenDocument)>.
 - 25 BWC/CONF.VI/6, III. Decisions and Recommendations, 5.A, p. 20.
 - 26 Article XIV of the BWC itself refers to the USSR, but the Russian Federation took on this responsibility upon the dissolution of the USSR.
 - 27 See Arts. 77 and 78 of the 1961 Vienna Convention on the Law of Treaties.
 - 28 BWC/CONF.III/23, Final Declaration, Article V, pp. 15-16.
 - 29 BWC/CONF.I, dated 29 August 1997, para. 1, p. 1.
 - 30 See BWC/MSP/2018/MX.4/WP.1, dated 25 July 2018, paragraphs 4-5, <<http://undocs.org/ru/BWC/MSP/2018/MX.4/WP.1>>.
 - 31 BWC/MSP/2017/6, dated 19 December 2017, para 5. p. 2.
 - 32 Provisional Rules of Procedure of the Security Council (S/96/Rev.7), Rule 2, <<http://www.un.org/en/sc/inc/pages/pdf/rules.pdf>>. The considerations related to the UN Security Council are also based on discussions with UN officials on the occasion of a project meeting held at the end of 2017 in the context of the above-mentioned UNODA project on ‘Strengthening global mechanisms and capabilities for responding to deliberate use of disease’, see *supra* fn. 1. Any inaccuracy, mistake or misinterpretation of relevant UN Charter, other provisions, or relevant practice is to be attributed to the authors of this writing.
 - 33 UN Charter, Article 99, <<http://legal.un.org/repertory/art99.shtml>>.

- 34 Provisional Rules of Procedure of the Security Council (S/96/Rev.7), Rule 6, <<https://documents-dds-ny.un.org/doc/UNDOC/GEN/N16/061/27/PDF/N1606127.pdf?OpenElement>>.
- 35 UN Charter, Article 11, para. 2 and Article 11, para. 3, <<http://legal.un.org/repertory/art99.shtml>>.
- 36 This agenda item on 'Non-Proliferation of Weapons of Mass Destruction' was introduced following the adoption of resolution 1540 (2004) on preventing non-State actors from acquiring weapons and materials of mass destruction.
- 37 See, for example, the call by the UN Secretary-General on the UN Security Council to 'act responsibly and (...) fulfil its duties and not give up on efforts to agree upon an investigative mechanism'; 'Secretary-General warns Security Council to swiftly unite on Syrian conflict, preventing dangerous developments from worsening', UN Security Council, 13 April 2018, <<https://www.un.org/press/en/2018/sc13293.doc.htm>>.
- 38 States Parties conceived a situation where, with a view to avoiding that assistance be delayed 'timely emergency assistance could be provided by States Parties if requested', 'pending consideration of a decision by the Council'. This wording was repeated by the Fourth (BWC/CONF. IV/9, Final Declaration, G. Article VII, para. 3) and then by the Sixth Review Conference (BWC/CONF. IV/6, Final Declaration, Article VII, para. 33 of its Final Declaration).
- 39 BWC/CONF. VIII/4, Final Declaration, G. Article VII, para. 35, <[https://www.unog.ch/80256EDD006B8954/\(httpAssets\)/19831FF45AE88E89C12580D80038951C/file/BWCCONF.VIII4+English+.pdf](https://www.unog.ch/80256EDD006B8954/(httpAssets)/19831FF45AE88E89C12580D80038951C/file/BWCCONF.VIII4+English+.pdf)>.
- 40 The Eighth Review Conference stressed that 'the international community should be prepared to . . . provide assistance, including *humanitarian and other assistance* to the requesting State Party' (emphasis added, BWC/CONF. VIII/4, Final Declaration, G. Article VII, para. 33). The Conference also noted the need for a procedure for assistance by which 'timely *emergency assistance* can be provided, including to better identify accessible information on the types of assistance that might be available in order to ensure prompt response and timely emergency and *humanitarian assistance* by States Parties, if requested in the event of use of biological weapons' (emphasis added, BWC/CONF. VIII/4, Final Declaration, G. Article VII, para. 38).
- 41 BWC/CONF. VIII/4, Final Declaration, G. Article VII, para. 38.
- 42 The Sixth Review Conference called for consideration of a 'detailed procedure for assistance in order to ensure timely emergency assistance would be provided by States Parties if requested' (BWC/CONF. VI/6, Final Declaration, Article VII, para. 38). The Seventh Review Conference repeated this call (BWC/CONF. VII/7, Final Declaration, Article VII, para. 37), and, as mentioned above the Eighth Review Conference noted 'the need for a procedure for assistance by which timely emergency assistance can be provided' (BWC/CONF. VIII/4, Final Declaration, Article VII, para. 38).
- 43 BWC/CONF. VIII/4, Final Declaration, Article VII, para. 39.
- 44 *Ibid.*, paras. 37 and 39.
- 45 See BWC/MSP/2017/6, paragraph 19, <<http://undocs.org/en/bwc/msp/2017/6>>.
- 46 A report on MX4 has been issued as document BWC/MSP/2018/MX.4/3, 'Report of the 2018 Meeting of Experts on assistance, response and preparedness', 12 November 2018, <<https://undocs.org/bwc/msp/2018/mx.4/3>>.
- 47 States Parties submitted a total of 11 Working Papers. See '2018 BWC Meeting of Experts on Assistance, Response and Preparedness', United Nations Office at Geneva, <[https://www.unog.ch/unog/website/disarmament.nsf/\(httpPages\)/4F307BBE73FE857FC125827C0029EA0B?OpenDocument](https://www.unog.ch/unog/website/disarmament.nsf/(httpPages)/4F307BBE73FE857FC125827C0029EA0B?OpenDocument)>.
- 48 'Joint NGO Position Paper to Biological Weapons Convention Meeting of Experts, Geneva, 7-16 August 2018, <[https://www.unog.ch/80256EDD006B8954/\(httpAssets\)/413B3AD5C04B53DFC12582E9003379DE/\\$file/Joint+NGO+Position+Paper+to+BWC+MXs+2018.13+Aug+2018+-+updated+version.pdf](https://www.unog.ch/80256EDD006B8954/(httpAssets)/413B3AD5C04B53DFC12582E9003379DE/$file/Joint+NGO+Position+Paper+to+BWC+MXs+2018.13+Aug+2018+-+updated+version.pdf)>.
- 49 BWC/MSP/2018/MX.4/3, 4 December 2018, Annex I, 'Summary Report. Submitted by the Chairperson of the Meeting of Experts on Assistance, Response and Preparedness', *cit.*, see fn. 47 *supra*.

- 50 The working papers and statements circulated during MX4 are available at: <[https://www.unog.ch/unog/website/disarmament.nsf/\(httpPages\)/4F307BBE73FE857FC125827C0029EA0B?OpenDocument](https://www.unog.ch/unog/website/disarmament.nsf/(httpPages)/4F307BBE73FE857FC125827C0029EA0B?OpenDocument)>.
- 51 BWC/MSP/2018/MX.4/3, 4 December 2018, Annex I, *cit.*, p. 6, para. 4.
- 52 BWC/MSP/2018/MX.4/3, 4 December 2018, Annex I, *cit.*, para. 6, p. 7.
- 53 *Ibid.*
- 54 See BWC/MSP/2018/MX.4/WP.3: Implementation of Article VII. Submitted by South Africa. 26 July 2018; BWC/CONF.VIII/WP.34: Implementation of Article VII. Submitted by South Africa. 10 November 2016; BWC/CONF.VIII/PC/WP.22: Implementation of Article VII. Submitted by South Africa. 16 August 2016; Implementation of Article VII. Implementation of Article VII. Submitted by South Africa. 6 August 2015; BWC/MSP/2014/WP.7: Perspectives on article VII. Submitted by South Africa. 2 December 2014; and BWC/MSP/2014/MX/WP.9: Article VII – Procedures. Submitted by South Africa. 31 July 2014.
- 55 See BWC/MSP/2018/MX.4/WP.1, 25 July 2018, paragraphs 4-5, <<http://undocs.org/ru/BWC/MSP/2018/MX.4/WP.1>>.
- 56 BWC/MSP/2018/MX.4/WP.4, 26 July 2018, p. 1, <<http://undocs.org/en/BWC/MSP/2018/MX.4/WP.4>>.
- 57 BWC/MSP/2018/MX.4/3, 4 December 2018, Annex I, *cit.*, para. 68, p. 7.
- 58 See BWC/CONF.VIII/PC/WP.38/Rev.1, 23 August 2016, <<http://undocs.org/en/BWC/CONF.VIII/PC/WP.38/Rev.1>>; BWC/CONF.VIII/PC/WP.38, 16 August 2016, <<http://undocs.org/en/BWC/CONF.VIII/PC/WP.38>>; and BWC/MSP/2015/MX/WP.7, 30 July 2015, <<http://undocs.org/en/BWC/MSP/2015/MX/WP.7>>. At MSP 2018, France and India re-submitted the same proposal. See doc BWC/MSP/2018/WP.7, 30 November 2018.
- 59 BWC/CONF.VIII/4, 11 January 2017. II. Final Declaration, G. Article VII, paragraph 47, p.15, <<http://undocs.org/en/BWC/CONF.VIII/4>>.
- 60 See BioWeapons Prevention Project: MX7 Report: First Day of MX4-assistance response and preparedness, Wednesday 15 August 2018, p.2, <<http://www.cbw-events.org.uk/MX18-07.pdf>>.
- 61 See Technical briefing by the OPCW, 14 August 2018, <[https://www.unog.ch/80256EDD006B8954/\(httpAssets\)/EB66C35F11AC8C60C12582E900513EAC/\\$file/BWC+-OPCW+database.pdf](https://www.unog.ch/80256EDD006B8954/(httpAssets)/EB66C35F11AC8C60C12582E900513EAC/$file/BWC+-OPCW+database.pdf)>.
- 62 See BWC/CONF.VIII/PC/WP.1/Rev.2, 4 July 2016, <<http://undocs.org/en/BWC/CONF.VIII/PC/WP.1/Rev.2>>; and BWC/CONF.VIII/PC/WP.1/Rev.2/Add.1, 25 August 2016, <<http://undocs.org/ru/BWC/CONF.VIII/PC/WP.1/Rev.2/Add.1>>.
- 63 BWC/MSP/2018/MX.4/3, 4 December 2018, Annex I, *cit.*, para. 10, p. 8.
- 64 BWC/MSP/2018/MX.4/WP.2, 26 July 2018.
- 65 BWC/CONF.VIII/PC/4, 31 May 2018, <<http://undocs.org/en/BWC/CONF.VIII/PC/4>>, Article VI, p.13.
- 66 Report of the 2018 Meeting of States Parties, Advanced version, paras. 25026, p. 6, <[https://www.unog.ch/80256EDD006B8954/\(httpAssets\)/4F8CCA935F1D4205C125835F004B6FoE/\\$file/2018+BWC+MSP+report+\(advance+version\)+FINAL.pdf](https://www.unog.ch/80256EDD006B8954/(httpAssets)/4F8CCA935F1D4205C125835F004B6FoE/$file/2018+BWC+MSP+report+(advance+version)+FINAL.pdf)>.
- 67 BWC/MSP/2018/WP.7, 30 November 2018 <<https://undocs.org/BWC/MSP/2018/WP.7>>.
- 68 BWC/MSP/2018/CRP.5, 5 December 2018 <[https://www.unog.ch/80256EDD006B8954/\(httpAssets\)/B3FE78F8D6A2DA49C12583930032F5A1/\\$file/CRP_5.pdf](https://www.unog.ch/80256EDD006B8954/(httpAssets)/B3FE78F8D6A2DA49C12583930032F5A1/$file/CRP_5.pdf)>.
- 69 An advance version of the report on MX4, submitted by the Chairperson, has been issued as document BWC/MSP/2019/MX.4/CRP .1, 'Report of the 2019 Meeting of Experts on assistance, response and preparedness', 7 August 2019, <[https://www.unog.ch/80256EDD006B8954/\(httpAssets\)/EFA1C1CB292211CEC1258455003050A6/\\$file/2019+MX4+FINAL+procedural+report.pdf](https://www.unog.ch/80256EDD006B8954/(httpAssets)/EFA1C1CB292211CEC1258455003050A6/$file/2019+MX4+FINAL+procedural+report.pdf)>. As in 2018, also in 2019 the report annexed a summary report of the considerations, perspectives and conclusions drawn from the meeting under his own responsibility and initiative. See Report of the 2019 Meeting of Experts on assistance, response and preparedness, BWC/MSP/2019/MX.4/2, 8 October 2019, <<https://undocs.org/>

- BWC/MSP/2019/MX.4/2>. Documents relevant for the 2019 session of MX4, including statements, working papers and presentations, are available at <[https://www.onug.ch/unog/website/disarmament.nsf/\(httpPages\)/F3CD1B793F369157C12583C1003F8FE9?OpenDocument](https://www.onug.ch/unog/website/disarmament.nsf/(httpPages)/F3CD1B793F369157C12583C1003F8FE9?OpenDocument)>.
- 70 BWC/MSP/2019/MX.4/WP.6, 29 July 2019, <<https://undocs.org/BWC/MSP/2019/MX.4/WP.6>>.
- 71 BWC/MSP/2018/MX.4/WP.1, 25 July 2018, <<https://undocs.org/ru/BWC/MSP/2018/MX.4/WP.1>>.
- 72 The presentation is available at <[https://www.onug.ch/80256EDD006B8954/\(httpAssets\)/D41F381077833B1BC125844E004FDB14/\\$file/MX4_EU_agenda+item+6.pdf](https://www.onug.ch/80256EDD006B8954/(httpAssets)/D41F381077833B1BC125844E004FDB14/$file/MX4_EU_agenda+item+6.pdf)>.
- 73 The presentation is available at <[https://www.onug.ch/80256EDD006B8954/\(httpAssets\)/D6F42772AD792CB2C125844F0045D002/\\$file/MX4_Russian+Federation_agenda+item7.pdf](https://www.onug.ch/80256EDD006B8954/(httpAssets)/D6F42772AD792CB2C125844F0045D002/$file/MX4_Russian+Federation_agenda+item7.pdf)>.
- 74 BWC/MSP/2019/MX.4/WP.2, 25 July 2019 <<https://undocs.org/en/bwc/msp/2019/mx.4/wp.2>>.
- 75 BWC/MSP/2019/MX.4/WP.3, 23 July 2019 <<https://undocs.org/BWC/MSP/2019/MX.4/wp.3>>, and BWC/MSP/2019/MX.4/WP.4, 22 July 2019 <<https://undocs.org/BWC/MSP/2019/MX.4/wp.4>>.
- 76 BWC/MSP/2019/MX.4/WP.1, 15 July 2019 <<https://undocs.org/BWC/MSP/2019/MX.4/WP.1>>.
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- 78 The presentation can be found at <[https://www.onug.ch/80256EDD006B8954/\(httpAssets\)/6AoED1344BoAC914C125844F0057AB51/\\$file/IPPC+Surveillance+and+contingency+plans_Shamilov.pdf](https://www.onug.ch/80256EDD006B8954/(httpAssets)/6AoED1344BoAC914C125844F0057AB51/$file/IPPC+Surveillance+and+contingency+plans_Shamilov.pdf)>.
- 79 The OIE statement is available at <[https://www.onug.ch/80256EDD006B8954/\(httpAssets\)/9F6F64230C50CE82C125844F0045E63F/\\$file/OIE+statement+MX4+item+9.pdf](https://www.onug.ch/80256EDD006B8954/(httpAssets)/9F6F64230C50CE82C125844F0045E63F/$file/OIE+statement+MX4+item+9.pdf)>.
- 80 BWC/MSP/2018/MX.4/2, 26 July 2018, Annex I, paragraph 76, pp.7-8, <<http://undocs.org/en/BWC/MSP/2018/MX.4/2>>.
- 81 *Securing our Common Future* (note 2), p.26.
- 82 The framework is being developed following the model of the IAEA Joint Radiation Emergency Plan of the International Organizations (J-Plan), which is a non-prescriptive, non-binding tool that aims to harmonize preparedness efforts and response actions by participating organizations. See *Joint Radiation Emergency Management Plan of the International Organizations*, Jointly sponsored by the CTBTO, EADRCC, EC, EUROPOL, FAO, IAEA, ICAO, ILO, IMO, INTERPOL, OECD/NEA, PAHO, UNDP, UNEP, OCHA, OOSA, WHO and WMO, in cooperation with the IFRC and UNSCEAR, 1 March 2017, <https://www-pub.iaea.org/MTCD/Publications/PDF/EPR-JPLAN-2017_web.pdf>.
- 83 The CTITF was established by the UN Secretary-General in 2005 to ensure overall coordination and coherence in UN counter-terrorism efforts. It brings together 38 entities of the UN system and key international organizations for enhanced coordination and coherence in the UN's broad-ranging activities against terrorism. Since 2017 it has been subsumed in the new UN Office of Counter-Terrorism.
- 84 UNOCT, *Ensuring Effective Interagency Interoperability and Coordinated Communication in Case of Chemical and/or Biological Attacks*, United Nations, New York, 2017, <https://www.un.org/counterterrorism/ctitf/sites/www.un.org.counterterrorism.ctitf/files/UNCCT_CTITF_WMD_WG_Project_Publication_FINAL.PDF>.
- 85 Three regional capacity-building workshops will take place in the ASEAN region and one in Central Asia. Information and documents related to these workshops can be found at: <[https://www.unog.ch/80256EE600585943/\(httpPages\)/1B69CE1FoBo30DAoC1257F39003E9590?OpenDocument](https://www.unog.ch/80256EE600585943/(httpPages)/1B69CE1FoBo30DAoC1257F39003E9590?OpenDocument)>.
- 86 Information and documents related to these seminars can be found at: <[https://www.unog.ch/80256EE600585943/\(httpPages\)/1B69CE1FoBo30DAoC1257F39003E9590?OpenDocument](https://www.unog.ch/80256EE600585943/(httpPages)/1B69CE1FoBo30DAoC1257F39003E9590?OpenDocument)>.
- 87 Council Decision (CFSP) 2019/97 of 21 January 2019 in support of the Biological and Toxin Weapons Convention in the framework of the EU Strategy against Proliferation of Weapons of Mass Destruction, Project 5, <[https://www.unog.ch/80256EDD006B8954/\(httpAssets\)/B26EAFc21BB18D33C-12583C900505B65/\\$file/EU+Council+Decision+2019-97.pdf](https://www.unog.ch/80256EDD006B8954/(httpAssets)/B26EAFc21BB18D33C-12583C900505B65/$file/EU+Council+Decision+2019-97.pdf)>.
- 88 See Nicholas A. Sims, 'The Evolution of Biological Disarmament' (note 5), p. 58.

CHAPTER 3

Future verification challenges for the Chemical Weapons Convention

Ralf Trapp¹

Introduction

The Chemical Weapons Convention (CWC) is a cornerstone multilateral arms control and disarmament agreement. Finalised immediately after the end of the Cold War, it entered into force in 1997. Today, with 193 states being party to the CWC, it enjoys almost universal adherence. However, among the few countries yet to join the treaty are North Korea, with a suspected chemical weapons (CW) programme of considerable size, South Sudan, despite indicating at the end of 2017 that the country would join the treaty soon, as well as Egypt and Israel (the latter a signatory state), both with former CW programmes.

The main undertakings of States Parties under the CWC include:

- Obligations to declare, open to verification, and eliminate within agreed time frames and under international control their CW stockpiles, old and abandoned chemical weapons, and chemical weapons production facilities (CWPF);
- Never under any circumstances to develop, produce, otherwise acquire, stockpile, or transfer to anyone chemical weapons or their means of production;
- Never under any circumstances to use chemical weapons or engage in military preparations for their use; and
- Not to assist, encourage or induce others in any act prohibited by the CWC.

An important feature of the CWC is its system of verification of compliance, implemented by the Technical Secretariat of the Organisation for the Prohibition of Chemical Weapons (OPCW), which builds on and complements the national implementation systems that the States Parties are required to put in place. The combination of verification and national enforcement provides assurances for compliance with the CWC's obligations, both by its States Parties and by individuals, organisations and enterprises that come under their jurisdiction or control.

This chapter first briefly explains the design and main features of the CWC verification system and then looks at how it has worked in practice. In particular, it explores

the challenges the verification system faces as the OPCW transitions from eliminating state CW programmes world-wide, to ensuring that chemical weapons will not be re-acquired by anyone — state or non-state actors — and that advances in chemistry will not be diverted for chemical weapons purposes.

The CWC verification regime

The CWC verification system has been praised as one of the most advanced in multi-lateral arms control and disarmament. Its design was based on the knowledge of past CW programmes, but at the same time it was to provide compliance assurances for a treaty of unlimited duration that has to function in a changing world with advances in science and technology, developments in industrial manufacturing, and changes in the political and security environment.

The CWC verification system is based on declarations by States Parties to be submitted when they join the treaty (initial declarations) and regularly thereafter. These declarations trigger data monitoring activities and on-site inspections by the Technical Secretariat. The system uses a risk-drive approach and provides for different types of routine on-site inspection regimes:

- Systematic verification of chemical weapons and their production facilities until completion of their elimination (systematic verification of CW production facilities converted for permitted purposes continues for a minimum of 10 more years after their conversion has been completed);
- Routine verification of declarations of old and abandoned chemical weapons and of their destruction (old chemical weapons produced before 1925 are verified after their declaration and upon confirmation of their status leave the verification system and are to be destroyed as toxic waste);
- Systematic verification of facilities involved in the production of Schedule 1 chemicals; and
- Routine verification of industry facilities (Schedule 2 and 3 facilities and 'Other chemical production facilities') based on the risk they pose to the object and purpose of the CWC.

In addition, the CWC verification system also provides for special (investigative) inspections: a challenge inspection mechanism which can be invoked by any State Party to clarify compliance issues related to any facility or location of another State Party ('anywhere, any time, no right of refusal'), and a mechanism to investigate allegations of the (threat of) use of chemical weapons against a State Party. The latter can

either be initiated as part of a request for assistance (i.e., by a State Party that is the victim of such chemical weapons threats) or as a challenge inspection.

Past CWC review conferences have characterised the CWC verification system as an important and reliable element of the treaty system. The Third Review Conference in 2013 reaffirmed that the full, effective and non-discriminatory implementation of Article VI was essential for the realisation of the object and purpose of the Convention, and concluded that the verification system ‘should continue to be improved in a manner consistent with the Convention in response to advances in science and technology. . .’.² Measures have been applied by the OPCW to enhance the efficiency of its routine verification measures (for example, the use of sequential inspections, software to support electronic declaration submission or site selection for inspections, and optimization measures applied in on-site verification systems at CW sites).

Challenge inspection, on the other hand, has never been invoked by any State Party. The Technical Secretariat has continued to improve its capacity and competence to implement challenge inspections and maintains readiness through training and exercise. Non-compliance concerns, as a rule, have been addressed by States Parties using informal (bilateral) mechanisms, or the OPCW has used *ad hoc* mechanisms such as the Fact-finding Mission³ and the Declaration Assessment Team⁴ established by the Director-General for Syria.

The OPCW did contribute to one investigation of alleged chemical weapons use, as part of the UN Secretary-General’s investigation in 2013 of allegations of chemical weapons uses in Syria. The legal basis for this involvement was paragraph 27 of Part XI of the CWC Verification Annex, which requires the OPCW to put its resources at the disposal of the UN Secretary General if (s)he decides to conduct such an investigation in a state not party to the CWC. The OPCW also supported the Joint Investigative Mechanism (JIM) established by the UN Security Council to identify those responsible for cases of use of chemical Weapons in Syria that had been confirmed by the FFM.

Transition from CW destruction to CW non-production verification

The refocusing of the priorities in the implementation of the CWC regime from the ‘positive’ obligations States Parties have undertaken (to declare, to subject to verification, to shut down, to destroy under international verification) to ensuring compliance with their ‘negative’ obligations (not to develop, produce, transfer, stockpile or use CW or engage in activities related to military preparations for chemical warfare or to CW proliferation) is an indication that the OPCW has been successful in achieving

some of its core objectives (the global elimination of chemical weapons arsenals and capabilities). This was also recognised by awarding of the Nobel Peace Prize to the OPCW in 2013.⁵

More remains to be done to achieve a chemical weapons free world: a few countries have yet to join and some may join as present or former CW possessor states which would trigger verification and destruction obligations; the completion of the destruction of the remaining chemical weapons in the United States; and the closure of the Syria file, and in this context the elimination of any chemical weapons and related infrastructure that many countries believe still exist.

But the transition has begun of an organisation that defines its primary objectives in terms of achieving global chemical weapons disarmament, to one that focuses on ensuring that no chemical weapons will 're-emerge'. This, inevitably, will shift OPCW verification objectives and methodologies. The Director-General in 2011 established a high-level panel on future OPCW priorities, which made a number of recommendations with regard to how the verification system of the CWC should evolve to take account of the changing implementation environment. With regard to industry verification, the panel observed that '[in] an era of globalisation with chemical industry spreading around the globe and chemical trade creating global partnerships and dependencies, and where information about chemical activities is available from an ever-expanding pool of authoritative sources on the Internet, it is difficult to comprehend why the Technical Secretariat does not make better use of open source information'.⁶ The panel also observed that the reluctance of States Parties to adapt the CWC's Schedules of Chemicals to advances in science, technology and industry had 'frozen' much of the industry verification system in the past. The system remains relevant with regard to the verification of non-production of chemical weapons as known from the Cold War. It reflects less and less, however, the emerging threats related to the possibilities of future hostile use of toxic chemicals', and it recommended that the Schedules be reviewed on a regular basis.⁷ With regard to directing industry inspections to the most relevant facilities, the panel made a number of suggestions that aimed at a holistic approach of using all information available to the Technical Secretariat. At the same time, it noted a number of restrictions that the OPCW had put in place, based on concerns about the protection of confidential information, and recommended that the OPCW take measures to ensure that the verification process enjoy the integrity and independence required under the Convention.⁸

The panel underlined the importance that the OPCW maintain the resources, technical competence, operational readiness and professional skills to implement challenge inspections, and it stressed that it was important that the States Parties themselves develop and maintain practical understanding of the requirements of this mechanism.⁹

With regard to investigations of alleged uses of chemical weapons, the panel assumed that the demand for such investigations was likely to grow given the emerging CW threat environment. That might require a rethinking of operational procedures and of the interaction of the OPCW with the UN and with states hosting such investigations. The OPCW's capacity depended:

'on a critical mass of well-trained inspectors with the right mix of technical skills and expertise. As the overall demand for inspectors with chemical weapons expertise and skills related to work in chemical warfare environments declines given the decline in chemical weapons destruction activity, the Technical Secretariat may have to develop new concepts for how it can maintain readiness to conduct investigations of alleged use. . .'.¹⁰

The panel also recalled the UN Secretary-General's Mechanism for investigating allegations of the use of chemical, biological and toxin weapons, noted the need for close cooperation between the OPCW and the UN in this regard, and stressed that 'both mechanisms need to be developed towards procedural inter-operability, similar technical and procedural standards and operational coordination'.¹¹ Many of these concepts re-emerged just two years later, when the OPCW was called upon to support the UN investigation of the use of chemical weapons in Syria, and the elimination of Syria's chemical weapons programme.

This panel report was a first step by the OPCW into a more systematic discussion of the requirements and opportunities emanating from the regime transition from achieving to maintaining CW disarmament. Consultations about evolving priorities took place among member states, and between them and the Director-General. The Scientific Advisory Board (SAB) as well as the Technical Secretariat made their contributions in the form of studies and strategy papers.

In March 2015, the Technical Secretariat issued a 'vision paper' under the title 'The OPCW in 2025: ensuring a world free of chemical weapons'. Building on the outcomes of the 3rd Review Conference, the paper intended to engage with States Parties in a forward-looking discussion of what the OPCW should look like in the future and how it could best fulfil the object and purpose of the Convention. The paper framed the vision for the OPCW in 2025 as being the 'premier international organisation working for a world free of chemical weapons, with a focus on preventing their re-emergence, by implementing all provisions of the Convention in an effective, efficient, and non-discriminatory manner'.¹²

To this end, verification remains important to ensure treaty compliance. Capacity development to prevent the misuse of chemicals and foster their beneficial uses complement verification, and the vision paper amongst others pointed to national implementation as well as enhanced chemical security and the need to engage a wider

audience and broaden existing networks to empower broader participation in the OPCW's mission and to leverage capabilities of others. What, then, are the challenges that the OPCW faces with regard to verification?

Challenges to the CWC verification system

The verification methodology used by the OPCW during the initial two decades of CWC implementation could perhaps be described, if in a somewhat simplified manner, as an *accountancy verification* approach. Based on data declared by States Parties—chemical weapons and CW production equipment inventories; amounts of Schedule 1 and 2 chemicals produced (processed, consumed); production ranges of Schedule 3 chemicals; and unscheduled 'discrete organic chemicals' including PSF chemicals—OPCW inspectors would conduct physical and book inventories, compare declared data with actual numbers/weights present at a facility (or processed through a destruction facility over an operational period), and attempt to resolve any inconsistencies between declarations and reality. Inspectors would confirm declaration data (or request a declaration amendment), confirm the amounts of chemical weapons or CW production capacity destroyed, and eventually certify the completeness of the destruction of a given stockpile, or the destruction or conversion of a CW production facility.

This approach will continue to remain sound for future chemical weapons related routine verification measures. The OPCW, also, will continue to devote verification resources to monitoring the destruction of non-stockpile (old and abandoned) chemical weapons. It also needs to retain the capability to conduct CW verification when any of the remaining States not party that has declarable CW items or facilities joins the treaty regime. But recent experiences have underlined the importance to go beyond confirming declaration data, and to address more fundamental questions about whether the submitted declarations were in fact complete and accurate, and whether chemical activities of the States Parties were consistent with the requirements of the CWC.

From verifying declared CW capabilities to ensuring the completeness of the elimination of past CW programmes

In the CW domain, questions have arisen about the completeness of certain declarations (the Syrian declaration as well as the absence of Novichoks from declared CW stockpiles being the most recent examples). There also remains the possibility of future uses of chemical weapons by states or non-state actors, which may require investigations of such allegations by the OPCW.

The case of Syria is of particular importance. Syria joined the CWC after the use of the nerve agent Sarin was confirmed by the UN Secretary-General's investigation

of alleged chemical weapons uses in Syria in 2013. Based on a US-Russian framework agreement, the OPCW Executive Council on 27 September 2013 adopted a decision on the elimination of the Syrian chemical weapons programme (EC-M-33/Dec.1), which was subsequently endorsed by UN Security Council resolution 2218(2013). This created the legal framework for the elimination of Syria's chemical weapons programme by the UN-OPCW Joint Mission (JM) and the verification measures applied in that context.¹³

However, concerns about the completeness of the Syrian declaration emerged soon after the submission of its declaration to the OPCW. In April 2014, the OPCW Director-General established what subsequently became known as the Declaration Assessment Team (DAT), to work with Syria on filling any gaps in its CW declaration. Initially, this approach worked reasonably well and a number of additional elements of the Syrian CW programme were declared to the OPCW. This was qualitatively different from previous efforts of the OPCW to assist States Parties with their declarations (based on paragraph 38(e) of Article VIII of the CWC which authorises the Technical Secretariat to provide technical assistance and technical evaluation to States Parties in the implementation of the provisions of the Convention). Such technical assistance had been provided in the past to help States Parties decide how to declare certain facilities, or to identify declarable facilities in their chemical industry.

The DAT was set up to deal with perceived gaps in the Syrian CW declaration. It had a more investigative nature and attempted to reconstruct aspect of the Syrian CW programme. A reading of the reports presented by the Director-General of the OPCW over time shows increasing frustration on the part of the OPCW with the Syrian cooperation with the DAT: whilst the initial relationship was cooperative and productive, later interactions were increasingly characterised by obstruction. In March 2018 (four years after the DAT was established), the Director-General reported that the 'Secretariat remains unable to confirm that the Syrian Arab Republic has submitted a declaration that can be considered accurate and complete in accordance with the Convention and the decisions of the Council'.¹⁴

Syria was not the only example for concerns about the completeness of CW declarations. Other such concerns, as a rule, been have dealt with through bilateral consultations between the States Parties concerned. The formal clarification procedures of the CWC including challenge inspection have never been used. The Second CWC Review Conference encouraged States Parties to use informal mechanisms and noted with satisfaction no challenge inspection had been requested.¹⁵ The Third Review Conference again noted that no challenge inspection had been requested, and requested the Technical Secretariat to improve its readiness to conduct challenge inspections and investigations of alleged use.¹⁶

Another incident—the Novichok poisoning of former Russian spy Skripal and his daughter in March 2018 in the UK—highlighted the political peril of not dealing

with non-compliance concerns. The assassination attempt quickly turned into a dispute about whether or not the Russian CW declaration had been complete and accurate; half a year after the OPCW had certified that Russia had completed the destruction of all its declared chemical weapons. But whilst the UK asked the OPCW to confirm the analysis of the causative chemical agent used in the attack, the underlying non-compliance concern related to the absence from the Russian declaration of information about the past Soviet programme to develop and weaponise Novichok agents (the 'Foliant programme') has yet to be resolved. As some observers have argued, a formal clarification procedure under paragraphs 3-7 of Article VIII could have created a context wherein this issue might have been discussed in a multilateral framework, allowing to bring into the debate about the Skripal assassination attempt the issues related to the missing Novichok declarations by Russia, and providing a procedural framework that might have facilitated a resolution of the matter.¹⁷

Both cases—the Syria experience and the Skripal affair—highlight the importance of looking again at the effectiveness of the CWC verification system with regard to providing assurances about the completeness of CW declarations. Two basic questions have emerged: should the verification system be capable not only of detecting a violation but also of establishing culpability (at least in the case of the use of a chemical weapon); and to what extent can it rely on *ad hoc* mechanisms designed for each specific case rather than the provisions and mechanisms provided by the CWC itself?

The first question has been answered by the 4th Special Session of the Conference of the CWC States Parties in June 2018: yes, it should. Initiated by the United Kingdom after the Skripal affair, influenced by the investigations of chemical weapons uses in Syria, and cognisant of recent CW uses in Iraq and Malaysia, this special session of the Conference amongst others requested the Technical Secretariat and the Director-General to:

- Put in place arrangements to identify the perpetrators of the use of chemical weapons in Syria by identifying and reporting on all information potentially relevant to the origin of those chemical weapons;
- Preserve and provide information to the relevant investigation mechanism established under the auspices of the United Nations;
- Consider options for further assistance to States Parties to help prevent the chemical weapons threat posed by non-state actors, and to aid States Parties' contingency planning in the event of a chemical weapons attack;
- Provide technical expertise to a State Party investigating possible chemical weapons use on its territory, upon request, to identify those who were perpetrators, organisers, sponsors or otherwise involved in the use of chemicals as weapons; and

- Submit to the 2018 regular session of the Conference a report with proposals to enhance the capacity and tools of the Secretariat to strengthen the implementation of the CWC verification regime, options for further assistance to States Parties in several implementation areas, and other proposals to strengthen the capabilities of the Technical Secretariat.¹⁸

The special session also authorised the Director-General to enlist support of outside experts with relevant qualifications and professional experience to help with attribution, and prepare specific proposals to establish such independent, impartial, expert arrangements.¹⁹

The decision was taken by vote (82 in favour, 24 against); it remains to be seen how these different mechanisms will work out in practice given the political divide in the OPCW about this matter. Signs of a split within the OPCW came to the surface during the 2018 annual session of the Conference of the States Parties, in the context of the adoption of the programme and budget of the OPCW for 2019, which included allocations for the setting-up of a new office—the Investigation and Identification Team (IIT)—to implement aspects of this decision. The dispute over the legality of the decision (whether it was interfering with the prerogative of the UN Security Council) also was one of the issues that prevented the OPCW from adopting a Final Document at its Fourth Review Conference immediately after that annual session.

As for the second question (reliance on *ad hoc* mechanisms *versus* use of the clarification mechanisms established by the CWC), the issue is less clear-cut. The DAT and FFM mechanisms have been described as examples for a flexible, adaptive application of the principles and objectives of the CWC that were easier to apply under the prevailing circumstances than the formal CWC procedures. Challenge inspection, in particular, was seen as politically sensitive by many countries. It had not been invoked by any State Party in the past, and there were fears that it might not be implementable under the conditions of the Syrian armed conflict, and too confrontational in political terms. Also, there may have been concerns that a failure to implement successfully a challenge inspection might damage the mechanism. *Ad hoc* arrangements based on the general authority given to the Director-General by the CWC were seen as more appropriate and flexible in the given context.

But there is a penalty for this flexibility: whilst the rules of the CWC have been worked out in great detail during the negotiations, the rules of engagement for *ad hoc* mechanisms and the criteria used in the assessment of investigation results are less clearly defined, and depend on the express consent and cooperation of the host country. This puts the Technical Secretariat into a position where it may have to defend its investigation methodology and conclusions against standards of proof that the State(s) Party(ies) directly concerned can set at their own discretion.

It is important, therefore, that the Technical Secretariat maintain its political and technical competence and operational capacity to implement challenge inspections and investigations of alleged use as regulated by the CWC, and that the OPCW continue to work on agreed evaluation criteria and standards for the evaluation of the results of investigative inspections.

The flip side of verifying the elimination of State chemical weapons stockpiles programmes is to provide assurances for the non-re-emergence of chemical weapons from legitimate chemical activities of the States Parties.

From verifying industry declarations to verifying the absence of the re-emergence of chemical weapons

In the field of legitimate chemical activity, the CWC verification system has been reliable in addressing whether declared industrial production data were accurate. More important for CWC compliance in the future, however, will be whether the activities of the chemical industry remain consistent with CWC obligations or whether there are indications for the emergence of breakout capabilities that could undermine the CW prohibition.

These demands on the verification systems are already inherent in the design of the CWC verification system, but new challenges stem from advances in science and technology, often subsumed under the notion of convergence between chemistry and biology in the life sciences, and their manifestation in industry.

Convergence at the intersection of chemistry and biology, as well as enabling technologies such as the industrial use of micro-processing equipment, nanotechnology, information technology and the evolution of the Internet, may challenge the verification system of the CWC in different ways. Examples include biological and biologically mediated processes for industrial-scale chemicals manufacturing; changing technological features associated with the manufacturing of highly toxic chemicals and a loss of signatures indicative of the production of highly toxic, volatile compounds; the emergence of novel agent candidates with new toxicological profiles (for example CNS-acting chemicals with high potency and relatively low lethality); new methods of agent delivery that may allow the use of biologically active molecules that in the past were not suitable for CW purposes (for example bioregulators); and synthetic methods to manufacture biomolecules such as toxins or bioregulators more effectively.²⁰

Convergence also is the blurring of lines between the hitherto separate arms control regimes applicable to, respectively, chemical and biological weapons. Although not a new issue *per se*, convergence as experienced today has a number of effects that are relevant to the functioning of the verification system:

- A dramatic reduction of the time it takes from scientific discovery to practical application, and an increasing potential for non-linear advances in the understanding of life processes;
- A growing role of drivers from within the R&D and industrial communities; and
- A new, globally distributed and interconnected environment of scientific and technological collaboration.²¹

These various aspects of convergence pose serious questions for the verification system of the CWC. To quote the report of the First Convergence Workshop of Spiez Laboratory:

‘The farther the distance in time grows from the chemical and biological weapons programmes of the Cold War area, the more one must ask what a novel chemical or biological weapon might look like. Would risk evaluation actually recognise the intended use of certain chemical or, perhaps more importantly, biological agents? What would a new biochemical weapons programmes look like?’²²

Issues raised in this context included the possibility of outsourcing to customs manufacturers in multiple countries, the option of renting production equipment, the manufacturing of sophisticated and high-performance equipment or components thereof by the end users, as well as proliferation networks with semi-legitimate front companies.

Advances in science and technology have also led to the emergence of new types of industrial plants with ‘intrinsic CW capability’. CWC negotiators attempted to deal with this issue in the context of the regime for other chemical production facilities (in particular the so-called PSF plants) under Part X of the CWC Verification Annex. But some of the plants that are today used in the pharmaceutical industry (small, highly flexible, manufacturing highly potent biologically active ingredients, using multipurpose equipment, equipped with safety features comparable to previous CW programmes) fall outside of this control regime whilst, in terms of capability, they may be of similar relevance to the CWC as certain Schedule 1 facilities.²³

Responses to such advances in science, technology and industry must be proportional and appropriate, but at the same time CWC verification does need to adapt to new realities. The OPCW vision paper suggested that:

‘[verification] to ensure continued confidence in compliance will remain at the heart of the Organisation’s work. But its methods and practices will need to be adapted to changing realities. In addition to maintaining a viable industry verification regime and

preparedness for non-routine inspections, greater emphasis will be placed on enhancing the Organisation's analytical capabilities'.²⁴

The need for a greater emphasis on a more holistic approach to verification has also been emphasised by the SAB. In the 2015 Report of its temporary working group on verification, the SAB looked at the experience of other international organisations with regard to verification, and emphasised:

'the value of evaluating all relevant data available, combined with appropriate information technology tools. The information utilised by these organisations is not limited to that submitted in accordance with treaty obligations but spans a wide range of additional sources. Information collected from open sources can provide insights into trends and developments that would not be picked up through the formal information flow'.²⁵

The SAB recommended that the OPCW's approach should:

'no longer be compartmentalised in organisational units. The Secretariat should move towards a comprehensive, systems-based approach where all the separate elements of information are combined and analysed in a systematic and collaborative manner within the organisation. Currently, information management support to the verification process is insufficient: there is a lack of analytical tools and the Verification Information System (VIS) has shortcomings in certain areas. The Secretariat should take steps to implement an information management structure that can support the needs of the verification process'.²⁶

Four key points sum up the challenges that the CWC verification system faces:

- CWC verification should move from accountancy verification (providing full accountability from declaration to destruction — which will remain essential as long as declarable CW items exist) to providing assurances that no CW capabilities remain undeclared and no new chemical weapons are being developed and acquired;
- There is therefore a need to enhance the investigative capability of the verification system to address allegations of non-compliance (including attribution of culpability for violations);
- The verification system needs to more quickly respond to changes in science, technology and the industry environment; and
- CWC verification should take a holistic approach, allowing the Technical Secretariat to use all relevant information sources available to it, in order to create a comprehensive image of CWC compliance for each State Party.

To achieve these objectives, what ought to be done to strengthen the CWC verification system?

How to strengthen the CWC verification and monitoring system

Perhaps most important is a further strengthening of the political culture of the OPCW (the Executive Council and the member states) to respond to verification findings in a constructive way based on the goals and requirements of the CWC. The discussions of the findings of the different Syria missions have shown an increasing polarisation in the OPCW policy-making organs, with little expert-level discussion of the factual findings and their implications for compliance, and decision-making following group solidarity. It will be important that member states find a way back to identifying common ground and shared interests based on the object and purpose of the CWC.

A precondition for this will be that the verification system and its procedures, technical methods and instruments remain technically sound and up to date, and are trusted by the member states. Member states must have confidence in the competence as well as the impartiality and neutrality of OPCW inspectors and verification officers, and the verification methods they use. This requires a reporting by the Technical Secretariat on verification methodologies, investigation conduct and results that is comprehensive, accurate and transparent; and it calls for a broad conversation about how the verification system of the OPCW should evolve. This conversation should involve the Technical Secretariat, member states, the SAB and external stakeholders, such as the chemical industry.

In 2015, the SAB submitted 18 specific recommendations concerning the further improvement of the OPCW verification system. These included:²⁷

- Adopting a comprehensive, more analytical approach to verification utilising all available and verifiable information;
- Using open-source information on a routine basis;
- Adopting an information management structure that can provide the support required for the verification process;
- Adding remote/automated monitoring technologies to the approved equipment list;
- Use of satellite imagery for the planning of non-routine missions;
- Visits to National Authorities to obtain assurance of the accuracy and completeness of declarations;
- Commissioning an independent review of all activities pertaining to the missions in Syria;

- Adopting an understanding that other chemical production facilities (OCPFs) to be declared by States Parties should include all such production facilities regardless of the purity of the chemical produced, including in mixtures;
- Fine-tuning the OCPF verification system to reflect the different relevance to the object and purpose of different types of OCPF;
- Reviewing the verification thresholds with regard to highly relevant chemicals and related thereto a revision of the product group codes used in declarations;
- Increasing the staff of the OPCW Central Analytical Laboratory to cope with the various aspects of investigations of alleged use (IAU) of chemical weapons, biomedical sample analysis, trace environmental analysis, toxins and on-site analysis;
- Extracting lessons from the OPCW laboratory support for the 2013 United Nations Secretary General's Mechanism (UNSGM) investigation and subsequent missions in Syria;
- Incorporating a broader range of chemicals, and at a broader range of concentrations, into OPCW Proficiency Tests;
- Expediting toxin identification exercises;
- Continuous addition of relevant chemicals (including some non-scheduled degradation products and derivatives of scheduled chemicals and non-scheduled chemicals relevant to IAU) to the OPCW Central Analytical Database;
- Developments in instrument portability, miniaturisation and disposable biosensors for on-site analysis;
- Developments in attribution analysis/chemical forensics; and
- Augmentation of the capability to monitor and forecast developments in science and technology of relevance to the CWC.

The need to move towards a more holistic verification approach

These recommendations were reviewed again and further developed by the SAB in preparation for the Fourth Review Conference.²⁸ The Director-General in his response to the SAB report supported the observations and recommendations by the SAB and indicated steps already taken by the Technical Secretariat in several action areas.²⁹ He pointed out that to be able to fulfil its mandate, the Technical Secretariat needed to maintain its current levels of knowledge and capacity, and expand its skills to keep pace with change. He identified as priority areas: skills and training requirements, knowledge management, staying abreast of changes in chemical production technologies, advancements for chemical analysis (including for certain non-scheduled chemicals),

and technologies that enable more effective implementation of the verification regime.³⁰ Several of these recommendations relate to the need to move towards a more holistic verification approach. As the SAB explained in 2018:

‘Effective verification is not the assessment of an individual data point as the outcome of an inspection, but rather all relevant data points pertaining to the site and State Party. To be able to better understand the effectiveness and completeness of the implementation of the Convention, the Secretariat was encouraged to move towards a comprehensive systems-based approach where all the separate elements of information are combined and analysed systematically. The SAB therefore recommended that the Secretariat considered adopting a comprehensive, more analytical approach to verification utilising all available and verifiable information’.³¹

This will require a more sophisticated system for gathering, managing and analysing information relevant to treaty compliance, including making use of a variety of data sources: declaration data and findings from inspections, but also other information available to the Technical Secretariat, such as the national implementation and enforcement measures that States Parties have put in place, or reliable information about chemical activities and facilities in the public domain. It will also require adjustments in the way in which the Technical Secretariat manages, shares and controls information; changes in how it manages collaborations across its different units; and upgrading its information technology systems to facilitate such analytical work.

The OPCW has begun applying such broader approaches to information gathering and analysis in its investigations of alleged CW uses in Syria, but member states in the past have been reluctant to accept the Technical Secretariat using public-domain data for other verification purposes. The Secretariat’s ‘vision paper’ envisages the Secretariat:

‘gathering, validating, and evaluating information befitting an independent and more holistic assessment of how the treaty is implemented. . . . An augmented capability to use reliable publicly available information will form part of this process. . . [It] will also require enhanced capabilities to monitor the full spectrum of relevant toxic chemicals falling within its mandate, ranging from toxic industrial chemicals to chemicals used for example in medicine or law enforcement, including those acting on the central nervous system’.³²

This may call for expanding the Technical Secretariat’s ‘Information Cell’, in scope as well as size, to develop systematic procedures to review States Parties data from a range of sources, and to put in place IT systems and software tools that support such analyses.

The need to strengthen the investigative and forensic capabilities of the Technical Secretariat

A second issue identified above was the need to strengthen the investigative and forensic capabilities of the Technical Secretariat. With regard to training and the development of forensic awareness of OPCW inspectors, this process has begun. Also noteworthy is that the OPCW has been gradually expanding the scope of its networks of Designated Laboratories. In addition to the network of Designated Laboratories established after the entry into force, which has developed a trusted capability for off-site analysis of environmental samples (soil, water, organic matrices, wipe samples taken from contaminated surfaces, etc.), the OPCW has now established a second laboratory network working in the field of biomedical (clinical) samples (blood, urine, tissue and other biological samples), and it has conducted initial confidence building exercises in toxin analysis. The requirements for the latter area of work still need to be further developed, in particular with regard to toxins not listed in the Schedules.

In addition, forensic verification tasks may require other technical and laboratory competencies such as the analysis of impurity and isotope profiles in chemical samples, or of metal compositions of remnants of equipment and delivery systems. The SAB in its verification review discussed the issue of chemical forensics and noted that '[once] the methodology has been developed further, and shown to be robust, it could complement other OPCW verification tools, particularly in IAUs and related fact-finding activities'.³³

In 2016, the SAB took up the issue of chemical forensics, in an international workshop organised together with the Finnish verification laboratory VERIFIN. The workshop discussed a range of still-evolving analytical techniques including impurity profiling and isotope ratio determination, analysed their potential for forensic attribution tasks, identified their limits and areas where further development was needed, and recognised the need for a broader engagement in the field.³⁴ With regard to CWC verification, the workshop noted that results of chemical forensics investigations were seldom definitive and must be integrated with other information. There was also a need for developing and curating reference databases necessary to accurately interpret result.

In 2018, the SAB established a temporary working group dealing with investigative science and technology.³⁵ The group began its work by reviewing the experiences of a past CW investigation missions including the 2013 UNSGM investigation in Syria, the DAT and FFM missions of the OPCW in Syria; and the OPCW-UN Joint Investigative Mechanism.

The JIM experience in particular highlighted that attribution investigations can easily be politicised, that it requires the use of multiple, mutually reinforcing analytical

techniques and other evidence, and that some of the analytical techniques have yet to mature and more work is needed to validate analytical methods and standards. The SAB working group then set up a number of sub-working groups to pursue a range of specific issues.

These discussions in the OPCW indicate that although the level of confidence among States Parties in the work of the networks of OPCW Designated Laboratories is high, the stakes in attribution investigations are such that demands for unambiguous results and 100 per cent certainty can easily be used to challenge, discredit or disregard investigation results. It is important therefore that the development of the OPCW's forensic capability includes the development of mutually accepted criteria and standards for the interpretation of the result of such investigations. This is a precondition for maintaining technical credibility and acceptability of results and technical conclusions.

Verification methods and equipment

A third issue is verification methods and equipment. Generally speaking, the experience of the OPCW with inspection equipment has been positive, including under complex and at times extreme conditions. The missions in Syria in particular have shown that although OPCW inspection teams have adequate equipment at their disposal, there are certain functional areas where additional equipment types would be desirable.

Specialised equipment to support safety and security of operations in conflict zones had not been part of past OPCW planning. The Syria missions had to be provided with body protection and other safety/security equipment (such as location tracking devices) that required familiarization training to develop confidence in its use.³⁶ This was a challenge for the early missions in Syria given their rapid deployment in October 2013. The ability to perform in high-risk environments should be maintained by the Technical Secretariat as part of its overall mission readiness, including with regard to the procurement of equipment needed in such scenarios and training in its use.

Portability is another key consideration for field missions. The standard OPCW on-site analysis suite includes a man-portable gas chromatograph-mass spectrometer (GC-MS) instrument, a sample preparation kit and transportable fume cupboard. Such a mobile laboratory can be set up and operated with minimum logistical and other support by the host country, but it is still quite heavy and must operate at a centralised location. In Syria, the OPCW used ruggedized hand-held Raman spectrometry for the first time to confirm the identity of declared chemicals. It was a method that turned out to be robust in the field and that performed well. Furthermore, the SAB observed that:

'Portable GC- and LC-MS instrumentation and direct sampling MS techniques, such as Desorption ElectroSpray Ionization (DESI) and Direct Analysis in Real Time (DART), which both eliminate the need for sample preparation, continue to improve. These direct sampling techniques have the potential to extend the range of analytes that could be determined on-site. DESI is already being used for Convention-related analysis in some mobile laboratories'.³⁷

Other opportunities may emerge from the development of sensors and hand-held detection devices, as well as networks of electronic nose (eNose) devices.³⁸

Also, the Syrian experience, as well as the removal of the remaining chemical weapons from Libya for destruction abroad, have underlined the benefit of using remote and/or automated verification techniques (video recordings, photography, etc.) in circumstances when OPCW inspectors could not access a site. These devices can be made tamper-resistance and equipped with geo-location devices to ensure that the data recorded can be authenticated. Other remote systems applied by the OPCW included the use of remote monitoring systems to ensure that tunnel structures that had been used for CW production in Syria and were closed off as part of the destruction operations remain closed and, thus, inoperable. Future opportunities may emerge from the integration of analytical tools with robotic systems (Mars-rover-like systems).³⁹

The SAB observed that MS-equipped unmanned aerial vehicles (UAVs) could be used in non-compliance related investigations:

'UAV with a 12 kg payload, 1 h flight time, 3-5 km range, and automatic take off/landing capability, could be customised with sampling capabilities, and deployed from afar. Using such systems could help to ensure the safety of OPCW personnel collecting evidence in hostile or contaminated environments'.⁴⁰

Other trends that may change the way equipment is used by OPCW inspectors include wearable technologies (both for safety monitoring and detection), point-of-care diagnostic devices and smart devices.

With regard to off-site analysis, significant progress has been made by the introduction of high-resolution mass spectrometry. This will be particularly valuable when the mass spectra of unknown compounds are not included in relevant databases (such as the OPCW Central Analytical Database (OCAD) or commercial databases such as the one maintained by the US National Institute of Standards and Technology (NIST)). Current developments that the SAB highlighted for the future verification tasks of the OPCW include validating methods for toxin analysis (mass spectrometry, immunoassays, other bioassays and quantitative NMR) and the measurement of site-specific natural abundance of stable isotopes for forensic analyses.⁴¹ More work will

be required with regard to toxic chemicals, degradation products, biomarkers and characteristic impurities in the context of forensic investigations. Past cases of the use of toxic chemicals as weapons have demonstrated that this must also include chemicals not covered by the Schedules, such as certain industrial chemicals (e.g. chlorine), toxins, and agents that were part of CW development programmes (e.g. Novichoks).

Another area that will need attention are IT systems for secure transmission of voice and electronic data from headquarters to a field mission and *vice versa*, as well as for information management and protection. The SAB observed that:

‘[reviewing] advances in analysis tools for cross-referencing, validating, and linking information related to investigation sites, materials collected/analysed and individuals interviewed, would inform the development of a system to better support the collection and management of data by the OPCW. Information management systems should integrate disparate sources of data and provide secure and readily searchable capability. To expand forensic capabilities a comprehensive systems-based approach where the separate elements of information are combined and analysed systematically is needed’.⁴²

If it is correct that future OPCW tasks are likely to include missions into non-permissive environments, there may be a need to include these types of equipment in the OPCW list of approved equipment so they can be procured in advance. The experience in Syria and Libya has shown that the procurement system of the OPCW can become a bottleneck, even if expedited procedures are used. Unless there are options for the OPCW to loan such equipment from other sources (e.g. member states) on short notice, or to procure items using systems that can avoid tendering, even expedited procurement measures often take too long for contingency operations.

Furthermore, the Syria experience has demonstrated the importance of using satellite imagery; it proved very beneficial for the preparation and planning of field activities as well as safety and security support, and provided a way of independently assessing security-related and site-specific information. The OPCW capacity to acquire and interpret satellite imagery was developed with support from the UN Institute for Training and Research (UNITAR) Operational Satellite Applications Programme (UNOSAT) and the European Union. This competence must be maintained if the OPCW is to get involved in future contingency operations. The SAB recommended that these techniques also be used for the planning of routine verification tasks, including for the inspection at sites that are difficult to access.⁴³

Finally, open sources monitoring has become a useful tool to collect and check information that might become important for subsequent operational planning and the preparation of verification activities. The Syria mission clearly demonstrated the utility of this method for developing situational awareness and understanding, and

there are plans to integrate open source monitoring into the future verification and field operations tool kit of the OPCW.

Resources and funding

All of the above needs will require member states to make available adequate funding to enable the Technical Secretariat to maintain the necessary resources, including qualified and trained personnel, equipment fit for purpose and infrastructure, as well as its networks of Designated Laboratories (and the associated resources necessary at the OPCW to validate their proficiency, as required). It is noteworthy in this context that the OPCW has been functioning on a zero nominal growth budget for many years, and that this practice is likely to continue for the foreseeable future. Hence, there is a need to fund any expansions through either savings elsewhere, or through voluntary contributions by member states.

With regard to human resources, one critical issue will be how the Technical Secretariat can maintain the necessary depth of expertise in the chemical weapons domain. The overall size of the Inspectorate, as well as its relative composition with regard to technical specialties, is to a large degree determined by the number of CW destruction facilities that are operational in a given year. This is the result of the requirement to have inspectors present at destruction facilities at all times when the facility is operating. Optimization efforts including the use of recording devices and containment measures to prevent diversions have reduced the team sizes significantly, but nevertheless, these long-term inspections with around-the-clock monitoring capability 'consume' the majority of inspector days in the field.

As the United States approaches the end of its destruction programme in 2023 (with only one CW destruction facility still in operation during the final years), it is likely that the Inspectorate will shrink significantly in a few years. This reduction in size, the application of the OPCW tenure policy and a shrinking pool of chemical weapons experts that the OPCW can use to recruit new inspectors, may result in a thinning out of technical competence with regard to chemical weapons and their destruction. The continuing verification activities in such areas as old and abandoned chemical weapons will not generate sufficient demand to maintain adequate human capacity with the necessary technical expertise. Contingency operations will require such technical expertise but the human resource requirements cannot easily be predicted, and it is unlikely that member states would authorise a 'standby capacity'. The OPCW will have to consider options to manage this problem, including developing a stronger 'ramping-up' capacity for bringing on board external experts on short notice when the need arises; multitasking so that CW expertise can be maintained in other areas of

the Technical Secretariat (for example, the International Cooperation and Assistance Division's assistance and protection portfolio); and enhancing its training programme to maintain the required technical skill sets across a larger number of staff members.

New verification methods and equipment and methods that have been proposed by the SAB and others will need to be developed and evaluated with regard to whether they meet the needs of the OPCW inspection/verification process. The SAB in its report to the 4th Review Conference has proposed several case studies to better define opportunities and requirements for future verification methods and equipment. These requirements are likely to include several new methods suitable for on-site analysis; studies of the needs for unmanned systems for deployment in high-risk environments; the use of vegetation as indicator for CW exposure; analytical methods for construction materials in chemical forensics investigations; analytical methods for provenance and attribution; and building up and curating authentic sample collections, object collections and analytical databases, as well as other analytical information and annotations. This process of using case studies to define new opportunities and requirements, which should include experts from the Technical Secretariat as well as member states, may lead to the establishment of a more efficient system of needs definition, specification, and evaluation of equipment required for on-site inspections and other verification tasks.

Part of this more systematic approach to developing equipment and infrastructure is the planned upgrade of the OPCW Central Laboratory and Equipment Store to a Centre for Chemistry and Technology. The Technical Secretariat proposed such an upgrade in 2017, describing its objectives as follows:⁴⁴

- To augment the analytical capabilities at the Central OPCW Laboratory;
- To augment the capacity of the Technical Secretariat to test, evaluate and deploy equipment;
- To obtain an OPCW capability to engage in research;
- To augment the OPCW's training capacity;
- To support an increase in the number of Designated Laboratories and support the expanded needs for Official Proficiency Testing and the management of the networks;
- To obtain investigatory capability to assist judicial processes; and
- To obtain a capability to safely synthesis small quantities of CW agents.

This upgrade will require new infrastructure and equipment. The cost for the upgrade has been estimated at €20-25 million. A special Trust Fund has been set up to manage the voluntary financial contributions by member states in support of the project.⁴⁵ At the end of 2017, the Technical Secretariat published a needs statement, which considered three alternative concept plans: renovation and extensions of the

existing facility in Rijswijk; construction of a new facility; or acquisition (own or rent) and renovation of an existing facility.⁴⁶

This upgraded facility will be essential for the OPCW to manage the technical and scientific challenges of the evolving CWC verification system, taking full advantage of new opportunities that could lead to miniaturisation/automation of equipment needed for verification, the use of remote or autonomous verification tools, the expansion of the equipment suit for on-site inspections, the further growth of the Designated Laboratories network both with regard to geographical spread and competence for specific analytical tasks, and the development of new verification methods and protocols, including with regard to chemical forensics.

Similar efforts will also be needed to upgrade the information management systems of the Technical Secretariat—both in the field and at headquarters—in order to adequately support the desired holistic verification concept.

The challenges that the OPCW faces with regard to adapting its verification system to changes in the implementation environment of the CWC, but also the opportunities for new verification concepts and capabilities that emanate from advances in science and technology, are formidable. This is augmented by institutional pressures such as the impact of a costly tenure policy that has only marginally delivered towards its stated objectives, the need to adapt the Technical Secretariat's structure and internal processes to the changing priorities and requirements of the OPCW, and a zero nominal growth budget approach that is likely to stay. The Fourth Review Conference was an opportunity to strengthen the political support of member states towards the further enhancement of the CWC verification system, and to ensure that funding for these developments through the regular budget and voluntary contributions will be forthcoming as needed. Its failure to adopt a Final Document, however, and the continuing controversy over the creation of the new attribution mechanism—the OPCW's Investigation and Indication Team—is casting shadows over the ability of the OPCW to address some of these challenges. As CWC implementation is moving from achieving disarmament to ensuring constancy of a chemical weapons free state of the world, getting the balance right between technical sophistication, procedural rigidity, operational robustness and political acceptability will be a challenge for the OPCW leadership and its member states.

Endnotes

- 1 The views expressed in this article reflect only those of the author.
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- 3 The FFM was set up in 2014 by the Director-General of the OPCW, based on an agreement with the Syrian Government which was subsequently endorsed by the Executive Council, 'to establish facts surrounding allegations of the use of toxic chemicals, reportedly chlorine, for hostile purposes in the Syrian Arab Republic'. See 'OPCW Fact-Finding Mission Continues Deployment to Syria', OPCW News, 14 April 2018, <<https://www.opcw.org/media-centre/news/2018/04/opcw-fact-finding-mission-continues-deployment-syria>>. It has investigated numerous cases of alleged uses of chemical weapons using chlorine and in some cases sarin, and confirmed some of them. Its mandate does not extend to identifying those responsible for these acts.
- 4 In April 2014, the OPCW Director-General assigned a team of Technical Secretariat experts to discuss with the Syrian authorities Syria's initial declaration of October 2013 and subsequent amendments. This team eventually became known as the Declaration Assessment Team (DAT), and since its initial visit has conducted numerous site visits, taken samples for analysis by OPCW designated laboratories, undertaken technical consultations, and conducted interviews with key principals of the Syrian chemical weapons programme. For details see <<https://www.opcw.org/declaration-assessment-team>>.
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- 10 *Ibid*, para 68, p. 17.
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- 19 *Ibid*.
- 20 Michael Crawley, Malcolm Dando and Lijun Shang (Eds.) *Preventing Chemical Weapons: Arms Control and Disarmament as the Sciences Converge*, Section III, Chapter 7 *Convergence of Chemistry and Biology, and Nanotechnology*, RSC Publishing (London 2018), pp. 193-227.
- 21 Spiez Laboratory and ETH Zurich, *Spiez Convergence*, Report on the first workshop, 6-9 October 2014, pp. 14-15.
- 22 *Ibid*, p. 39.

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- 26 *Ibid.*, p. 6.
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- 28 OPCW Review Conference, *Report of the Scientific Advisory Board on Developments in Science and technology for the Fourth Special Session of the Conference of the States Parties to Review the Operations of the Chemical Weapons, Convention*, OPCW document RC-4/DG.1, 30 April 2018.
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- 30 SAB Report to the 4th Review Conference, paras 6-7, p. 2.
- 31 *Ibid.*, para 162, p. 45.
- 32 OPCW Technical Secretariat, document S-1252, para 21, p. 6.
- 33 SAB TWG Report on Verification (2015), p. 7.
- 34 OPCW document SAB-24/WP.1, 14 July 2016.
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- 40 *Ibid.*, para 175, p. 47.
- 41 *Ibid.*, paras 185-190, pp. 49-50.
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CHAPTER 4

Twenty-one years of OPCW inspector training

Brendan Whelan[†]

Introduction

Gas! Gas! Gas! the instructor would cry out when least expected, as inspector trainees waded behind in cumbersome Saratoga suits and rubber over-boots across the sand dunes of Wassenar, the grounds we then used for field training exercises. It was the cue to close your eyes, hold your breath, and hastily position your slung gas mask across your face, then secure it by pulling tightly on the straps, quicker than you could say Jack Robinson. Six seconds to be precise. Why exactly we were conducting these drills, or many of the other training activities for that matter, none of us quite understood. Nor did we ask. It would all be clearer by the end of our intensive five-month inspector-training programme, or so we thought. It never was; even to the instructors themselves.

Training for the worst

These highly knowledgeable and experienced instructors had come mostly from chemical, biological, radiological and nuclear (CBRN) units of their respective militaries; some from the time the cold war was at its height. They were trained to prepare against chemical weapons as a method of warfare. They were taught to act instinctively and instantaneously. For them, rapidly donning their protective gas mask could be a question of life or death.

They were the undisputed experts in the field of chemical protection. They could set up a decontamination line in minutes and passed on these skills with enthusiasm. They taught us to avoid those instinctive hand movements that could contaminate you when doffing your chemically exposed gear. *Ad nauseam*, we would simulate jabbing the nerve agent antidote injectors into our thigh muscle, or gluteus maximus if you were slightly-built. We were prepared for doomsday-like scenarios and trained and retrained until it was second nature. This was our passport to safety if we were ever exposed to highly toxic chemical weapons agents. And there lies the rub.

No one believed we would ever have to operate in such toxic environments and certainly not in battle-field type scenarios where chemical weapons might be raining

down. The cold war was over. Chemical weapons were a thing of the past—antiquated and ineffective in the theatre of battle. No state would ever resort to using such outmoded weapons. The known possessor states had unequivocally committed to destroying their stockpiles, along with the facilities that produced them. Within ten years, chemical weapons would be as obsolete as a floppy disk or the eight-track music tape. That, at least, was the plan. To ensure that they would remain confined to history, there was Article VI of the Chemical Weapons Convention (CWC) for which States Parties agreed to open their chemical industry to inspections by the Organisation for the Prohibition of Chemical Weapons (OPCW)—the implementing body for the CWC. It would build confidence that the industry, where once chemical weapons had sometimes been manufactured in secret, would never again be party to such nefarious activities.

Early developments in training

Training in the start-up days of the OPCW (1997-1998) had more to do with what the instructors knew best or had experience in, rather than the actual requirements of the job. Programmes were rarely based on training needs analysis. Kirkpatrick, the gold standard for training evaluation and development, is not a name that rolled off the tongues of course designers or instructors. Even in later years, when 'live agent training', in which inspectors would be trained to work around live chemical weapons agents rather than simulants, was initially incorporated into training programmes, it was not because of any particular vision or foresight. It resulted more from a conviction that chemical weapons inspectors (a title that doesn't actually appear in the Convention), by definition, should have 'experience' around chemical weapons agents.

Generic training for munitions specialists, paramedics, engineers, and chemists included topics on basic chemistry of chemical weapons production, types and design of chemical munitions, the science of explosives and the technology involved in chemical weapons destruction. Such cross-specialist training added flexibility to operations by, for example, facilitating the deployment of inspectors with industry backgrounds to chemical weapons destruction and storage sites, and even on occasions to inspect old and abandoned chemical weapons. Many other topics, however, although fascinating in their own right, were of questionable relevance to the day-to-day work of an inspector. These included subjects as wide-ranging and esoteric as optical isomerism, molecular modelling, gas dispersion modelling and quantitative structure-activity relationships of drugs.

Specialised training for the various categories of inspectors was not necessarily any more pertinent; at least not for the CPTs, or Chemical Production Technologist as we were called, which included chemical engineers, production chemists and process

development chemists. The central role of the CPT was to inspect the chemical industry under Article VI of the Convention.

The core of CPT training involved a six-week module in Switzerland that included time spent at Spiez Schedule 1 Laboratory and Novartis Pharmaceuticals.² Training was intense and comprehensive, and as inspector hopefuls we were privileged to receive instruction from some of the best in their fields; lectures on chemical weapons production from hands-on experts; and chemical engineering from instructors with years of experience in the industry's top pharmaceutical companies. Intensive classroom instruction was complemented with practical exercises in the Schedule 1 laboratory and in a large chemical plant. A rigorous continuous evaluation of trainees' performance ensured full attention at all times, particularly given that the offer of a fixed position was performance related.

The chemists among us reveled in the lectures on the production of chemical weapons agents. Chemical reactions by the bucketful. We couldn't get enough. Our chemical engineering colleagues, however, many of whom had not seen organic chemistry since college, if at all, winced at the endless chemical structures scribbled out on the white board. Their glory moment would come later when the unit operations modules and the endless mathematical calculations were heaped on. As their appetites were whetted with the progressively more complex calculations on rates of heat transfer, theoretical plates in distillation columns, or chemical throughputs, us chemists took the back seat.

On the job

Training came and went. Most got through the grueling episode and were hired as inspectors. A few, disillusioned with almost everything, rejected the job offer and returned to their previous lives. As we took to real-life inspections, eager to put into practice our new-found and hard-earned knowledge and skills, it became apparent that much of it would serve little purpose.

On the job, the engineering challenges were tame requiring little more than an ability to distinguish a centrifuge from a reactor, a batch from a continuous reactor or even a distillation column from a scrubber. No requirement for fancy engineering calculations, no Reynolds numbers, no heat transfer coefficients; nothing to whet the intellectual appetite of a chemical engineer. There was not much chemistry either. The endless Schedule 1 reaction schemes proved to be little more than course fillers. Evidence of this was the fact that in later years Chemical Production Logisticians (CPL), who had little or no background or training in engineering or chemistry, would go on to work as CPTs as the position of CPL was phased out.

In hindsight, the huge discord between the training programme and the competencies required for the job was not surprising. The reality in those start-up days of the Organisation was that nobody really knew how industry inspections would pan out in real life, making it difficult therefore to design an effective training programme. Yes, the Convention set out the objectives and timelines of industry inspections in the Verification Annex, but the operational practicalities were left to the Organisation to figure out. In the absence of a clear job analysis, training took on a doctrine of ‘more was better’.

Industry verification in essence turned out to consist primarily of checks on declared information provided by the State Parties in their annual declarations under Article VI. In the case of Other Chemical Production Facilities (OPCF) inspections, that information consisted only of the name and owner or operator of the facility, the address of the site being inspected, ranges of production of discrete organic chemicals, the approximate number of production plants, the activities conducted on site and information on so-called PSF-chemicals—those containing phosphorus, sulfur or fluorine. Any discrepancies noted between the declared and verified information is discussed with State Party representatives and detailed in the reports, where necessary, for future correction. The key aim of the inspection, i.e. to verify the absence of Schedule 1 chemicals, would be satisfied with a lengthy and detailed description of the facility, its infrastructure, equipment, security and medical procedures.³ This was as technical as inspections got.

Teething problems

Although industry inspections never quite offered the engineering or chemistry challenges inspectors had so ably been prepared for during induction training, that is not to say they were not tested during on-site inspections. Problems of interpreting provisions in the Convention that were vexingly ambiguous were now coming to the fore and had to be dealt with. Some States Parties clearly had interpretations which were not aligned with those of the inspectors or the OPCW Technical Secretariat. The inspectors’ negotiation skills won out over technical capabilities and a firm knowledge of the intricacies of the Convention texts often became their sharpest tool.

Something so obvious and trivial to an engineer or chemist in a previous life as counting the number of plants on site or differentiating a unit from a plant, now became a source of animated discussion, and on occasions, animosity between the inspectors and State Party representatives. It was not a question of one-upmanship, but rather one relating to access. Gaining access to areas of the site it deemed necessary to fulfill the mandate aims was essential for the inspection team. Equally important

for States Parties was to protect confidential information by limiting access to areas of a plant site it considered not relevant to the inspection. Eventually, after many a heated discussion, on site as well as between States Parties and the Technical Secretariat, a compromise would be reached in which some of the access issues that had been so contentious were, if not solved, at least abated. For example, a fix would be arranged that would grant limited access to disputed areas during the so-called site tour, where inspectors would get a quick walk around or drive-through of the site to be inspected prior to the inspection activities commencing.

Access was not the only contentious issue arising from unclear language in the Convention. There were, and still are, numerous others. Even Executive Council decisions to clarify ambiguities in the Convention were sometimes themselves vague or open to interpretation. This lack of clarity not only generated conflicting views between the State Party and inspectors, but even among inspectors themselves, often leading to uneven application of the Convention's provisions by different inspection teams. The inconsistency in application was not lost on States Parties, which were often not disinclined to point out such shortcomings to the Director General.

A training rethink

The implementation of the tenure policy in the mid-2000s heralded the arrival of new groups of inspector trainees to replace those departing. The training programme for the new arrivals differed significantly to the one for the inspectors who came on board in 1997 and 1998; not only in duration but more importantly in terms of substance and delivery. The driving factor for the change was primarily one of economics. The Technical Secretariat no longer had the vast budget it boasted for the training of the first two groups of inspectors, which was often provided by external instructors brought to The Hague. Nor would the trainees be taken to destinations like China, Germany, Romania, Russia, Spain and the UK, among others, for the practical modules. A second factor for the modified programme was one of urgency. Unlike the first groups of trainees, new cohorts were hired directly as inspectors (as opposed to trainees) and getting them into the field as soon as possible was essential due to the increasing number of inspections. The Secretariat didn't have the luxury of committing to a five-month training programme for inspectors.

These limitations however, rather than undermining the quality of the training, ironically provided the impetus for development of a more effective and efficient programme. To reduce costs, external training was substituted with in-house instruction from experienced inspectors, who were now familiar with the inspection process. The actual tasks of the job were by now well established and irrelevancies in training

could be weeded out to make the training more focused. Technical training was assigned low priority and chemical engineering and chemistry topics were for all intents and purposes out, the argument going that chemical engineering and chemistry skills would be captured during the hiring process and not require training. The focus now was squarely on inspection procedures, negotiating skills, the texts of the Convention and how to apply them uniformly during inspections. Hands-on training at far-flung chemical factories around the world was jettisoned in favour of on-the-job training during real inspections.

The impact of the new training programme was evident. Discarding the technical elements that featured so heavily earlier had little negative impact on inspections. The CPLs, whose training had been generally non-technical, and had now crossed over to do the same job as the CPTs, were equally competent conducting Article VI inspections. All in all, inspectors were now better trained on the provisions of the CWC, particularly when it came to Article VI inspections. This was helped with extensive training on sets of guidelines that were developed by a cross-divisional working group consisting of inspectors and verification and policy officers, to assist inspectors in evenly applying the provisions of the Convention. Allied to the improved common understanding between the Technical Secretariat and States Parties on what were previously disputed interpretations of Treaty provisions, the more focused training undoubtedly led to more efficient and effective inspection conduct.

The Syria factor

It would be an understatement to say that the war in Syria profoundly impacted the operations of the Technical Secretariat and by extension the training of inspectors to conduct those operations. The use of chemical weapons, including by non-state actors, presented challenges to the Organisation that hitherto were confined to the realms of the theoretical. Disarming Syria of its declared stockpiles of chemical weapons and overseeing the destruction of its chemical weapons production facilities in the midst of an ongoing civil war presented extraordinary challenges, which were exasperated by the high political and media profile of the situation.

Although training to operate in hostile environments was not new to the Secretariat, regular Safe and Secure Approaches in Field Environments (SSAFE) training would now become mandatory for all inspectors who could likely be deployed into hostile environments like Iraq or Syria. SSAFE training is not for the faint hearted. Participants are subjected to simulated, but highly realistic, life-threatening situations as well as psychological and physical abuse, with the goal of preparing inspectors for the unthinkable. The rocket attack and ambush on an inspection team in Syria⁴ while

on its way to investigate an alleged chemical attack in 2014 brought home the stark reality of the grave dangers inspectors could now be exposed to. The security detail that conducted the reconnaissance mission for the OPCW inspection team to visit one of the sites of the alleged chemical incident in Douma in April 2018 would also come under gunfire and a grenade explosion from an aggressive mob.⁵ Training no longer served to merely boost knowledge and professional skills, but to potentially save lives. Operating for long hours in chemical protective gear and heavy bullet-proof vests would become the norm for contingency operations. This required not just specialised training but a level of fitness, not to mention psychological preparations, that would previously not have even been a consideration.

The experience in Syria impacted the inspector training programme in other unsuspected ways. Revelations about the chemical weapons production facilities in Syria challenged established ideas about the wherewithal required to run an illicit chemical weapons programme. Many of the infrastructural and engineering features, such as differential pressure control, high capacity air purification systems or equipment manufactured from specialised acid resistant alloys, considered essential for safe production of highly toxic chemicals were often absent. In some cases, production units were mounted inside the trailers of articulated trucks or had extraction systems for toxic fumes that were no more than an opening in the roof. The experience raised questions about the methodology historically being used by inspectors during Article VI inspections at industrial chemical facilities to verify the absence of production of toxic Schedule 1 chemicals. Those features once considered key signatures in determining the absence of any nefarious production were now less assuring.

Back to basics

Few would argue that legitimate commercial chemical companies that voluntarily declare and subject their activities to inspections under Article VI present any threat to the object and purpose of the CWC. Inspections are important confidence-building exercises but are never expected to uncover fundamental breaches. The real threat in today's world is arguably chemical terrorism, particularly from non-state actors gaining access to highly toxic chemicals and their precursors, either by intercepting legitimate trade in these chemicals or theft from chemical facilities.

Securing toxic chemicals and their precursors at chemical sites will help mitigate the risk of diversion for illicit purposes, and the Technical Secretariat recognises a role in working with industry in this respect. Offering advice, if solicited during on-site inspections, about Schedule 1 precursors and the possibilities for mis-use to manufacture chemical weapons could make an important contribution to global chemical security.

Providing such expert advice requires inspectors to be fully conversant in the chemistry and production methods of Schedule 1 chemicals as well as toxic industrial chemicals in general. For this, a comprehensive programme of chemistry training, after an absence of several years, was re-introduced in 2015 to create competency in this field. The programme emphasised greater importance than previously to understanding the principles behind the synthesis of chemical weapons and being able to critically apply the knowledge for verification and investigative purposes.

The greater competency in Schedule 1 chemistry is now contributing to more robust Article VI inspections, in particular with relation to verification of the absence of Schedule 1 chemicals, which now takes a more scientific and forensic-type approach. Greater emphasis is placed on the chemicals and chemistry on site and less on equipment or infrastructure. This more investigative approach has also proved useful on contingency operations. During the mission to Douma to investigate the alleged use of chemical weapons, a key undertaking of the team was to investigate a facility and warehouse suspected of producing chemical weapons⁶. The task underscored the crucial importance of commanding a thorough understanding of chemical weapons production, and organic chemistry in general, and the ability to apply the knowledge in an investigative manner.

Inspector to investigator

The greater part of the Organisation's and inspectors' work over the past 21 years has been routine and low key in nature. Whether inspections to industrial facilities under Article VI or verifying the destruction of chemical weapons or chemical weapons production facilities under Articles IV and V, the activities generally follow standard and well-established procedures. Analysis or interpretation of information or data is usually not necessary. Even the massive operation to remove Syria's chemical weapons for destruction or eliminate its chemical weapons production facilities was routine to a large extent. Whilst a major logistic and human achievement, considering the extremely dangerous environment in which the operations had to be conducted, the activities and procedures themselves were already quite familiar to inspectors—verifying irreversible destruction of equipment and chemicals, non-diversion of chemicals, applying seals, conducting inventories etc.

The investigation of alleged use of chemical weapons, unfortunately an ever increasing part of an inspector's work, on the other hand, is quite a different matter. Although inspectors are well versed in the operational aspects of such missions, the investigative aspect is relatively fresh territory. The fact-finding mission in April 2018 to investigate the alleged use of chemical weapons in Douma, Syria, highlights the

extremely complex nature of such missions. They necessitate not only meticulous operational planning to work in potentially hostile environments, but also the competency to conduct what is essentially a crime scene investigation involving a systematic examination to verify or refute an alleged use of chemical weapons. Some of the work is forensic in nature, a scientific discipline in which inspectors have little or no background. The often highly political and public nature of such missions only compounds their complexity.

The challenge for training is greater than ever. Inspectors conduct routine inspections to verify compliance with the Convention. As an investigator of alleged use, one investigates fundamental breaches. The distinction is important. Training to date has attempted to fill the gap required to make the cross-over from inspector to investigator with instruction in interview techniques, forensic awareness and satellite imagery, among others. Yet, much more needs to be done.

One area suggested where inspectors might want to develop competency is in dealing with the media, particularly in high-profile investigations. Currently, the OPCW policy is that the inspection team should not communicate with the press, but there are arguments for reconsidering this approach. The experience from the most recent fact-finding mission in Syria was that information was often disseminated about the team's activities that was inaccurate or misleading. As the inspectors are the ones on the ground, allowing them to deal with the press directly would not only guarantee the accuracy of the information, but would minimise the risk to operational aspects of the mission. Of course, any such access to the media would need to be well managed and limited so as not to detract from the actual job at hand, i.e. the investigation itself.

Investigator to prosecutor

On 27 June 2018, at the Fourth Special Session of the Conference of States Parties, member states voted by a margin of 82 to 24, to empower the Technical Secretariat to attribute responsibility for demonstrated cases of use, or likely use, of chemical weapons by the fact-finding missions. The responsibility bestowed is formidable and will require the Organisation to pull out all the stops to prepare for such a daunting task. The challenges are not merely technical but highly political. Skills and competencies not hitherto considered within the Organisation will need to be fomented. Reminiscent of the early days of inspector training, identifying those skills and competencies will itself be a formidable challenge given the uncertainty of what exactly the undertaking will entail.

While there may not yet be clarity on exactly what competencies will be required to attribute responsibility for use, or likely use, of chemical weapons, such investigations

will possibly require, among others, competencies in forensics, toxicology, criminal investigation, epidemiology and metallurgy. Few of these skills are currently to be found within the Organisation and training alone will almost certainly not satisfy the need. Historically, inspectors have always been hired on their qualifications to conduct routine inspection activities and not because of any investigative attributes. Such expertise will patently have to come from outside, either through hiring or contracting consultants. Getting such experts on board may itself be a challenge, particularly given the paucity of such specialist skills worldwide and the unattractiveness of the Organisation's limited tenure policy.

Gas! Gas! Gas!

Since its inception in 1997, inspector training in the OPCW has constantly had to adapt to ever changing operational needs. The original training programme for Article VI inspections gave way to one that was more commensurate with the realities of the job by undergoing a paradigm shift from technical instruction in engineering and chemistry to one with greater focus on verification provisions of the Convention, inspection procedures and negotiating skills. A move from external suppliers of training to in-house resources proved not only more economical but more focused and targeted.

Developments in technology in the chemical industry, allied to ever growing concerns regarding global chemical security and chemical terrorism highlighted a need for further adaptation. An inspection regime which is shifting the focus on verification from equipment and infrastructure to toxic chemicals and their precursors necessitated a return to a training programme that again prioritised technical instruction, particularly the chemistry and production methods of chemical weapons agents and toxic industrial chemicals.

The use of chemical weapons in Syria and Iraq over the last six years signaled a new era for the Organisation that required swift and radical action to prepare inspectors to conduct tasks in non-permissive environments heretofore unfamiliar. Training was no longer just about developing specialist knowledge and skills but also about preparing for the risk of personal injury, kidnapping or even death.

Investigations of alleged uses of chemical weapons and attributing responsibility for them present enormous challenges for inspectors and the Organisation as a whole. Training will be pivotal in meeting these challenges. The shift from verification to investigation calls for many specialist competencies that cannot be acquired through training alone. The historical policy of hiring inspectors with backgrounds in the chemical industry will certainly require reconsideration. The skills of forensic scientists, criminal investigators, academic researchers and toxicologists, to mention a few, will

most likely be required if the Organisation is to take up the gauntlet of conducting credible investigations of alleged use of chemical weapons and identifying the perpetrators.

Inspectors today face challenges and responsibilities as never before. They have the final call on refuting or confirming cases of alleged use of chemical weapons, and with the newly acquired mandate to assign culpability for chemical attacks, will be instrumental in pointing the finger of responsibility. The repercussions and political fallout from such pronouncements are potentially colossal. It is incumbent on inspectors, therefore, to conduct their work not only with competence, professionalism and scientific rigor, but just as importantly, with integrity, independence and impartiality. Training will go a long way towards addressing the former. The latter, on the other hand, are not so readily guaranteed. Can they be acquired through training? Unlikely, but they can probably be nurtured and fomented with an organisational culture that values honesty, inclusiveness and transparency and where virtues like integrity, independence and impartiality are recognized and justly rewarded.

Gas! Gas! Gas! cries go out as the inspectors reach for their metaphorical mask to safeguard against political pressure and interference—arguably as toxic and insidious as any poisonous gas.

Endnotes

- 1 The views expressed in this article reflect only those of the author.
- 2 Schedule 1 facilities are those which States Parties are permitted under the CWC to produce and use small quantities of Schedule 1 chemicals, in specially designated facilities, for research and defence purposes. See footnote 2 for explanation of Schedule 1 chemicals.
- 3 Schedule 1 chemicals are highly toxic chemicals which were used or developed in the past as chemical weapons. Their presence or production on commercial chemical facilities is prohibited under the CWC.
- 4 OPCW Technical Secretariat, 'Note by the Technical Secretariat - Summary Report of the Work of the OPCW Fact-Finding Mission in Syria Covering the Period from 3 to 31 May 2014', S/1191/2014, 16 June 2014, <https://www.opcw.org/sites/default/files/documents/Fact_Finding_Mission/s-1191-2014_e_.pdf>.
- 5 OPCW Executive Council, Fifty-Ninth Meeting, 'Update by the Director-General on the Deployment of the OPCW Fact-Finding Mission to Douma, Syrian Arab Republic, to the Executive Council at its Fifty-Ninth Meeting' EC-M-59/DG.2, 18 April 2018, <https://www.opcw.org/sites/default/files/documents/EC/M-59/en/ecm59dg02_e_.pdf>.
- 6 OPCW Technical Secretariat, 'Note by the Technical Secretariat - Report of the Fact-Finding Mission Regarding the Incident of Alleged Use of Toxic Chemicals as a Weapon in Douma, Syrian Arab Republic, on 7 April 2018', S/1731/2019, 1 March 2019, <<https://www.opcw.org/sites/default/files/documents/2019/03/s-1731-2019%28e%29.pdf>>.

CHAPTER 5

Developments in implementing port State measures to combat illegal, unreported and unregulated fishing

Judith Swan¹

Introduction

Massive changes in fisheries compliance and enforcement are underway, driven by the 2009 UN Food and Agriculture Organization (FAO) Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (the Agreement).² Not only is it a showcase for the effective use of information in combating illegal, unreported and unregulated (IUU) fishing, but its fabric features cost-effectiveness, interagency cooperation and integration with a wide range of other tools for fisheries monitoring, control and surveillance (MCS).

This chapter briefly explains the legal framework for the Agreement at international, regional and national levels. It highlights key international implementation activities at international and regional levels. Internationally, Parties' activities under the Agreement are described, including meetings and the establishment of a funding mechanism for developing States and an open-ended technical group on information exchange. In addition, it elaborates the support given to implement the Agreement by an extensive FAO Global Capacity Development Programme.

This chapter also describes the progress of the Indian Ocean Tuna Commission (IOTC) in pioneering an electronic port State measures (PSMs) communications platform through a web-based application. It also underlines the importance of ongoing integration of PSMs with other MCS tools for robust information and verification purposes. Finally, the chapter illustrates the support given by civil society to combating IUU fishing that involves key measures taken at port, before drawing some conclusions.

The legal framework: international, regional and national The Port State Measures Agreement

As at May 2019, 59 countries and the European Union were party to the Agreement.³ It targets foreign fishing vessels that wish to enter designated ports (of the port State party), but countries may decide to apply it to their own vessels as well. The reach

of the Agreement is extensive; it may apply to fishing and fishing related activities—including transshipment—in areas within and beyond national jurisdiction, and to vessels used for fishing or fishing related activities.⁴

The measures aim to combat IUU fishing by providing minimum standards to be harmonized by port States, including for entry into port, denial of entry into or use of port, inspections, information and communications. Information underpins all activities, and annexes to the Agreement specify minimum information to be required in the advance request for port entry and reports on the results of inspections, as well as handling information transmitted through electronic communications systems.⁵ Verification of information is addressed in an annex setting out inspection procedures. These procedures include requirements to verify that the:

- vessel identification documentation, including information relating to the owner of the vessel, is true, complete and correct—if necessary after checking with the flag State or international records of vessels;
- vessel's flag and markings—for example the name, external registration number, International Maritime Organization (IMO) ship identification number, international radio call sign and other markings and main dimensions—are consistent with information contained in the documentation; and
- authorizations for fishing and fishing related activities are true, complete, correct and consistent with the information provided in accordance with Annex A of the Agreement.⁶

The duty of Parties to exchange information with and among regional fisheries management organizations (RFMOs), coastal States, flag States, port States and international organizations underpins the potential effectiveness of the measures.

Where IUU fishing is suspected in stated circumstances or is shown, the port State is obligated to deny entry into port or use of port, including for landing, transshipping, packaging and processing of fish that have not been previously landed and for other port services, including, *inter alia*, refuelling and resupplying, maintenance and dry-docking. This has potentially hard-hitting economic consequences for vessel owners.

Significantly, the role of Parties as flag States is addressed. Their duties include requesting inspections by other Parties where IUU fishing is suspected and requiring their vessels to cooperate with inspections undertaken by the other Parties. They must encourage their vessels to use ports of States acting consistently with the Agreement and investigate where inspections show clear grounds to believe that IUU fishing or related activities had been undertaken. They must make reports to other Parties, States, RFMOs and the FAO on actions taken where IUU fishing is determined.

Measures by regional fisheries management organizations

Most RFMOs have adopted legally binding resolutions on PSMs that are based on the Agreement and variously tailored to their needs and mandates.⁷ The Resolution of the Indian Ocean Tuna Commission (IOTC), first adopted in 2011, is almost identical to the Agreement and was amended in 2016 to incorporate electronic reporting by vessels and a web-based information system as described below.⁸ As of March 2018, the implementation of the Resolution has led to the identification and listing of nine vessels in the IOTC IUU Vessels List.⁹ Other RFMOs have been progressively strengthening their measures to reflect and implement the standards in the Agreement.¹⁰

National legislation

A wide range of countries are updating their legislation to implement their international and regional obligations in relation to PSMs. National legislation is essential in order to enforce the sanctions required in the Agreement. Without it, countries cannot enforce the agreed minimum standards for information provision and verification, have no authority to prevent vessels from entering and using ports for a range of reasons, including offloading the fish caught or transhipped in IUU operations, are powerless to take necessary legal or administrative action and have no legal basis for developing procedures or interagency cooperation.

To support effective legislative review and implementation, the Common Oceans ABNJ Tuna Project has developed and distributed a publication that features a legislative template for implementing the Agreement.¹¹ The template, which can be adapted to different legal systems, institutions and instruments, addresses the core provisions of the Agreement, as well as supportive provisions needed to ensure robust implementation. The latter would include the powers and authorities of enforcement officers, evidentiary rules and a basis for legally or administratively proceeding against vessel operators and persons that assist vessels to use port where it has been denied. The publication also refers to a basic framework of procedures needed to support the legislation.

The Agreement calls for integration or coordination of fisheries related port State measures with the broader system of port State controls.¹² This underlines the vital need for interagency cooperation at the national level. However, experience suggests that there is often a lack of such cooperation in many port States which can raise a number of potential problems. For example, port authorities may not notify fisheries authorities when vessels enter port and inspections by customs, immigration, health, law enforcement or other agencies may not include or pass along fisheries-related information which indicates IUU fishing activities.

Efforts are being made to support the structuring of national interagency cooperation through initiatives described below, including through the FAO Global Capacity

Development Programme and RFMOs such as IOTC which has developed a training course and draft Memorandum of Understanding on national interagency cooperation for PSMs, as well as best practice guidelines for interagency cooperation at regional level.¹³

Key implementation initiatives and activities

A wide range of implementation activities have been initiated that reflect the strong will of the international community to maximize the value of the Agreement in combating IUU fishing. Some key areas are described below.

Implementation required under the Agreement

At the **first meeting of the Parties to the Agreement** in 2017, a need for concerted action for implementation by port States, flag States and other States was identified, and the important role of FAO, RFMOs other international organizations and bodies was recognized.¹⁴ The FAO was tasked with developing templates for reporting of information on national contact points, designated ports and other relevant information for the implementation of the Agreement, and to publish the information through a dedicated section within the FAO website. The Parties also agreed that a staged approach to data exchange should be adopted and called for the establishment of an open-ended technical working group on information exchange (hereafter, the working group) to provide guidance on the development of appropriate mechanisms (its first meeting is described below).

The Parties established the working group under Part 6 of the Agreement and its terms of reference were adopted. The Parties called upon the IOTC Secretariat to develop a specific web-based questionnaire for the purpose of monitoring implementation of the Agreement, as well as recording challenges faced. Initially, the questionnaire is to be completed every two years. The IOTC Secretariat was also requested to prepare draft Rules of Procedure for meetings of the Parties and any subsidiary working groups based on the General Rules of the FAO, and relevant rules of its Committee on Fisheries, for consideration at the next meeting of the Parties. The Parties agreed to hold meetings every two years along with supplementary technical meetings as required.

Recognizing the special requirements of developing States for implementing the Agreement, an important Article requires the establishment of funding mechanisms and an **ad hoc working group** to periodically report and make recommendations in relation to such mechanisms. The Agreement tasks the ad hoc working group with addressing a scheme for contributions, identification and mobilization of funds, the development of criteria and procedures to guide implementation, and progress in the implementation of the funding mechanisms.¹⁵

At its first meeting in 2017, the ad hoc working group discussed the main requirements and priorities of developing States for the implementation of the Agreement.¹⁶ The meeting recommended that support should consider legal and policy aspects, institutional set-up and capacity, and operations and procedures. It recognized that assistance should be tailored to accommodate the specific needs of countries and regions and highlighted the importance of linking individual and institutional capacity building. The importance of support by existing RFMO mechanisms was also recognized.

The ad hoc working group agreed on draft Terms of Reference for the funding mechanisms that would be considered by the Parties at their next meeting. Funding mechanisms will include contribution schemes toward an Assistance Fund, including for projects in support of the implementation of the Agreement. The meeting also emphasized the important linkages between activities supported by the Assistance Fund and the FAO's Global Capacity Development Programme in support of the Agreement, described below, and other complementary instruments.

Parties to the Agreement called for an **open-ended technical working group on information exchange** that met in 2018.¹⁷ It recognized that the transmittal, electronic exchange and publication of information—key components of the Agreement—are essential if its objective is to be met. The aim of the working group is to consider the information exchange requirements needed to support the implementation of the Agreement, including the most appropriate structure for an information exchange system and how such a system would interact with complementary tools.

The technical working group noted the wide array of information systems in existence and acknowledged that a global information exchange system was needed to support the implementation of the Agreement.¹⁸ It was agreed that a two-staged approach for developing this system should be taken, prioritizing the need to access basic information such as national points of contact and designated ports. The second stage would focus on the development of a robust global system that facilitates the exchange of information and would include a publicly available information section and a limited access section for protected information such as port inspection reports.

Options for the type of information exchange mechanism to be developed by the FAO were considered by the working group and included a basic reporting system, a complete e-PSMA system or a system that linked with other systems and networks. It noted, *inter alia*, that: the near-real time exchange of information, both public and protected, was crucial; the linkages with the relevant systems of RFMOs and global systems, such as IMO's Global Integrated Shipping Information System (GISIS) and Equasis (a public website promoting maritime safety), was important; and the FAO Global Record is a promising platform for information sharing and could be linked with the information exchange system under the Agreement.¹⁹ FAO undertook to explore options to facilitate a standardized approach for the electronic exchange of information.

The working group agreed that the information exchange system should provide information to facilitate a risk assessment for a vessel, including where it has been placed on an IUU vessel list or denied port entry (with reasons for the latter) and its compliance history (e.g. previous inspection reports). Any previous denial of port entry was thought to be of particular importance to support risk-based assessments for port inspections.

The FAO Global Capacity Development Programme

An expansive five-year FAO Global Capacity Development Programme has been established to provide support for the implementation of the Agreement. The specific aim of the programme is to support developing coastal countries and small island developing States (SIDS), both States Parties and non-Parties to the Agreement, in building capacity to implement its provisions as well as complementary international instruments and regional mechanisms to combat IUU fishing.²⁰ The programme contributes to Sustainable Development Goal 14.4, which calls for ending overfishing, IUU fishing and destructive fishing practices by 2020 through, inter alia, capacity building and support for MCS, compliance and enforcement systems.²¹ To receive assistance under the programme, countries may make official requests directly to FAO.

Partnering with complementary national and international initiatives, projects developed under the programme offer recipient countries support in:

- ascertaining the need to strengthen national legislation, institutional set up, and MCS systems and operations consistent with the provisions of the Agreement;
- formulating and/or revising relevant fisheries policies, laws and by-laws;
- strengthening MCS, compliance and enforcement institutions and systems, including through South-South cooperation and mechanisms for regional harmonization, coordination and cooperation;
- enhancing capacity to improve flag State performance in line with the FAO Voluntary Guidelines; and
- as appropriate, implementing market access measures, such as catch documentation and traceability schemes.

The implementation of different programme elements in each country depends on their state of advancement in the adoption and implementation of provisions and procedures consistent with the Agreement and complementary MCS operations, measures and tools to combat IUU fishing. Additional assistance is provided through FAO funded Technical Cooperation Programmes in support of activities concerning the

adoption and implementation of the Agreement or related to the broader context of combatting IUU fishing. Over the past three years, around 40 countries have received such support.

Electronic port State measures

The IOTC has pioneered an electronic port-State measures web-based application. In the second part of 2016, the PSM communications platform (e-PSM application) was rolled out for a three-year trial period, after which the Compliance Committee will evaluate its success. It is aimed at facilitating implementation of PSMs and the exchange of information between stakeholders (the competent authorities of port States, flag States and industry).²² National in-country training has been conducted and port calls are being made through the application.²³

The application allows vessels to request entry into port electronically, via the internet. The advantages of requesting entry into port through the e-PSM application include:

- faster processing of requests for entry into port by the port State decision makers;
- reduced paperwork for the vessel master or agent and the port State;
- enhanced direct communication between the vessel master, flag State and port State;
- facilitating the port State to monitor requests for entry into port, request additional information, issue an authorization to enter port and record information on port inspection and on landing/transshipment in port; and
- facilitating the ability of flag States to exercise effective control over their vessels as they enter foreign ports.

The system has other useful components, including a library—containing resources on where users can find previous inspection reports, relevant documents, useful internet links, information on designated ports, port State contacts and flag State contacts—and a report-building tool, which can generate a variety of reports and statistics related to the activities of vessels in port or the level and types of activities in port by foreign vessels.

Preliminary working group discussions have taken place regarding the possibility for the e-PSM application to be extended to the International Commission for the Conservation of Atlantic Tuna (ICCAT) where provisions from both RFMOs would be integrated. Mindful that the measures adopted by RFMOs are similar to but not identical with each other or the Agreement, it was suggested that the application could be transposed to any RFMO with minor adjustments, since the application follows the requirements of the Agreement in full.

Integration of port State measures with other MCS tools

The Agreement calls for PSMs to be integrated with other measures to combat IUU fishing.²⁴ Information systems are essential tools for verification and must therefore integrate the outcomes of other MCS tools for use in applying PSMs, taking into account the technological advances that are continuously being made in electronic tracking, reporting and monitoring.

Information from Vessel Monitoring Systems (VMS), as required at national and regional levels, and from Automatic Identification Systems (AIS) should be integrated. In addition, information should be sourced, as appropriate, from organizations/websites that are using emerging technologies to identify IUU fishing by individual vessels. These include Global Fishing Watch (Google, Oceana, Skytruth), which makes satellite-based VMS data available to the public, and Fish Spektrum, which uses AIS data from the Marine Traffic database.²⁵

Information-focused MCS tools would include authorized vessel lists and IUU vessel lists maintained by RFMOs; vessels not on the former, or listed on the latter, should not be permitted to enter a port, except for inspection, or to use a port. Continuing efforts to combine these lists will facilitate and broaden the information available for verification in implementing port State measures and include the following two lists. First, the tuna RFMOs have established a Consolidated List of Authorized Vessels (CLAV), which is updated daily with information that the RFMO members are required to provide.²⁶ It represents a dynamic snapshot of the authorized vessel databases for each RFMO at the day users access the CLAV. Second, a Combined IUU Fishing Vessel List, maintained by Trygg Mat Tracking, provides an updated and consolidated real time listing of all the main RFMO IUU vessel lists, and vessels identified in INTERPOL Purple Notices.²⁷ The aim of the site is to improve the effectiveness of the original IUU lists as a tool to combat illegal fishing and broader fisheries crime.

The FAO Global Record, described above, will be a valuable source of information noting that its use for PSMs is under development, and mindful that it only accepts vessels with an IMO number, is voluntary and does not include vessels flagged in Taiwan.

Electronic monitoring systems (EMS) installed on vessels that record activities with cameras are being developed and will provide clear information on operations at sea for verification at port. A pilot project that installed EMS on tuna purse seiners showed that they perform to the highest standards in monitoring of certain vessel activities, including tracking of vessel position and speed, identification of vessel activities in search of tuna schools and fishing sets, and activities related to fish aggregating devices.²⁸ It was concluded that, through proper procedures and training of land based observers, they can also be used to assess the amount of catch loaded per purse seine set, including the amounts retained and discarded.

Other MCS tools with which PSMs should be integrated to provide maximum information include observer programmes, catch documentation schemes and air and sea patrols. The flag State's responsibility to effectively control its vessels should also be drawn upon for information, investigation and enforcement purposes.

Support by civil society

Civil society has played an important role in supporting the development and implementation of PSMs to combat IUU fishing, including as observers in international organizations and RFMOs and through publications and projects. Many non-governmental organizations have successfully contributed to these efforts and established networks that result in strong compliance and enforcement measures against IUU fishers.²⁹

A leading NGO is Stop Illegal Fishing (SIF) and its associated FISH-i Africa Task Force comprised of eight member countries.³⁰ In 2015, SIF was the recipient of the Margarita Lizárraga Medal, awarded biennially by the FAO in recognition of serving with distinction in the application of the Code of Conduct for Responsible Fisheries.³¹ The FISH-i Task Force cooperates in MCS efforts, including PSMs. A recent example of its efforts involves the *STS-50*, which called into port in Madagascar in February 2018 where inspectors identified that it was in fact the IUU listed vessel that was better known under its previous names of *Andrey Dolgov*, *Ayda* and *Sea Breez 1*.³²

Tracked by FISH-i as it sought to refuel and obtain fresh provisions, the *STS-50* was held and inspected by a multi-agency team in Mozambique who seized the documents of the vessel and crew and detained the vessel for further investigation. While in detention, the vessel fled from Mozambican authorities. All of the ports in the region were then put on high alert and it was forced to refuel at sea.

Despite the vessel's attempts to hide its identity and location, analysts at FISH-i Africa were able to track the *STS-50*, enabling pursuit of the vessel by the Sea Shepherd patrol boat *Ocean Warrior* that was actively patrolling in the Tanzanian exclusive economic zone. This positional information was shared with the Maritime Fusion Centres in Madagascar and Singapore, leading to the successful arrest of the vessel by the Indonesian Navy as it fled the Western Indian Ocean and headed for South East Asia. A multilateral team that included relevant national authorities, INTERPOL and FISH-i Africa later investigated the activity and identity of the *STS-50*.

An earlier FISH-I case in which PSMs played a prominent role featured the Korean registered *F/V Premier*, which had been fishing in Liberia in 2012 using a forged licence.³³ This had been discovered in a port inspection and subsequently landing was denied in Seychelles and Mauritius, and licence issuance or renewal was denied in Kenya, Mozambique and Tanzania. The outcomes included a payment of US\$2 million to Liberia, offloading in Sri Lanka and return to Busan where it changed its name.

FISH-i has developed a 'VIGILANCE' programme to check and verify the identity of all 500 licensed and flagged fishing vessels of its members as well as their owners and operators. It provides information that can feed into a system used for port State measures. It is designed to increase compliance and identify vessels that are operating illegally, by sharing licences or identities and avoiding oversight by providing false information on their size and activities.³⁴ It requires processes at national level for interagency cooperation as well as regional coastal State cooperation and global information exchange.

Multi-agency due diligence and checks on fishing vessels under the VIGILANCE programme include examination of documents to: cross check details with RFMO lists, other coastal States and international vessel registers; check companies and owners history; and verify information with flag States. Physical inspections of vessels are made to verify characteristics, obtain photographs and check for irregularities in the vessel or its crew.

Conclusions

The international community continues to broaden and deepen the scope of PSMs implementation activity as a powerful and cost-effective tool for combating IUU fishing. Implementation of the measures is progressively being strengthened by meetings and working groups of Parties to the Agreement, international and regional capacity development programmes, technical advances and legal templates, RFMO conservation and management measures, procedures and training programmes, national implementation and integration with other MCS tools and world class initiatives by civil society.

The implementation arrangements take into account technological developments and intensify the dynamic role that information and communications play in ensuring the global reach of PSMs. The consequences for vessel owners and masters in detecting IUU fishing or fishing related activities in port are wide-ranging. In addition to the denial of entry into or use of port under the Agreement, they may be subject to:

- criminal, civil or administrative proceedings under national legislation;
- fines, and seizure/forfeiture of catch and vessel;
- other measures as a result of cooperation by the port State with coastal States, flag States, market States and any relevant RFMO on enforcement and deterrence, including:
 - legal or administrative process by coastal States where there is evidence of IUU fishing;

- denial of port entry or use by other States;
- enforcement by the flag State and de-flagging; and
- market State measures, including a ban on imports; and
- a coordinated system of controls involving officials responsible for trade, labour, health, security, pollution, safety and transnational criminal matters.

Although traceability initiatives are strengthening through, among others, progressively more robust catch documentation schemes, the fact remains that it is easier to detect IUU fishing at the first point of landing than afterwards, thereby paving the way for the above actions to be taken swiftly and effectively. The benefits of PSMs to sustainable fisheries and the blue economy are limitless and include the sustainability of fisheries, a broader blue economy, economic sustainability for legitimate fishers, and investment in and use of compliant, professional ports.

The next steps at national level are to seek to benefit from the ongoing developments described above at international and regional levels, and by civil society. National capacity-building, legislation, procedures, training and information/communication systems should be a priority, as well as mechanisms for relevant interagency cooperation. Great strides have already been made in developing and implementing PSMs, and the consequent verification of information to identify IUU fishing and related activities. It is work in progress as the international community continues its efforts to elaborate the fuller fabric of implementation activities.

Endnotes

- 1 The views expressed in this article reflect only those of the author.
- 2 Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing, 22 November 2009, <http://www.fao.org/fileadmin/user_upload/legal/docs/037t-e.pdf>.
- 3 Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing, FAO, 21 February 2019, <http://www.fao.org/fileadmin/user_upload/legal/docs/037s-e.pdf>.
- 4 Defined in Article 1(d): ‘fishing related activities’ means any operation in support of, or in preparation for, fishing, including the landing, packaging, processing, transshipping or transporting of fish that have not been previously landed at a port, as well as the provisioning of personnel, fuel, gear and other supplies at sea.
- 5 Annexes A, C and D of the Agreement, respectively.
- 6 Annex B of the Agreement.
- 7 For detailed information on resolutions adopted by the tuna-RFMOs and other select RFMOs, see Judith Swan, *Implementation of Port State Measures: Legislative Template, Framework for Procedures, Role of Regional Fisheries Management Organizations*, FAO: Rome, 2016, <<http://www.fao.org/3/a-i5801e.pdf>>.
- 8 Resolution 16/11 on port State measures to prevent, deter and eliminate illegal, unreported and unregulated fishing, IOTC, 2016, <<https://www.iotc.org/cmm/resolution-1611-port-state-measures-prevent-deter-and-eliminate-illegal-unreported-and>>.

- 9 The IUU Vessels Lists maintained by RFMOs generally operate as a 'blacklist', and all members of the RFMOs are required to implement certain prohibitions in relation to those vessels, such as prohibiting licence issuance, transhipment, use of port and more.
- 10 Judith Swan (note 6). Also see *Port State Performance: Putting Illegal, Unreported and Unregulated Fishing on the Radar*, The Pew Charitable Trusts, 2010, <[http://www.pewtrusts.org/~media/post-launch-images/2015/04/2015_april_pew_port-state-performance--putting-iuu-on-radar\(1\).pdf](http://www.pewtrusts.org/~media/post-launch-images/2015/04/2015_april_pew_port-state-performance--putting-iuu-on-radar(1).pdf)>. This report assessed the roles of eight RFMOs in combating IUU fishing and concluded that they had not been active enough in supporting their members in implementing port State measures.
- 11 It is funded by the Global Environmental facility and implemented by FAO. See 'Successful tool to support implementation of port State measures now available in three languages', FAO, 1 June 2017, <<http://www.fao.org/in-action/commonoceans/news/detail-events/en/c/891618/>>. The publication is cited in Judith Swan (note 6).
- 12 Article 5(a) of the Agreement.
- 13 Information available at 'Port State Measures', IOTC, <<http://www.iotc.org/compliance/port-state-measures>>.
- 14 The Agreement requires meetings of the Parties under Article 24, Monitoring, review and assessment. See 'Report of the first meeting of the Parties to the Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing', Oslo, Norway, 29-31 May 2017, <<http://www.fao.org/documents/card/en/c/b6b1b80e-9f2e-446f-acod-3eaa4c75b534/>>.
- 15 Article 21 of the Agreement. The working group is to take into account: the assessment of the needs of developing States parties, in particular the least-developed among them and small island developing States; the availability and timely disbursement of funds; transparency of decision-making and management processes concerning fundraising and allocations; and accountability of the recipient developing States parties in the agreed use of funds.
- 16 'Report of the first meeting of the Ad Hoc Working Group established by the Parties to the Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing', Oslo, Norway, 1-2 June 2017, <<http://www.fao.org/documents/card/en/c/5499187b-c88b-45fd-aa51-dd464c240f05>>.
- 17 Report of the Open-Ended Technical Working Group on Information Exchange, London, United Kingdom, 16-18 April 2018, <<http://www.fao.org/documents/card/en/c/CA0287EN>>.
- 18 The working group referred to systems implemented by RFMOs, including the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), General Fisheries Commission for the Mediterranean (GFCM), Indian Ocean Tuna Commission (IOTC) and the North East Atlantic Fisheries Commission (NEAFC). Other organizations also provided relevant examples, including the International Maritime Organization's (IMO) Global Integrated Shipping Information System (GISIS), the European Fisheries Control Agency's (EFCA) Exchange of Fishery Inspection and Surveillance data and the Pacific Islands Forum Fisheries Agency's (FFA) Information Security Management System (ISMS), Regional Information Management Facility (RIMF) and Niue Treaty Information System (NTIS).
- 19 At the Thirty-third session of the FAO Committee on Fisheries (COFI) in July, 2018, the Committee commended the launch of the public version of the Global Record of Fishing Vessels, Refrigerated Transport Vessels and Supply Vessels (Global Record), and noted that it supports the implementation of the Agreement and encouraged members to submit information and provide regular updates. The Committee recommended that the Global Record be further developed, in particular to allow for automatic uploading from other monitoring, control and surveillance systems. For information about Equasis, see <<http://www.equasis.org/EquasisWeb/public/HomePage>>.
- 20 Relevant ongoing and pipeline projects in the programme are being supported by the European Commission, Norway, Republic of Korea, Sweden and the United States.

- 21 The programme also adheres to: (a) the Blue Growth Initiative, an FAO Major Area of Work initiative which aims at restoring the potential of the oceans and wetlands by introducing responsible and sustainable approaches to reconcile economic growth and food security together with the conservation of aquatic resources; (b) the SIDS Accelerated Modalities of Action (SAMOA) Pathway adopted by the UN General Assembly on 14 November 2014, which provides a framework for addressing SIDS' most urgent problems, including strengthened legal, institutional and human capacities for the sustainable management of coastal zones and fisheries and MCS to combat IUU fishing; and (c) the Global Action Programme on Food Security and Nutrition in SIDS of FAO, which includes measures for the sustainable management and use of oceans and seas and their resources. All projects developed under the programme aim at improving States' capacity to effectively implement PSMs and complementary MCS operations, measures and tools to combat IUU fishing.
- 22 'Launch of the Electronic Port State Measures Application (e-PSM) by the Indian Ocean Tuna Commission', IOTC News Release, 28 September 2016, <<http://www.iotc.org/news/launch-electronic-port-state-measures-application-e-psm-indian-ocean-tuna-commission>>. The application was developed by the IOTC Secretariat with the financial support of the World Bank.
- 23 Over 400 individuals, from 13 IOTC member States (port States and industry), have been trained to use the application, supported by the IOTC and the Common Oceans ABNJ Tuna Project. For further information on the training programme see IOTC document IOTC-2018-CoC15-11 [E], <<http://www.iotc.org/meetings/15th-session-compliance-committee-coc15>>. As of 19 March 2018, through the e-PSM application: 2,853 vessel files were created and 6,431 PSM forms were submitted, of which: 2,710 were advance request of entry into port (AREP), 2,079 were notifications (NFV) of entry into port authorised, 1 notification (NFV) of entry into port denied and 774 were port inspection reports. The application was being used by 37 flag States, 13 IOTC port States and 1,255 vessels' representatives (fishing agents/vessel masters).
- 24 Article 5(b) of the Agreement calls for parties to integrate port State measures with other measures to prevent, deter and eliminate IUU fishing and fishing related activities in support of such fishing.
- 25 Global Fishing Watch, <<http://globalfishingwatch.org/>>; and Fish Spektrum, <<http://fishspektrum.com/>>.
- 26 'Global list of authorized tuna fishing vessels', Tuna.org, <<http://www.tuna-org.org/globaltvr.htm>>.
- 27 TMT is a Norwegian not-for-profit organisation that provides expert fisheries intelligence analysis to national authorities and relevant international institutions and provides the list as a public service, <<http://iiu-vessels.org/>>.
- 28 For experience in the Seychelles, see Miguel Herrera, 'Lessons learned from the Electronic Monitoring System Pilot Activity in the Seychelles', FAO News Release, 4 September 2017, <<http://www.fao.org/in-action/commonoceans/news/detail-events/en/c/1034291/>>. The Seychelles Fishing Authority (SFA) received support from the Common Oceans ABNJ Tuna Project, the Organización de Productores Asociados de Grandes Atuneros Congeladores (OPAGAC) and Satlink-DOS for the implementation of a pilot activity to test the feasibility of monitoring activities of two purse seiners flagged in Seychelles using electronic monitoring.
- 29 Relevant NGOs include Pew Charitable Trusts, Sea Shepherd and World Wide Fund for Nature (WWF). Pew has developed a capacity needs assessment for implementing PSMs, see 'Implementing the Port State Measures Agreement', Pew Charitable Trusts, April 2017, <<http://www.pewtrusts.org/en/research-and-analysis/reports/2017/04/implementing-the-port-state-measures-Agreement>>. The Sea Shepherd cooperation includes the use of its vessel *Ocean Warrior* for patrols targeting IUU fishing where PSMs play an important role, as referenced in the case study of the *STS-50* (described below). The WWF Transparent Seas programme includes promoting laws and policies to keep stolen fish from entering ports or crossing international borders, working with industry towards 'business smart' solutions to make all seafood fully traceable 'from bait to plate', helping fishermen, industry, and governments adopt tracking systems to monitor fishing activity and document catches and educating consumers on how

they can be part of the solution, see 'Transparent Seas Project', WWF, <http://wwf.panda.org/our_work/oceans/smart_fishing/how_we_do_this/good_governance2/transparent_seas_/>.

- 30 'FAO workshop provides launch for Stop Illegal Fishing support to PSMA implementation in Ghana', Stop Illegal Fishing, 12 June 2018, <<https://stopillegalfishing.com/news-articles/fao-workshop-provides-launch-for-stop-illegal-fishing-support-to-psma-implementation-in-ghana/>>. The 8 countries of the FISH-i Africa Task Force are: Comoros, Kenya, Madagascar, Mauritius, Mozambique, Seychelles, Somalia and Tanzania, see <<https://fish-i-africa.org/>>.
- 31 'Stop Illegal Fishing awarded the Margarita Lizárraga Medal', NFDS News, December 2015, <<https://nfdi.info/news/stop-illegal-fishing-awarded-the-margarita-lizarraga-medal/>>.
- 32 'FISH-i Africa closes ranks leading to arrest of IUU listed STS-50 in Indonesia', FISH-I Africa, 9 April 2018, <<https://fish-i-africa.org/fish-i-africa-closes-ranks-leading-to-arrest-of-iuu-listed-sts-50-in-indonesia/>>.
- 33 For details, see 'The FV Premier is formally charged by the Liberian Government for illegal fishing', FISH-I Africa, 23 September 2013, <<https://fish-i-africa.org/the-fv-premier-is-formally-charged-by-the-liberian-government-for-illegal-fishing/>>.
- 34 See *FISH-i Africa: Our Future*, Gaborone, Botswana, Stop Illegal Fishing, 2017, <https://www.fish-i-africa.org/wp-content/uploads/2017/09/FISH-i_Africa_Our_future_WEB.pdf>.

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The evolving framework of international treaties and agreements provides an essential tool for overcoming global security challenges. The implementation and verification of these arrangements builds confidence and know-how, allowing the international community to work cooperatively toward mutual goals. Informed and innovative approaches to verification and implementation that draw on technical, legal, political and economic insights will help to strengthen and sustain this framework. *Verification & Implementation* brings together leading practitioners and experts from the field to explain, appraise and propose ideas for strengthening the verification and implementation mechanisms that make international arrangements work in practice.