

The role of scientific advice in multilateral disarmament

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25 April 2024

Let's start...

- The use of S&T for supporting processes/mechanisms/advice is well established in different disarmament regimes.
- Main objective to monitor relevant S&T advances and provide advice.

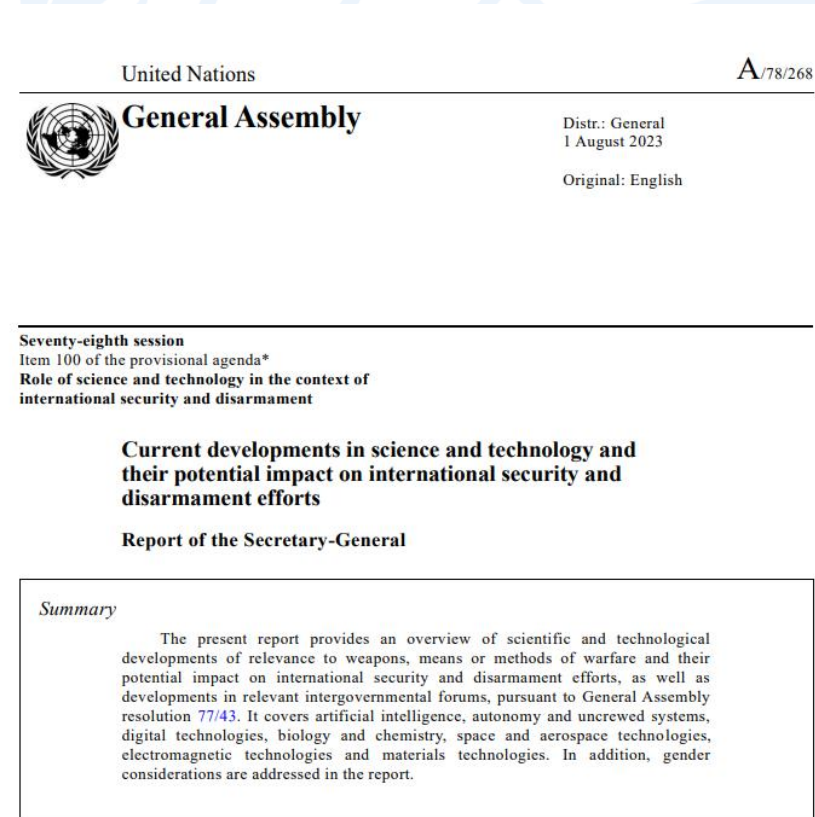


Aim: Food for thought by showing some S&T examples to aid your upcoming consultations

1. S&T in the **SG report**: highlights on Bio and Chem.
2. S&T at the **OPCW**: SAB + biotoxin working group.
3. S&T in the **CTBTO**: analysis and data collection.
4. S&T for **Small Arms and Light Weapons**: a proposal for a technical board.
5. S&T within the **BWC**: where S&T already happens + future views.

1. Secretary-General's report on current developments in science and technology and their potential impacts on international security and disarmament efforts

- First report in 1990 (ongoing)
- Topics (1990-2018): nuclear, space tech, materials tech, information and biotechnology
- Call for experts to submit individual papers assessing the impact and military potential of developments in those fields.
- A multistakeholder high-level conference: “New trends in science and technology: implications for international peace and security”, was held in Japan in 1990.



C. **Biology and chemistry**

23. The norm against the hostile uses of chemistry and **biology** is long-standing and enshrined in international law through the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (**Biological**) and Toxin Weapons and on Their Destruction of 1972 and the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction of 1993. However, recent uses of chemicals as weapons, allegations of the development of **biological** weapons and advances in chemistry and **biology** threaten to undermine these legal and normative measures. The coronavirus disease (COVID-19) pandemic has exposed the vulnerability of modern societies to **biological** agents and could increase the interest of some State and non-State actors in the hostile use of **biology**.

24. As stated in the Secretary-General's policy brief on A New Agenda for Peace, multiple technologies in the life sciences are advancing and converging to generate considerable potential benefits for society at large. However, the same technologies also raise significant safety and security issues and could facilitate the development of new **biological** weapons. Trends in a number of broad areas are facilitating advances that should be monitored for any potential security implications. For example, advances in genome editing technologies enable relatively easier and more precise manipulation of the genetic code of life, as a result of which it is now possible to read, write and, increasingly effectively, edit DNA. The convergence of the life sciences with big data and machine learning enables large amounts of data to be collected and analysed for patterns that can address public health challenges more effectively.

25. Research and development in those fields are overwhelmingly undertaken for such peaceful purposes as the development of new vaccines and therapeutics. Along with other technologies, these developments could play a significant role in addressing societal challenges and strengthening the international legal regime against **biological** weapons. For example, big data and DNA sequencing could aid investigations of non-compliance with the **Biological** Weapons Convention and facilitate the timely identification and characterization of causative agents, thereby expediting the provision of more effective assistance in the event of a violation. The benefits that such developments bring notwithstanding, several ethical, legal, safety and security concerns exist. These include developments that could feed into new forms of **biological** weapons, ease access to or production of known **biological** weapons, or complicate existing means of detecting and responding to disease.

26. For example, improved understanding of immunology could facilitate the development of vaccines and therapeutics. However, the same knowledge could be exploited for hostile purposes in developing new weapons capable of more effectively

27. With regard to chemical weapons, the remarkable progress made in understanding life processes at the molecular level in recent years has resulted in a greater ability to manipulate and interfere with such processes. Capabilities in those areas are expected to continue to grow. Computational tools to design molecules that can target specific cell types and highly active pharmaceutical-based chemicals that act on the central nervous system have led to concerns about the possibility of new types of toxic biochemical weapon agents. There is also increased risk from more rudimentary chemical weapons. The availability of knowledge of improvised chemical dispersal devices combined with easy access to commercially available toxic chemicals presents ongoing challenges for security and disarmament.

28. The crossover between the domains of **biology** and chemistry requires consideration by Member States and other relevant stakeholders, in particular industry, to ensure that existing legal instruments are not undermined. Chemicals are increasingly being produced using **biologically** mediated processes, such as microbial fermentation or the use of enzymes as catalysts. In addition, substantial advances have been made in the chemical synthesis of molecules of **biological** origin. Multidisciplinary research teams continue to expand beyond **biology** and chemistry to incorporate ideas and approaches from other disciplines, including computing, machine learning, materials science and nanotechnology. This convergence is blurring the boundaries between disciplines and provides significant social and economic benefits, including through improved countermeasures against chemical and **biological** warfare agents. However, new approaches and processes in drug discovery and delivery could also facilitate the identification, development and delivery of new toxic compounds that could be exploited for use as weapons or in the modification of **biological** agents on a molecular level to affect the route of infection, transmission or severity of disease.¹²

Relevant intergovernmental processes, bodies and instruments

29. Both the **Biological** Weapons Convention and the Chemical Weapons Convention have provisions for review conferences every five years, at which relevant scientific and technological developments are reviewed. The Ninth Review Conference of the States Parties to the **Biological** Weapons Convention was held in November and December 2022, and the fifth Review Conference of the States Parties to the Chemical Weapons Convention was held in May 2023.

30. Both treaties contain provisions relating to more regular means of reviewing relevant developments in science and technology. Pursuant to a mandate from the Conference of the States Parties to the Chemical Weapons Convention, the Director-General of the Organisation for the Prohibition of Chemical Weapons (OPCW) established a Scientific Advisory Board within the Organisation. In 2022, the Board convened its thirty-fourth, thirty-fifth and thirty-sixth sessions, and its temporary working group on the analysis of biotoxins concluded its work after holding its fourth, fifth and sixth meetings. In addition, OPCW has inaugurated its Centre for Chemistry and Technology, which will enable it to carry out research activities to support and

strengthen the verification regime, and to conduct training courses and other capacity-building activities.

31. Several proposals have been submitted in recent years regarding a scientific **advisory body or mechanism under the Biological Weapons Convention**. Many proposals were discussed during the Ninth Review Conference of the States Parties to the Biological Weapons Convention, which established the Working Group on the strengthening of the Convention and called upon it to further develop such a mechanism and to discuss scientific and technological developments relevant to the Convention. The importance of the discussions on the convergence between the Biological Weapons Convention and the Chemical Weapons Convention has been recognized.

32. Pursuant to Security Council resolution [1540 \(2004\)](#), Member States are required to establish and strengthen controls to prevent the proliferation of biological and chemical weapons and their means of delivery to non-State actors. In November 2022, the Council extended the mandate of the Security Council Committee established pursuant to resolution [1540 \(2004\)](#) and its Expert Group until 30 November 2032.

2. S&T in the Chemical Weapons Convention

“Its scientific endeavours are particularly important for those states with more limited resources and unable to monitor the various advances in science and technology”



SAB Terms of Reference



Emerging Technologies

The SAB monitors, assesses, and provides advice on emerging technologies and advances that can be applied to OPCW verification activities.



Board Members

The 25 independent experts of the Scientific Advisory Board serve in a personal capacity (not as representatives of their respective governments) and serve no more than two consecutive three-year terms.

Temporary working groups (e.g: Analysis of Biotoxins):

- “These groups comprise Board members with relevant expertise, bolstered by additional external experts.
- 2-year mandate
- 5 subgroups
- Addressed seven specific questions that the Director-General had requested (e.g: list of biotoxins most relevant to consider when building capabilities for investigations of alleged use).
- Met a total of 7 times: 4 virtual and 3 in-person meetings.
- Funded: EU
- Report to the SAB.

Reports

| Document Symbol | Title | Date ▼ |
|--------------------|----------------------------------------------------------------------------------------------------------------------|-------------------|
| SAB-37/1 | Report of the Scientific Advisory Board at its Thirty-Seventh Session | 1 September 2023 |
| SAB/REP/1/23 | Analysis of Biotoxins Report of the Scientific Advisory Board's Temporary Working Group | 20 April 2023 |
| SAB-37/WP.1 | Summary of the Sixth Meeting of the Scientific Advisory Board's Temporary Working Group on Analysis of Biotoxins | 17 April 2023 |
| SAB-36/WP.2 | Summary of the Fifth Meeting of the Scientific Advisory Board's Temporary Working Group on the Analysis of Biotoxins | 17 November 2022 |
| SAB-36/1* | Report of the Scientific Advisory Board at its Thirty-Sixth Session | 29 September 2022 |
| SAB-36/WP.1 | Summary of the Fourth Meeting of the Scientific Advisory Board's Temporary Working Group on Analysis of Biotoxins | 29 July 2022 |
| SAB-33/WP.2/Corr.1 | Summary of the Third Meeting of the Scientific Advisory Board's Temporary Working Group on Analysis of Biotoxins | 14 July 2022 |
| SAB-35/1 | Report Of the Scientific Advisory Board At Its Thirty-Fifth Session | 16 June 2022 |
| SAB-34/1 | Report of the Scientific Advisory Board at its Thirty-Fourth Session | 17 March 2022 |



OPCW

Scientific Advisory Board

Thirty-Seventh Session
28 August – 1 September 2023

SAB-37/1
1 September 2023
Original: ENGLISH

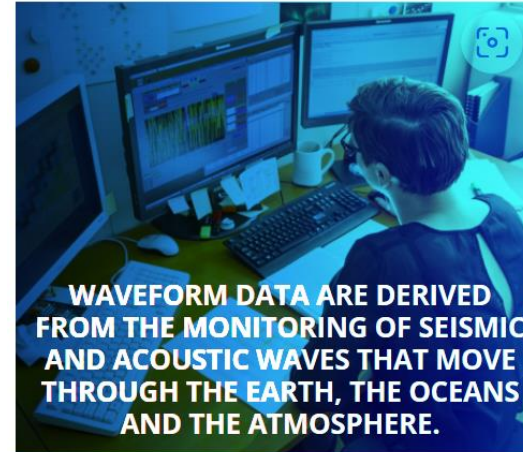
**REPORT OF THE SCIENTIFIC ADVISORY BOARD
AT ITS THIRTY-SEVENTH SESSION**

1. AGENDA ITEM ONE – Opening of the session

3. S&T at the Comprehensive Nuclear-Test-Ban Treaty (CTBTO)

Systems work together to detect nuclear tests around the globe.

- International Data Centre (IDC)
- International Monitoring System (IMS)
- Global Communications Infrastructure (GCI).
- Ready for future On-Site inspections (tech for imaging, radiation monitoring).
- Science and Technology conference series to foster innovation and enhance the treaty's verification regime.



THE INTERNATIONAL MONITORING SYSTEM

A unique global monitoring network

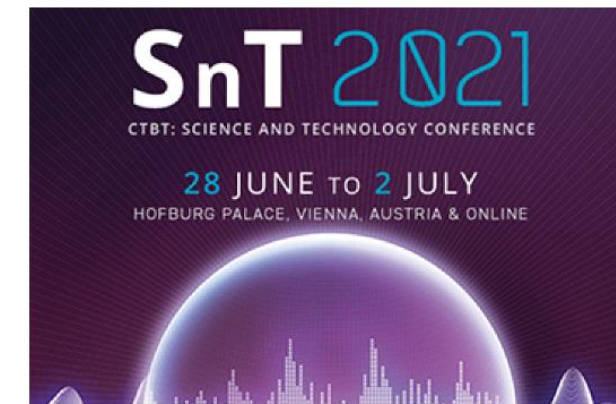
The International Monitoring System (IMS) is a [unique global network](#) that, when complete, will consist of 321 monitoring stations and 16 laboratories hosted by 89 countries around the globe.

Four complementary technologies

The IMS uses four complementary verification methods, using the latest available technology:

- Fifty primary and 120 auxiliary [seismic stations](#) to monitor for an underground test by measuring shockwaves through the ground.
- Eleven [hydroacoustic stations](#) to detect soundwaves through the ocean from an underwater explosion.
- Sixty [infrasound stations](#) to listen for ultra-low-frequency sound waves moving through the atmosphere at levels inaudible to the human ear.
- Eighty [radionuclide stations](#) to detect radioactive particles or gases from atmospheric explosions, or vented by underground or underwater nuclear explosions. Sixteen radionuclide laboratories assist radionuclide stations in identifying these radioactive substances.

In practice, a single event may be detected by more than one type of monitoring station.



4. S&T for Small Arms and Light Weapons



Proposals for an open-ended technical expert group to develop agreed recommendations in the light of recent developments in small arms and light weapons manufacturing, technology and design



Ivor Richard Fung, PhD
Chief Conventional Arms Branch

Modalities of the technical expert group

(1) Composition

- **National technical experts** – with specific expertise in relevant areas, including marking, tracing, forensics, law enforcement and legal services.
- **Industry and private sector**, including manufacturers, shipping companies, technology developers.
- **Academia**
- **Civil society**

Scope of the open-ended technical expert group (proposal):

1. Address current challenges posed by recent and ongoing developments in weapons manufacturing, technology and design (use of polymer and 3D printing).
2. Find potential opportunities to strengthen the implementation of the PoA/ITI (program of action/ International Tracing Instrument).
3. To bridge the technological gap between states through international cooperation and assistance
4. Establish a mechanism capable of monitoring and developing effective measures for dealing with future technologies.

5. Where does Science Advice fit in the BWC?

- Meeting of Experts on Review of Developments in the Field of Science and Technology Related to the Convention
 - MSPs & RevCons
 - Youth4Biosecurity
 - NCPs
 - Int S&T Conference in preparation for 9th Rev Con.
-
- Working Group topics.
 - Science and Technology Review Mechanism
 - ICA
 - Verification mechanism



Let's finish...

“ BWC States Parties may need to build a common understanding around why States Parties require a review, who the review is for, and how any outputs or advice will be used. Clarity around these questions can enable States Parties to develop a mechanism that best suits their needs “



Exploring Science and Technology Review Mechanisms Under the Biological Weapons Convention

James Revill, Alisha Anand, and Giacomo Persi Paoli

 **UNIDIR** UNITED NATIONS INSTITUTE
FOR DISARMAMENT RESEARCH

Gracias!



<https://disarmament.unoda.org/biological-weapons/>



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