POLICY BRIEF

Hard to Prove

Compliance with the Biological Weapons Convention

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Summary

This policy brief aims to support multilateral efforts to strengthen biological disarmament by advancing the discussion on verification and compliance monitoring.

Conceptually, it offers an analysis of how understandings of biological threats have evolved since the Biological Weapons Convention (BWC) was first agreed, and it introduces the concepts of multi-level stakeholdership, network governance and trimodal regulation. It is argued that the future of biological disarmament, and of compliance with the BWC, lies in outreach to the ever-growing group of stakeholders and in effective links and partnerships between governments, civil society, national and international scientific and medical associations, and industry.

In thinking through what compliance with the BWC looks like in 2013, the policy brief also looks back historically at the politics of bioweapons verification. It examines the international community's prime experience of verifying biological disarmament, and it draws a number of lessons for the inspection process and the tools required.

Absolute certainty on full treaty compliance is exceptionally hard to prove in the biological field. Yet, there are a number of arrangements that can be strengthened or put in place to satisfy states parties that they are not exposing themselves to unacceptable risks. These arrangements include means to better communicate compliance, convey intent, and build stronger responses.

A set of dedicated forums can be established to consider, discuss and give feedback on the national compliance reports submitted to the Review Conferences and the confidence building measures (CBMs) submitted annually.

The "cycles of engagement" these forums establish would build a clearer picture of how national compliance reports and CBMs operate in practice, and whether they inspire a satisfactory level of confidence. Once this emerges, **an expert working group can be established to develop a clearer, collective vision of national compliance reports and CBMs, as well as of the longer-term evolution of compliance monitoring.**

Finally, **shortcomings in the United Nations Secretary-General's mechanism must be addressed to ensure effective investigations in the rare cases when breaches in compliance with Article I become apparent and there are allegations of biological or toxin weapons use.**

Policy brief objective

Verification and compliance monitoring remain highly contentious for Biological Weapons Convention (BWC) states, and have been kept firmly off the negotiating table for well over a decade. A small group of states is trying to change this. In their Working Paper to the 2012 Meeting of States Parties, Australia, Canada, Japan, New Zealand and Switzerland called for an initial conceptual discussion "to promote common understanding of what constitutes compliance with the BWC and effective action to enhance assurance of compliance." This policy brief aims to support the multilateral policy discussion on strengthening biological disarmament.

In thinking through what compliance with the BWC looks like in 2013, the policy brief begins by outlining two core concepts that are increasingly taking hold in structuring responses to biological threats: multi-level stakeholdership and network governance. The following five sections look back historically to address the politics and practice of verification. They analyse how the politics of verification has evolved over the forty odd years since the treaty was agreed; outline what a biological weapon and biowarfare programme is, and what it is that is particular to these weapons that makes them so hard to detect; and examine the lessons learned about the inspection process and the tools required through the international community's key experience of verifying biological disarmament.

The following four sections deal with compliance monitoring today and in the mid-term. It is argued that while a fully effective verification system, or certainty on full treaty compliance, is exceptionally difficult in the biological field, there are a number of arrangements at the multilateral level that can be strengthened or put in place to satisfy states parties that they are not exposing themselves to unacceptable risks. Three core arrangements are outlined for communicating compliance, conveying intent and building stronger responses.

The final section of the policy brief looks to the future of biological disarmament. A trimodal model or regulation is outlined, in which the three different modes of regulation must all be harnessed to effectively influence, identify and inhibit those who seek to misuse the life sciences. It is argued that the future of biological disarmament, and of compliance with the BWC, lies in outreach to the ever-growing group of stakeholders, and in effective links and partnerships between governments, civil society, national and international scientific and medical associations, and industry.

Multi-level stakeholdership

Concerns with biological weapons were originally related to practices and policies associated with national security – with military defence against the use of biological weapons by nation states and with disarmament efforts. Since the early 1990s, however, and particularly post-9/11 and the anthrax letter attacks, a new understanding of the deliberate infliction of disease has emerged, one which incorporates the threat of biological weapons use by non-state actors and which links biological weapons with efforts to 'secure health'.

This new way of thinking about biological threats has brought in a wider range of actors, and now involves not only groups associated with war, defence, international order and strategy, but also groups concerned with crime, internal security, public order and police investigations, as well as groups concerned with medicine, healthcare and the life sciences.

The move towards multi-level stakeholdership and the greater inclusion of what Caitríona McLeish and Daniel Feakes call 'new security' actors is reflected in the changing backgrounds of the contributors to meetings of BWC states parties. The narrow group of experts involved in the Ad Hoc Group, for instance, has given way to the more inclusive approach of the intersessional process. State party delegation members now often include representatives from the ministries of health, the interior,

and the environment, as well as from agencies such as health and safety, and law enforcement. 'Guests of the meeting' have over the last decade included the International Criminal Police Organisation (Interpol), the World Health Organisation (WHO), the International Committee of the Red Cross (ICRC), the Food and Agriculture Organisation (FAO), United Nations Educational, Scientific and Cultural Organisation (UNESCO), the World Organisation for Animal Health (OIE) and the Organisation for Economic Co-operation and Development (OECD). Private industry including professional associations have also been given a platform at recent BWC meetings, as has the scientific community, including national academies of science, as well as a wider range of stakeholders.

Network governance

Unlike the top-down approach to law and regulation, where those seeking control over an activity authoritatively assert their policies on those who are to be controlled, multi-level stakeholdership is based on the adoption of a governance approach.

A governance approach begins with the acknowledgement that no single body can achieve control on its own. This is because, no single actor, public or private, has all of the knowledge and information required to solve complex dynamic and diversified problems; no actor has sufficient overview to make the application of needed instruments effective; no single actor has sufficient potential to dominate unilaterally. Consequently a governance approach includes, rather than excludes, the active participation of multiple actors.

The governance framework for biological threats today is thus multi-layered and consists of a collection of both connected and unconnected measures, as Jez Littlewood outlines in his paper to the Weapons of Mass Destruction Commission, including: the BWC at the multilateral level; the G8 Global Partnership, the Global Health Security Initiative, the Proliferation Security Initiative and the Committee of the United Nations Security Council Resolution 1540 at the plurilateral level; national criminal law and regulations at the national level; and a host of other measures at the subnational level, such as codes of conduct, procedures for vetting publications and research proposals for security-sensitive information, and private sector screening of gene synthesis orders.

In contrast to the traditional, hierarchical model of diplomacy that stresses the centrality of intergovernmental relations, the multi-level stakeholdership diplomatic approach is centred on the network. The former UN Secretary General, Kofi Annan, promoted this approach in his remarks to the Sixth Review Conference when he said that the BWC should be seen "as part of an international array of tools, designed to deal with an interlinked array of problems" including disarmament, non-proliferation, bioterrorism and crime.

Countering the development and use of biological weapons is not a matter that can be solved for all time. It is a continual process that requires on-going and permanent management, and it cannot be achieved by states alone. Managing biological threats, including biological weapons, requires a broad range of complementary and synergistic measures at all levels from the individual to the international, and all stakeholders have important contributions to make.

The two concepts of multi-level stakeholdership and network governance are increasingly taking hold in structuring thought on verification and compliance monitoring of the BWC.

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Verification and the BWC

Unusually for an arms control treaty, the 1972 BWC was agreed without on-site verification mechanisms to deter or to safeguard against treaty violations. Some states maintain that the nature of biological weapons is such that they are inherently impossible to verify: not only can significant quantities of biological agents be produced in small and readily concealable facilities, but most of the equipment required (e.g. fermenters, centrifuges, freeze-dryers) is ubiquitous in public, private and commercial laboratories. Others argue that while the same level of accuracy and reliability as the verification of, for example, nuclear arms control treaties is unattainable, it is possible to build a satisfactory level of confidence that biology is only used for peaceful purposes. They use the term 'verification' as the description of a set of activities – declarations, visits, and investigations – without making a value judgment about the level of assurance of compliance that could be achieved by this set of activities.

Clearly, a fully effective verification system for the BWC is exceptionally difficult. Yet, there are a number of arrangements that can be strengthened or put in place to satisfy states parties that they are not exposing themselves to unacceptable risks. The following section describes in detail what a biological weapon and biowarfare programme is, and what it is that is particular to these weapons that makes them so hard to detect.

Judging intent

"This is not like finding a bomb in a building some place. The challenge in biological inspections is to find information that can be easily disguised and doesn't leave much of a signature."

UNSCOM chief biological inspector
David Huxsoll

A biological weapon can take many different forms. The biological agent of choice can vary tremendously depending on the intended effect, be it to kill or incapacitate, contaminate terrain for long periods, or trigger a major epidemic. The biological agent might be completely unknown. DNA synthesis techniques, which synthesize DNA strands from off-the-shelf chemicals and assemble them into genes and microbial genomes, might in future enable the creation of bioengineered agents whose characteristics combine traits from a number of dangerous pathogens, or whose characteristics are entirely novel and possibly more deadly and communicable than those that exist in nature.

Biological agents can be combined with a large variety of delivery systems to create a biological weapon; in the past these have included: intercontinental ballistic missiles, cruise missiles, drones, cluster bombs, pipe-bomb-like devices, balloon bombs, 'feather' bombs (stuffed with feathers inoculated with an agent), sprayers and spray tanks, aerosol generators and insects.

Biowarfare programmes can also come in all shapes and sizes, as they have done in the past, from the grandiose, resource-rich, high-tech ones to the small, almost primitive efforts funded on a shoestring.

The varied manifestations of biological weapons and biowarfare programmes can make them especially hard to detect. This problem is compounded by the fact that there are few aspects of a biowarfare programme that are unique to offensive applications and that are readily detectable by outsiders. This is unlike strategic nuclear weapons, which require large industrial facilities to be developed, produced and tested visible to overhead reconnaissance systems or with distinct signatures that can be detected at long range, and chemical weapons programmes, which also require industrial-scale production facilities and large stockpiles of munitions to pose a significant military threat. Of course biological weapons (munitions designed to disseminate biological agents) and biological defences (such as syringes filled with vaccine) can be readily distinguished when placed side by side, but the research, development, production and testing activities used to develop these capabilities are similar, if not identical, in many ways.

At the research-and-development stage, it is extraordinarily difficult to differentiate between research conducted solely for defensive purposes and research that is undertaken for the development of weapons. The same equipment, materials, technologies and techniques are used for both types of research.

Pathogen production facilities can be externally identical to medical or pharmaceutical facilities, or indeed to nondescript administrative buildings. High levels of biocontainment are not necessary to produce biowarfare agents, and advanced technology, such as continuous-flow fermenters and viral reactors, reduce the size of a production facility and accelerate the production process, obviating the need to stockpile biological weapons. Complicating the picture further, the production of biowarfare agents does not produce easy-to-detect effluents such as those associated with the production of chemical and nuclear weapons.

The weaponization of biowarfare agents also does not necessarily generate readily identifiable signatures. Field tests and associated facilities could be camouflaged as, for example, chemical weapon tests, biopesticide trials or vulnerability studies. The munitions themselves may be modified versions of civilian aerosol generators, chemical warheads, conventional bombs or aircraft fuel tanks.

In short, the lines between peaceful research, commercial production, and permitted defence activity and illegal offensive weapons work are exceptionally blurred in the biological weapons field, and this can make it extremely difficult to distinguish between offensive and defensive or

civilian activities. This is why Article I of the BWC – in which states agree to never under any circumstances acquire or retain biological weapons – is so vague in demarcating the borders of prohibited and legitimate activities, and also why the Convention places such a heavy burden on interpreting the intent of an activity to determine whether or not it is in compliance with Article I.

The following three sections outline the key experience the international community has of judging intent and verifying biological disarmament, and highlight the most pertinent lessons learned about the inspection process and the tools required.

UNSCOM

United Nation (UN) Security Council Resolution 687 of April 1991 forced Iraq, defeated in war, to unconditionally agree to allow the UN to remove, render harmless, or destroy its weapons of mass destruction and ballistic missiles. It established the UN Special Commission (UNSCOM) to effect the majority of that mandate, and it directly linked the lifting of trade sanctions to Iraq's compliance with its disarmament obligations based on UNSCR 687.

Iraq's first declaration to UNSCOM flatly denied possession of biological weapons, and Iraqi officials remained uncooperative throughout the 35 biological weapons-related inspections UNSCOM carried out during 1995-1996.

UNSCOM was the most intrusive arms control and disarmament regime ever devised and it had access to an unprecedented range of inspection techniques and technologies. It was authorised to conduct an unlimited number of unannounced inspections of any site anywhere in Iraq, ask any questions during interviews, conduct aerial over-flights of any location in the country; seize, copy, or photograph any item or record; employ any sensor, take any samples, and use any means of analysis it deemed necessary; install monitoring equipment at designated sites; and search any means of transport. In addition, Iraq was obliged by the UN resolutions to provide information to UNSCOM on all sites, facilities, materials, equipment, documentation, imports, activities, and intentions relevant to nuclear, biological, chemical, and missile programmes and dual-use capabilities.

By the time of its final report to the Security Council, UNSCOM had scrutinized a huge number and diversity of facilities and pieces of equipment. It had monitored 82 dual-use facilities including vaccine and pharmaceutical plants, breweries, distilleries, an agricultural research facility, a blood bank, a slaughterhouse, a bakery, dairies, university labs, and public health and diagnostic laboratories; and it had also tagged 1,334 pieces of dual-use biological equipment, more than in the missile and chemical fields combined. And **still** it was extremely difficult to judge intent and verify biological disarmament, and UNSCOM could only conclude that it had compelling yet circumstantial evidence indicating an offensive programme.

Despite this, as Amy Smithson documents in her book *Germ Gambits*, UNSCOM inspectors maintain that inspections **can** sort peaceful biological research and production activities from offensive weapons work. UNSCOM amply demonstrated the utility of a number of technologies and techniques for verifying biological disarmament, as well as the extraordinary measures that were required to overcome a dedicated state's attempts to conceal and retain an offensive bioweapon capability based on multiuse technologies. The first-hand field experience and technical expertise of the inspectors offer a number of lessons about the core set of inspection tools and the inspection process.

Inspection tools

"The beauty is that we had all of these tools and could apply them as required. Inspectors should use the right tool at the right time. Saying that one tool is better than another isn't possible because at some time they are all good."

Senior UNSCOM official

On-site observation: Active observation and comprehension is a skill that needs to be learned. Inspectors need to accumulate a mental inventory of a site, looking at things systematically, and, when they see something odd, discipline themselves to pursue why something would be that way instead of letting that information go past their eyes. Mixed skill sets or technical expertise in inspection teams is important so that some inspectors can focus on gathering specialised information and others on more general, big-picture information. Advance data about dual-use facilities is also important to on-site observation, as it helps to anticipate a site's infrastructure, capabilities, equipment, unique features, and regulatory framework, as well as the likely number, disciplines and skill levels of personnel.

Interviews: As definitive physical evidence is often hard to come by, the biological inspectors relied more heavily on interviews than the other UNSCOM inspectors. Interviewing is more than just asking a series of questions. Like the kind of observation and comprehension required for on-site observation, interviewing as part of inspections also requires training and experience. Eliciting and distinguishing pieces of truth requires knowledge and practice in who to speak with, how to phrase a question, when to ask particular questions, which details to follow up on, when and how to start picking holes in a story, how to effectively press for more information, knowing the appropriate point to introduce independent data, etc. Formal interviews can be useful, and developing protocols for how to carry them out is essential. Impromptu interviews during no-notice inspections can be equally useful. When interviewees are being deliberately deceptive, constructive elements can be found in what is or is not said. As one of UNSCOM's core biological inspector said: "The lie may be as valuable as the truth because it is the bodyguard of what they are trying to protect." Interviews tend not to give you the hard evidence often required, but they provide a good indication of possible and probable scenarios.

Paper trail and document collection: For many, documentary evidence is more persuasive than information that emerges from interviews. In hindsight, many UNSCOM inspectors felt they should have pushed harder to acquire documents in their very first inspections, not waiting till later when arguably there was less to find. Successful document audits and document search missions require well-trained teams that include technically competent interpreters and computer experts. Protocols are also essential, detailing how to carry out quick sweeps of filing cabinets and drawers room by room, building by building, as well as in-depth assessments of paper and computer records in the more promising locations (that specify, among other things, how to keep appropriate records, what to photocopy, and when to confiscate hard drives). Devising on-going monitoring procedures specifically designed to force evidentiary support of declarations and statements is another crucial element in document collection. Documentation from sources outside the country, such as suppliers, financiers, and shipping companies, can also be informative about the size and sophistication of national biological activities and the types of capabilities that are being pursued.

Sampling: Physical evidence is often considered the best, most persuasive data that inspectors can obtain, and sampling gained considerable potency in the 1990s as the science of microbial forensics advanced by orders of magnitude. As UNSCOM chief inspector Jeff Mohr noted: "Now there is absolutely no doubt that inspectors could go into a facility and tell what they've been doing for the last twenty years. With the current, extremely sensitive forensic techniques, if anyone used a warfare agent on a piece of equipment, it would be almost impossible to completely sanitize. A couple of copies of DNA would be found that would identify what they made in that equipment."

Standardised protocols for sampling and analysis are key to collecting the right sample in the right place, and one of the main lessons coming out of the UNSCOM experience was that the sooner and more intrusively sampling is done, the better.

The inspection process

The UNSCOM experience offered four valuable lessons for future inspections to verify biological disarmament.

First, it highlighted the kind of expertise that is critical to inspections of biological sites: practical experience in applicable disciplines, an understanding of past biowarfare programmes, the ability to think creatively and objectively about the potential to employ dual-use equipment and settings for legitimate and prohibited military activities, and acute powers of observation.

Second, it highlighted the importance of a more aggressive overarching inspection strategy, in which inspection teams would be rotated into the country one after another, cascading inspections off of the first team sent in. The first team would quickly survey the sites of highest inspection priority, working from a list of inspection targets probably derived from intelligence, open source data, and declarations. The initial team would educate its relief team on the issues of concern, clues, anomalies, and any other information it developed about what was taking place at a nation's dual-use biological facilities. Thus outbound teams would recommend the inspection focal points for inbound ones, which would in turn develop their own new data.

This cascade strategy would still incorporate inspection targets from fresh intelligence or open source data, but it would largely free successive teams to follow in a timely fashion the leads the inspectors found and to spend more time at facilities deserving in-depth examination.

Third, UNSCOM experience demonstrated the effectiveness of assertive tactics like no-notice inspections and the simultaneous deployment of inspection teams to different facilities.

And, fourth, in terms of inspection tools, UNSCOM inspectors emphasised the need to sample early, sample smart, and sample aggressively. They also emphasised that a cascading inspection strategy could be further strengthened by purposefully identifying and interviewing all of the human assets possibly connected to a bioweapons programme as soon as possible.

The politics of verification

Following the initial political debates when the treaty was developed, verification came to the political fore again in the early 1990s, at the Third Review Conference. Continuing concerns about possible Soviet noncompliance and growing concerns about a suspected Iraqi bioweapons programme, meant a number of state parties wanted to press ahead immediately with the development of a verification protocol. Others were less interested. As a compromise, an Ad Hoc Group of Governmental Experts was established, later known as the VEREX group, whose mandate was to identify and examine potential verification measures from a scientific and technical standpoint. The group identified and evaluated twenty-one potential verification measures and divided them into several categories under on-site and off-site measures. The group agreed that no measure, on its own, would be capable of verifying compliance, but that some measures applied in combination did have the capability to do so. The VEREX group concluded – as UNSCOM's real-world test of many of the measures showed a few years later – that from a scientific and technical viewpoint, verification of the BWC was feasible.

A Special Conference of BWC members convened in September 1994 to consider the VEREX report. Despite considerable disagreements on the nature and content of any further work, including divergent views on the verification issue, the meeting reached a 'last minute' agreement to establish an Ad Hoc Group (AHG) with a mandate to consider appropriate measures, including "possible verification measures", and to draft proposals to strengthen the BWC to be included in a legally binding instrument. This was part of a 'package deal' that also included – at the request of several Non-Aligned Movement states – the consideration of specific measures to ensure effective and full implementation of Article X (on peaceful scientific and technological collaboration).

As the AHG negotiations proceeded, the legally binding instrument became increasingly referred to as a verification protocol. A core group of states recognized the potential benefits of a verification protocol and, drawing on the CWC verification model, were of the view that its effectiveness required the following elements:

- **declarations of relevant activities** to provide transparency on activities of potential relevance to the BWC, including biodefense, high-containment biological facilities, work with listed agents, and other relevant parts of the biotechnology industry;
- **visits** to establish routine, non-accusatory inspections at declared facilities to encourage complete and accurate declarations of relevant facilities, to deter violations in declared facilities, and to provide assurance that declarations are accurate;
- **facility investigations** to enable a short-notice investigation at any facility within a state;
- **field investigations** to allow a state party to request an investigation if it has concerns that biological weapons have been used against it;
- **confidentiality provisions to protect sensitive information** to include appropriate safeguards against the possible loss of national security and confidential business information; and
- **international cooperation and assistance** to facilitate international collaboration and the exchange of scientific and technical information on biotechnology for peaceful purposes, and to provide assistance to a state under threat of biological attack.

Even at this early stage, however, some negotiators saw the word 'verification' as a stumbling block to progress. A number of states started to use the term 'compliance monitoring' instead of verification, because of views that verification had a specific meaning based on its use in nuclear arms control.

In the course of the negotiations, a substantial number of states conducted practice visits and/or practice facility investigations at sites, including biodefense, high-containment, and vaccine production facilities, in an effort to evaluate and further develop the provisions that were being developed by the AHG. But (unlike the situation several years earlier during CWC negotiations) the reporting of these experiences did not result in any observable degree of a convergence of views, and, in particular, did not appear to convince the state parties that were opposed to visits to accept them. There were limited efforts by states in the formal meeting room to assess the utility and efficiency of the provisions being developed for the protocol.

By 1999, visits had become one of the most contentious aspects of the AHG negotiation. Some states felt there should be zero inspection visits a year; others felt that each state party was obliged to receive a certain number of visits annually. To avoid this issue becoming a treaty stopper, a proposal was made to postpone the commencement of visits until agreed by a future conference of BWC members.

At the end of 1999, some major issues remained unresolved. The AHG's 310-page procedural report (the BWC Protocol draft text, usually referred to as the 'rolling text') reflected a range of divergent positions, with much of the text footnoted and/or within square brackets (indeed, often multiple sets of square brackets!). The net result was that the rolling text contained, in effect, many alternative packages between the two contrasting alternatives at each end of the spectrum: one set of provisions that were more or less as intrusive as those agreed for the CWC, which many then considered acceptable for the effective verification of the CWC; and another set of provisions, significantly less intrusive than those contained in the CWC, that many argued would result in a protocol of very limited value, if any, to strengthening the BWC.

In March 2001, the chair of the AHG presented a composite text as a compromise to the various preferred options in the rolling text.

However, at the commencement of the twenty-fourth session of the AHG in July 2001, the United States rejected the composite text, arguing that it did not offer rigorous enough verification measures to detect clandestine biological weapons activities, but that it was invasive enough to compromise classified and proprietary information from the US biodefense programme and pharmaceutical industry. The meeting subsequently descended into acrimony, ending without agreement on even a procedural report of the AHG's work. It is well documented that several other states who equally had concerns with the composite text were happy to hide behind the formal rejection by the US.

The decade that followed saw the introduction of an intersessional process in between the quinquennial Review Conferences, which shifted political attention away from the thorny issue of verification onto less contentious topics where dialogue could continue. Recent efforts by a small group of states parties to refocus attention on compliance in the third intersessional cycle, and to prepare the ground for agreement on common understandings and effective action at the Eight Review Conference in 2016, is a welcome development. It is in everyone's interest that states are assured other nations are abiding by their treaty obligations, that evidence of treaty breaches is detected, and that, more broadly, the overall threat of biological weapons proliferation is reduced.

Compliance monitoring

Developments in the political, security and scientific contexts over the last decade are making it increasingly clear that a fully effective verification system, or absolute certainty on full compliance with the BWC, is exceptionally difficult. As the United Kingdom noted in its response to the 2012 Working Paper on compliance by Australia, Canada, Japan, New Zealand and Switzerland: "Making judgements about BTWC compliance is an unavoidably complex task and rarely straightforward; the dual-use nature of relevant science and technology makes it much more challenging still. And this is becoming even more acute given rapid developments in the life sciences and the increasing globalisation of biotechnology."

A fully effective verification system, or absolute certainty on full compliance with the BWC, is exceptionally difficult. Yet, this does not mean that it is impossible for states to be assured other nations are abiding by their treaty obligations.

Yet, this does **not** mean that it is impossible for states to be assured other nations are abiding by their treaty obligations. The United Kingdom response very helpfully outlines a series of actions and activities that cumulatively may give a reasonable indication of a state party's intent and compliance status over time, including the existence and implementation of a broad range of effective national measures under Article IV, the effective enforcement of legislation, transparency in national biodefence programmes, an open publication policy on research at biodefence facilities, among many others.

In addition to these national actions and activities, there are a number of arrangements at the multilateral level that can be strengthened or put in place to satisfy states parties that they are not exposing themselves to unacceptable risks. These arrangements need to allow states to continually demonstrate their compliance with the BWC. In other words, they need to allow states to persuade other nations that they are engaged in a coherent pattern of peaceful activity and that their compliance is full and genuine. Three core arrangements are outlined in the follow sections: communicating compliance, conveying intent and building stronger responses.

Communicating compliance

One of the key means through which compliance is actively demonstrated multilaterally is the national compliance reports submitted by states parties to the quinquennial Review Conferences. States parties choose individually how to do this, each selecting the information they judge will best demonstrate their commitment to the Convention and their compliance with its obligations.

The compliance reports have traditionally been organised Article by Article, where states reiterate their compliance with the various Article provisions, describe how their obligations are fulfilled, and outline their implementation measures. Yet, often the reports take a different format. They may be set out using an alternative organising principle. Various broad headers are often used, such as: "Legislative and administrative measures", "CBMs", "Working with other states parties", "Biosafety and security", "Response to public-health emergencies". Other states parties use no headers, and some provide only one or two paragraphs describing their compliance in broad terms. Some provide merely a single sentence stating that they are in compliance without providing any further details.

Demonstrating compliance, however, involves more than just providing information. It involves **communication**, and this entails at least two actors, one providing information and one receiving information. In the BWC context, there is currently no structure for states parties to collectively consider the reports submitted and give feedback on them. States providing information do not know whether the kind of information they provide is reassuring to others, or whether they dismiss it as irrelevant.

A dedicated forum is needed in which states parties can compare notes on how they are carrying out their obligations under the Convention, and consider, discuss and give feedback on one another's reports. The emphasis is on offering comment constructively and amicably, not adversarially, and on learning from one another's implementation experience with a view to each state considering for itself where its own national implementation might be strengthened. In the course of such discussion, compliance assurance should be enhanced; or, alternatively, it may become clearer what additional information, not initially provided, would constitute more convincing evidence of compliance in the eyes of other states parties.

Treaty partners are understandably keen on reciprocity. Yet, as Nicholas Sims notes, it is sometimes worth taking an initiative even without the certainty that it will be reciprocated. A small number of compliance assurance initiatives have already been taken. Canada and Switzerland, joined in 2012 by the Czech Republic, have taken an initiative in compiling evidence of their own compliance through an analysis of their regulatory frameworks, in accordance with their shared concept of compliance assessment. They have put the results into the public domain without waiting for other states parties to do the same. France and its eventual partner in 'peer review,' understood as review by counterparts, will likewise be taking an initiative without any certainty that others will follow suit. These are examples of good practice to be emulated; even if emulation is a patchy and slow process, these initiatives are worth taking for the sake of the Convention's health. Over the history of the BWC there have been others. The forum proposal builds on such initiatives and the motives which have inspired them.

It is essential to emphasise that states parties would be invited, not instructed, to participate in the new forum. Nothing mandatory is being suggested. Nor is it assumed that take-up would be near-universal. Instead the assumption is that the forum would shape and channel a movement beyond the pioneering efforts already noted, a movement towards a gradually widening multilateralism.

Conveying intent

The Confidence Building Measures (CBMs) of the Convention, adopted some years after the BWC was agreed in an effort to redress the lack of verification mechanisms, provide another opportunity for states parties to continually demonstrate their compliance. The regular exchange of data they provide for – on, among other things, biodefence programmes, laboratories and research centres, outbreaks of infectious diseases, and vaccine production facilities – strengthens compliance monitoring by maximising the transparency of national patterns of normal activity.

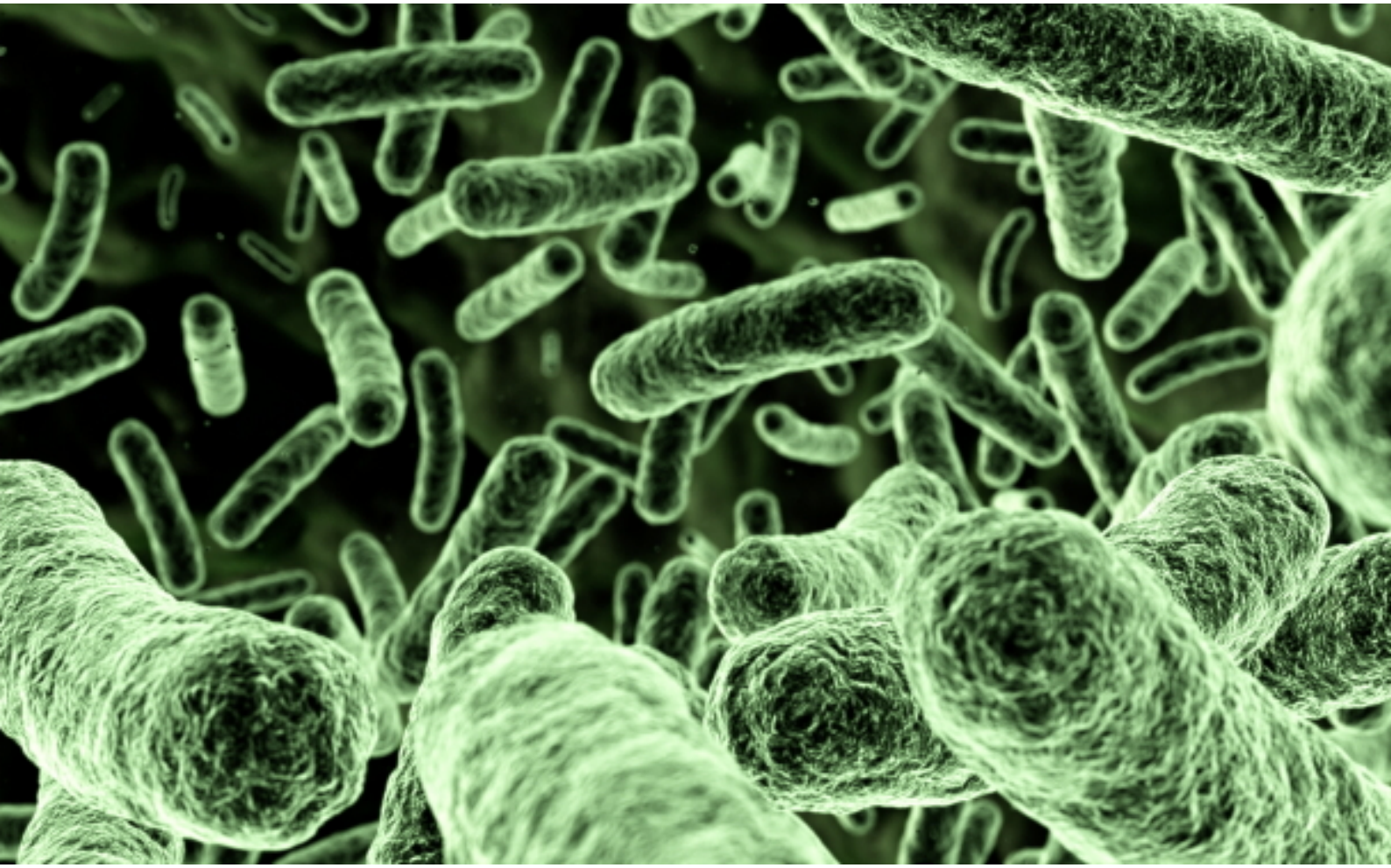
In the current political, security and scientific contexts, it is particularly important for states to be open about dual-use projects that edge close to the offensive and defensive line to clearly convey the intent of their activities to the international community. For example, as Judith Miller and colleagues reported in their book *Germs*, a series of secret projects were underway in early 2000 in the United States to improve biodefenses. The Pentagon was buying commercially available equipment to build a small-scale germ factory to produce anthrax simulants – *Bacillus thuringiensis*, the biopesticide made at the main Iraqi bioweapons facility before it was blown up by UNSCOM in 1997. Another US project involved genetically modifying anthrax to make a vaccine-resistant superbug. Meanwhile the CIA, in one of its projects, was building Soviet-style bio-bomblets and testing them for dissemination characteristics and performance in different atmospheric conditions. Pentagon and CIA lawyers said the projects were legitimate defensive activities: Building and operating a bioweapons facility helped uncover the telltale clues of distinctive patterns of equipment buying; genetically modifying anthrax was essential to check whether the

Demonstrating compliance involves more than just providing information; it is a two-way communication process.

current vaccines administered to soldiers were effective; and building and testing bomblets was a defensive response to specific intelligence about a possible adversary. Others disagreed, saying the projects were not permitted by the BWC.

The treaty permits almost any kind of research in the name of defense. Some of this work is unquestionably justifiable. Other research edges closer to the blurred line between defensive and offensive work. The trouble with distinguishing permitted biodefense projects from non-permitted projects is that it is not just about the facilities, equipment, and activities, but also – as already discussed in the 'judging intent' section – about the purpose or intent of those activities. An essential component in reaching a compliance judgment with the treaty is therefore an analysis of justifications provided by states for the activities in question, and the CBMs offer a useful medium through which states can provide these sorts of justifications.

In the interest of maximizing transparency, and disseminating the relevant information as widely as possible, many states parties are now making their CBM returns publicly available or are working toward doing so. Making these submissions public can greatly enhance their function. The knowledge, experience and expertise of civil society can contribute to the CBM communication process and to enhancing transparency between states parties in several ways, including through: assisting states to collect and collate information for and on the CBMs; monitoring states parties' activities; collecting data from open sources; processing the data submitted to generate accessible information; and, ultimately, by bringing this information into the public sphere. Restricting access to CBM returns risks building suspicion rather than confidence among important stakeholders, and misses an opportunity to engage these same stakeholders in processes that might actually enhance the quality and completeness of the information submitted.



An essential component in reaching a compliance judgment with the treaty is an analysis of justifications provided by states for their dual use research.

Given, however, that most CBM returns will continue to be published on the restricted area of the BWC website, the CBMs will only enable limited transparency. They cannot be utilized by the BWC community as a whole. In an effort to remedy this, the current mandate of the ISU should be expanded from "compiles and distributes data on CBMs" to "compiles, **analyses** and distributes data on CBMs" to allow for an objective trend analysis that highlights qualitative and quantitative aspects without making reference to individual countries.

Transparency is about something more than just the availability of relevant information. It is also about analysing that information, and ensuring that any outstanding questions are answered. There is currently little knowledge of how states parties use the completed returns submitted by other states. We do not know to what extent states parties feel these measures provide the necessary level of transparency or whether they actually build confidence. We do not know if the language of submission is a hindrance to their use. We do not have periodic, collective reviews of the returns and opportunities to seek clarification about the information submitted.

A dedicated forum is needed in which states parties can consider, discuss and give feedback on one another's CBM returns on a regular basis. Like the forum on national compliance reports, states parties should be invited to participate, not instructed, and the emphasis should be on offering comment constructively and amicably, not adversarially. The "cycles of engagement" these forums establish would build a clearer picture of how national compliance reports and CBMs operate in practice, and whether they inspire a satisfactory level of confidence. Once this emerges, an expert working group can be established to develop a clearer, collective vision of their purpose and longer-term evolution.

Building stronger responses

The United Kingdom response to the 2012 Working Paper on compliance also outlined a series of actions and activities that may raise questions about a state party's comprehensive compliance. These include: clandestine procurement of dual-use equipment and materials, closed or unduly secretive military or civil biological facilities, persistent failure to submit CBMs, hostile attitudes to the international community, recurring refusal to respond to clarification requests under Article V, among others.

In the rare cases when allegations of biological or toxin weapons use have actually been made, they tend to arise during international or internal armed conflict, or where there has been deep antagonism between the parties involved. This calls attention to the importance of impartial, multilateral investigations of alleged attacks. The involvement of a diverse array of countries in an investigation tends to generate greater international credibility and legitimacy than evidence based on national intelligence alone, and for this reason, provide a stronger basis for a response.

In the absence of a BWC verification mechanism, and in light of the constraints on WHO's field investigation

The "cycles of engagement" these forums establish would build a clearer picture of how national compliance reports and CBMs operate in practice, and whether they inspire a satisfactory level of confidence.

capability, the United Nations (UN) Secretary-General's mechanism is currently the only multilateral vehicle available for investigating allegations of biological weapons use. The record of UN field investigations under the mechanism reveals, however, that past findings have largely been inconclusive because of recurrent problems with timeliness, access, cooperation by the host country, and chain of custody. All of these shortcomings must be addressed and corrected if future investigations of alleged use are to be effective.

In particular, the historical record has highlighted the need for the investigation team to do the following: arrive as soon as possible after an alleged attack; obtain unrestricted access to the affected area; and conduct prompt medical examinations of the sick and deceased. Prompt sample collection and analysis is particularly important in the case of biological agents, which tend to degrade rapidly in the environment and may not be detectable after a period of days or weeks. It is also essential to document a continuous and secure chain of custody for all samples. Past investigations have taught that an allegation of use can only be confirmed with high confidence if environmental and biomedical samples are analyzed by at least two independent reference laboratories.

request of a UN member state and not in response to allegations made by a humanitarian organization, such as the ICRC. Giving the Secretary-General greater flexibility to launch investigations based on credible information provided by non-governmental organizations and other unofficial sources would significantly strengthen the mechanism.

Second, it should be clarified that the Secretary-General's mandate not only covers the use of a biological agent by a state against another state (international armed conflict), but that it also covers the use of a biological agent by: 1) a rebel army against a state (insurgency warfare); 2) a state against a rebel army or against civilians who are supporting it (counterinsurgency warfare); 3) a sub-state group against another sub-state group (civil or ethnic warfare); and 4) a sub-state group against unarmed civilians (terrorism).

Third, a formal means should be established by which the Secretary-General's mechanism can integrate data held by WHO, OIE and FAO into an investigation, as these are the key collective resources for technical data on unexplained outbreaks. Fourth, a strengthened mechanism should include a political commitment by all UN member states to cooperate fully with field investigations. Fifth, the lack of a dedicated source of funding to maintain the lists of experts

Truly effective management of the knowledge-based risk posed by dual-use life science technologies must therefore couple hard-law with both soft-law and mimetic regulation.

Efforts by the European Union and individual European Union countries to review and update this mechanism are welcome. Deserving of particular mention is Germany's concern that all previous experience with the Secretary-General's mechanism has involved the alleged use of chemical or toxin weapons, and that the current investigation guidelines and procedures must be made suitable for incidents involving microbial pathogens as these require different techniques for medical examination and the collection and analysis of environmental and biomedical samples.

The mechanism can also be strengthened in a number of other ways. First, under the present mandate, the Secretary-General can only initiate an investigation at the

and reference laboratories and to conduct field investigations needs to be rectified.

Since allegations of biological or toxin attacks are likely to be rare, it would be desirable to hold periodic training exercises for the experts on the roster to encourage the sharing of knowledge and expertise, to keep the group current with any advances in science and technology, and to foster the interpersonal relationships needed for a strong *esprit de corps* and effective intra-team communication. In addition to the roster of qualified experts, a list of "interpreter-experts" skilled in a broad range of languages should be established and maintained.

The future of biological disarmament

The traditional "artefact-centric" approach to regulating unconventional weapons – which seeks to control the materials, methods and products involved in misuse – is becoming ever-more ill-suited to the life sciences, where the technologies are less about hardware, equipment and tools, and more about people, processes and know-how. Dual-use, or multi-use, life science technologies are increasingly diffuse, globalised and multidisciplinary and are often based on intangible information rather than on specialised materials and equipment. This changes the definition of the problem from a material- and equipment-based threat that can be eliminated to a knowledge-based risk that must be managed.

Risk-based regulation involves a plurality of public and private actors, instruments and purposes that can be grouped into three modes of governance: coercive, normative and mimetic:

- Coercive regulation, or "hard-law", is based on the authority of the state and accompanied by penalties for noncompliance; it includes statutory regulations, reporting requirements, and mandatory licensing, certification and registration.
- Normative regulation, or "soft-law", is less formal and based on conceptions of what is socially desirable; it includes professional self-governance, codes of practice, guidelines, and transparency measures.
- Mimetic regulation involves the emulation of successful practices and models of behaviour; it includes national and international standards, education and awareness-raising.

All three modes of regulation play important roles in influencing, identifying and inhibiting those who seek to misuse the life sciences. Truly effective management of the knowledge-based risk posed by dual-use life science technologies must therefore couple hard-law with both soft-law and mimetic regulation.

The future of biological disarmament, and of compliance with the BWC, lies in outreach to the ever-growing group of stakeholders and in effective links and partnerships between governments, civil society, national and international scientific and medical associations, and industry.

Soft-law and mimetic regulation can be shaped by both state and non-governmental actors. Efforts to reduce the risks of biological weapons proliferation and terrorism can only be maximised when these actors cooperate and send the same message. The future of biological disarmament, and of compliance with the BWC, lies in outreach to the ever-growing group of stakeholders and in effective links and partnerships between governments, civil society, national and international scientific and medical associations, and industry.