

**Exploring Science
and Technology
Review Mechanisms Under the
Biological Weapons Convention**

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UNIDIR UNITED NATIONS INSTITUTE
FOR DISARMAMENT RESEARCH

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ACRONYMS AND ABBREVIATIONS

BWC	Biological Weapons Convention
CCW	(Convention on) Certain Conventional Weapons
DSA	Daily subsistence allowance
EEG	Eastern European Group
ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
EU	European Union
ICC	International Criminal Court
ISU	Implementation Support Unit (of the BWC)
IUPAC	International Union of Pure and Applied Chemistry
LMIC	Low- and middle-income country
MSP	Meeting of States Parties
NATO	North Atlantic Treaty Organization
NAM	Group of the Non-Aligned Movement and Other States
MX2	Meeting of Experts on Review of Developments in the Field of Science and Technology Related to the Convention
OPCW	Organisation for the Prohibition of Chemical Weapons
S&T	Science and technology
SAB	Scientific Advisory Board (of the ICC, the OPCW or the United Nations Secretary-General)
SAM	Scientific Advice Mechanism (of the European Union)
STA	Subsidiary Body for Scientific and Technological Advice (of the UNFCCC)
STEAF	Scientific and Technological Experts Advisory Forum
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNOG	United Nations Office at Geneva
WG	Western Group
WHO	World Health Organization

EXECUTIVE SUMMARY

Since the Biological Weapons Convention (BWC) opened for signature in 1972, biology and other converging disciplines have advanced considerably. These changes could have profound implications for a science-based disarmament agreement like the BWC.

To address changes in biology and biotechnology, BWC States Parties have established processes to review developments in science and technology, including annual expert meetings on this topic. However, shortcomings are evident in the current approaches and many BWC States Parties have expressed support for a more systematic review of science and technology under the Convention. This support is further reflected in the results of a voluntary UNIDIR survey of all BWC States Parties in which 39 of the 42 respondents indicated support for a mechanism to systematically review science and technology of relevance to the BWC.

Such support was forthcoming for several different reasons. As such, 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.

Agreement around any mechanism will also require consultation among States Parties on key areas of divergence. The question of participation in the mechanism is likely to be particularly divisive, based on past proposals. This split was apparent in the UNIDIR survey, in which 23 respondents favoured limited participation and 12 respondents favoured some sort of open-ended participation model. Both models have advantages and disadvantages. Moreover, they are not necessarily mutually exclusive. It could be useful to further consider creative approaches to combining different models to form a hybrid process for reviewing science and technology.

There are also differing views regarding how specific priority areas and questions should be determined

(and who should do this). If there is appetite for some form of review mechanism, States Parties will need to find a balance between, on the one hand, collectively agreeing topics for discussion in advance and, on the other, ensuring the necessary flexibility to address unanticipated issues and respond to end user requirements as they emerge.

Issues of autonomy and independence will also be important to consider further. For a mechanism to be credible and effective, participants must remain free from outside political (or commercial) influence. States Parties will therefore need to consider what measures or processes can be applied to ensure independence and autonomy of the review mechanism.

States Parties will also need to reach agreement on the resourcing of any mechanism. Institutional support is widely seen as critical for a successful mechanism. However, this will require political support and the provision of adequate resources, plausibly through some combination of assessed and voluntary contributions.

Each of these issues requires consideration and consultation ahead of the Ninth Review Conference, when States will have the opportunity to determine the future direction of the Convention. As they consider a possible review mechanism, they must take into account that its mandate, objectives, participants, outputs, audience and funding are all interconnected. A decision around any one of these factors will require a careful consideration of its implications for the others.

While there are considerable challenges to achieving consensus agreement on a science and technology review mechanism, these issues are not insurmountable. The Ninth Review Conference provides a unique opportunity to advance the BWC through an agreement around a review mechanism as part of a package of measures designed to strengthen the Convention at a point where science (and security) are evolving rapidly and efforts to strengthen biological disarmament are needed more than ever before.

1. SETTING THE SCENE

1.1 INTRODUCTION

Over the course of the evolution of the 1972 Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction (Biological Weapons Convention, BWC), many of its States Parties have expressed support for a more systematic review of developments in science and technology (S&T) of relevance to the Convention.¹ However, BWC States Parties have so far been unable to reach agreement on any dedicated and systematic process for in-depth technical exchanges on science and technology. The Ninth BWC Review Conference provides an opportunity to rectify this issue.

This report aims to inform discussion around a mechanism to review S&T under the BWC at the Ninth Review Conference. It is based on the findings of a UNIDIR study on Exploring Science and Technology Review Mechanisms under the Biological Weapons Convention.

The report focuses on seven key aspects of an S&T review mechanism: objectives; selection and composition of participants; leadership; working methods; institutional support; outputs; and funding. Following a short introduction and an outline of the wider context, in chapter 2 this report presents project findings on each of these themes. It then presents, in chapter 3, three options for a BWC S&T review mechanism for States Parties to consider. The report is based on the four methods outlined in table 1.

1 First BWC Review Conference, Argentina, “Summary Records of the Eighth Meeting”, 10 March 1980, BWC/CONF.I/SR.8, 12 March 1980, <https://undocs.org/BWC/CONF.I/SR.8>, p. 8; Second BWC Review Conference, “Report of the Committee of the Whole: Addendum”, BWC/CONF.II/9/Add.1, 29 September 1986, <https://undocs.org/BWC/CONF.II/9/Add.1>; Third BWC Review Conference, “Summary Record of the 8th Meeting”, BWC/CONF.III/SR.8, 27 September 1991, <https://undocs.org/BWC/CONF.III/SR.8>; Fifth BWC Review Conference, “Background Paper on New Scientific and Technological Developments Relevant to the Convention”, Prepared by the Secretariat, BWC/CONF.V/4/Add.1, 26 October 2001, <https://undocs.org/BWC/CONF.V/4/Add.1>, p. 6; Fifth BWC Review Conference, Statement by Canada 19 November 2001, URL??, p. 4; and Fifth BWC Review Conference, Working Paper by Japan, BWC/CONF.V/COW/WP.14, 26 November 2001, <https://undocs.org/BWC/CONF.V/COW/WP.14>.

Table 1. Methods employed in this study

Desk-based review of other mechanisms	A desk-based review of 20 science and technology review-type mechanisms employed in different regimes beyond the BWC. ²
Semi-structured interviews with experts	A series of 19 semi-structured interviews with experts involved in existing S&T review-type mechanisms, or with experience working in other similar mechanisms.
Desk-based review of past BWC proposals	A desk-based review of the policy material from BWC meetings and wider discussions, including working papers submitted to the BWC by States Parties and national statements.
Survey of the views of BWC States Parties	<p>An anonymous voluntary electronic survey of the views of BWC States Parties on an S&T review mechanism. All 183 States Parties were invited to participate in the survey via email. With a view to receive participation from a maximum number of States Parties, the authors followed up with the States Parties via email and telephone, in most cases with their missions in Geneva.</p> <p>This survey received responses from 42 States Parties. In the responses originally submitted to UNIDIR, a small number of States submitted multiple differing sets of answers from different departments. The authors subsequently followed up with contact points to agree on a single consolidated response and all data used in this report is based on one response per State.</p> <p>The 42 responses include 17 responses from the Western Group (WG) of BWC States Parties; 7 responses from the Eastern European Group (EEG); and 18 responses from the Group of the Non-Aligned Movement and Other States (NAM).</p> <p>The survey questions were of three types: single-choice, multiple-choice and rating questions. Not all respondents answered all the questions in this survey. The number of respondents per question is indicated in footnotes attached to the figures used throughout this report.</p> <p>The survey results are not a statistically significant representation of the views of 183 States Parties, but they do provide an illustrative overview of perspectives of the States Parties on an S&T review mechanism.</p>

2 These bodies were selected based on existing references in the BWC as well as a wider review of prominent international, regional or like-minded mechanisms. The mechanisms include: advisory committees convened by the World Health Organization (WHO); the Committee on Science and Technology (COST) of the Association of Southeast Asian Nations (ASEAN); the Scientific Advisory Committee (SAC) of the Food and Agriculture Organization of the United Nations (FAO); Group of Governmental Experts (GGEs) of the High Contracting Parties to the Convention on Certain Conventional Weapons (CCW Convention); the CCW Meetings of Military and Technical Experts (MMTE); the Scientific Advisory Board (SAB) of the Office of the Prosecutor of the International Criminal Court (ICC); the High-Level Advisory Group on Finance and Technology of the International Monetary Fund (IMF); the Science and Technology Organization (STO) of the North Atlantic Treaty Organization (NATO) and its Science and Technology Board (STB); the Scientific Advice Mechanism (SAM) of the European Union (EU); the International Panel on Climate Change (IPCC); the SAB of the Organisation for the Prohibition of Chemical Weapons (OPCW) and its temporary working groups; the Scientific and Technical Partnership (STP) of the United Nations Office for Disaster Risk Reduction (UNDRR) and its Scientific and Technical Advisory Group (STAG); the Specialist Commissions of the World Organization for Animal Health (OIE) and its Ad Hoc Groups of Experts; the Subsidiary Body for Scientific and Technological Advice (STA) of the United Nations Framework Convention on Climate Change (UNFCCC), and its Structured Expert Dialogue (SED); the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) of the Convention on Biological Diversity (CBD) and its Ad Hoc Technical Expert Groups (AHTEGs); the United Nations Commission on Science and Technology for Development (CSTD), a subsidiary body of the Economic and Social Council (ECOSOC); the United Nations GGE on Developments in the Field of Information and Telecommunications in the Context of International Security; the United Nations Secretary-General's SAB for sustainable development; the Scientific Advisory Panel (SAP) of the United Nations Environment Programme (UNEP); and the Science, Technology and Innovation Advisory Board of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP).

1.2 A CHANGING BIOTECHNOLOGY LANDSCAPE

Since the BWC opened for signature in 1972, the science and technology of relevance to the Convention has changed considerably. The power to manipulate biology has advanced and is further accelerating as biotechnology and other fields in the life sciences converge with other technologies including nanotechnology, machine learning and advanced computing.³

As biology and other areas of the life sciences have evolved, so too have the geography and economics of life science research. Ever more institutions and actors are undertaking life science research in a wider range of countries around the world (see table 2). This has resulted in a growing “bioeconomy” that will further feed interest in the field over the decades to come, potentially resulting in many societal, economic and environmental benefits.

Table 2. Illustrative indicators of changes in the life science landscape between 1990 and 2018

Indicator	1990	2018
Number of publications on the topic of biotechnology	492	3,519
Number of countries publishing academic articles on the topic of biotechnology	31	113
Number of authors publishing on the topic of biotechnology	664	14,652
Number of institutions with authors publishing on the topic of biotechnology	298	3,993
Estimated number of biotechnology patents grants ⁴	4,945	25,290

However, advances in the life sciences could also be exploited for hostile purposes. To avert such an eventuality while promoting the peaceful use of biology, international science-based legal agreements such as the BWC need to keep abreast of advances in S&T. Advances in biology and biotechnology can have profound implications for the BWC, both positive and negative. For example, although the BWC remains comprehensive in its scope, developments in science and technology could fundamentally change perceptions of the utility of biological and toxin weapons; undermine export controls; improve the detection of (and response to) disease outbreaks; or enhance international cooperation around the peaceful uses of biology.⁵

In response to these developments, BWC States Parties have already agreed on processes to monitor developments in science and technology.⁶ However, these existing arrangements have several shortcomings, particularly regarding the extent to which they allow for focused in-depth, expert exchanges around the implications of advances in relevant S&T.⁷

3 A. Anand, “The 2020 Innovations Dialogue: Life Sciences, International Security and Disarmament”, Conference Report, UNIDIR, 2020, <https://unidir.org/publication/2020-innovations-dialogue-conference-report>. See also L. Warmbrod, J. Reville and N. Connell, Advances in Science and Technology in the Life Sciences and their Implications for Biosecurity and Arms Control, UNIDIR, 2020, <https://doi.org/10.37559/SecTec/20/01>.

4 Based on information on biotechnology patent grants between 1990 and 2018 from World Intellectual Property Organization (WIPO), IP Statistics Data Center, <https://www3.wipo.int/ipstats/index.htm>.

5 Article I of the BWC contains an intent-based definition of biological weapons that enables the Convention to remain comprehensive in the face of “scientific and technological developments that were unknown or could be known or anticipated in the late 1960s and early 1970s”. See J.R. Walker, “Missing the Obvious: Coping with Scientific and Technological Change in Chemical and Biological Weapons Arms Control, 1968–2013”, in B. Balmer and B. Rappert (eds.), *Absence in Science, Security and Policy*, 2015, p. 84.

6 For example, Article XII of the BWC stipulates that the Review Conference “shall take into account any new scientific and technological developments relevant to the Convention” and recent intersessional programmes include a Meeting of Experts to Review Developments in the Field of Science and Technology Related to the Convention (MX2).

7 For example, the InterAcademy Partnership (IAP) has identified several shortcomings in earlier Meeting of Experts

1.3 SUPPORT FOR A SCIENCE AND TECHNOLOGY REVIEW MECHANISM

Given these changes, many BWC States Parties have therefore expressed support for a more systematic review of science and technology under the Convention.⁸ Over the last decade alone, Australia, Finland, Germany, the Islamic Republic of Iran, Japan, the Netherlands, New Zealand, Norway, the Russian Federation, Spain, Sweden, Switzerland, the United Kingdom of Great Britain and Northern Ireland, and the United States of America, among others, have all submitted working papers related to mechanisms to review science and technology.⁹

processes, including: the rigidity of setting the topics to be considered in advance for a five-year period; a lack of focus or guidance as to how specific subtopics should be addressed on an ongoing basis throughout the work programme; ensuring timely consideration of rapidly moving advances; too much input from non-specialists and involvement of policy elements; getting invited external experts to focus on the implications for the BWC of the advances they were presenting; limits on the utility of side events or input from the scientific community due to resource limitations; difficulties in integrating input provided in informal sessions, side events and on the margins of the work programme into the formal work of the BWC: difficulties in distilling from the formal work of the BWC specific needs for science advice; a lack of interactivity in discussions on science and technology; and not providing answers to specific questions raised by States Parties. InterAcademy Partnership, “The Biological and Toxin Weapons Convention: Considerations for a Science Advisory Mechanism”, 2016, <https://royalsociety.org/-/media/policy/projects/biological-toxin-weapons-convention/biological-toxin-weapons-convention-btwc-april-2016-meeting-summary.pdf>.

8 For example, in 1980, Argentina proposed establishing a system for the “periodic evaluation” of science and technology; in 1986, the Soviet Union along with Hungary and the German Democratic Republic proposed the “establishment of a group of scientific experts to study latest biological developments of relevance to compliance with the Convention”; in 2001, the EU called for the establishment of a “Scientific Advisory Panel (SAP)” for the BWC; in 2006, a collective of South American States proposed a “flexible ad hoc follow-up mechanism [to] analyse, in meetings of governmental experts, developments in the fields of biotechnology, genetic engineering, microbiology and other related areas that may have an impact on the work of the Biological Weapons Convention”. See respectively First BWC Review Conference, Argentina, “Summary Records of the Eighth Meeting”, 10 March 1980, BWC/CONF.I/SR.8, 12 March 1980, <https://undocs.org/BWC/CONF.I/SR.8>, para. 20; Second BWC Review Conference, “Report of the Committee of the Whole: Addendum”, BWC/CONF.II/9/Add.1, 29 September 1986, <https://undocs.org/BWC/CONF.II/9/Add.1>, p. 4; Fifth BWC Review Conference, “Proposals”, Working paper submitted by the European Union, BWC/CONF.V/COW/WP.23, 27 November 2001, <https://undocs.org/BWC/CONF.V/COW/WP.23>; and Sixth BWC Review Conference, “Follow-up Mechanism”, Submitted by Argentina, Bolivia, Brazil, Colombia, Costa Rica, Chile, Ecuador, El Salvador, Guatemala, Mexico, Peru and Uruguay, BWC/CONF.VI/WP.11, 20 October 2006, <https://undocs.org/BWC/CONF.VI/WP.11>. In 2006 the NAM group also proposed “holding of four annual meetings of the governmental experts and of States Parties . . . to consider [among other issues] Advances in life sciences and biotechnology and their relevance to the implementation of the Convention, in particular Article I”. Sixth BWC Review Conference, “Intersessional Ad Hoc Mechanism to be Established between the Sixth and Seventh Review Conferences of the BWC”, Submitted by the States Parties of the Non-Aligned Movement and other States, BWC/CONF.VI/WP.32, 28 November 2006, <https://undocs.org/BWC/CONF.VI/WP.32>, para. 3.

9 See for example, Seventh BWC Review Conference, “Proposal for the Annual Review of Advances in Science and Technology Relevant to the Biological Weapons Convention”, Submitted by Australia, Japan and New Zealand, BWC/CONF.VII/WP.13, 19 October 2011, <https://undocs.org/BWC/CONF.VII/WP.13>; Eighth BWC Review Conference, Preparatory Committee, “Elements on Science and Technology for the 2016 Review Conference – The Importance of an Active Review Process”, Submitted by Finland, Norway and Sweden, BWC/CONF.VIII/PC/WP.7, 25 April 2016, <https://undocs.org/BWC/CONF.VIII/PC/WP.7>; Meeting of Experts on Review of Developments in the Field of Science and Technology Related to the Convention, “Rethinking the BTWC Science and Technology Review: A Renewed Case for a BTWC Scientific and Technological Experts Advisory Forum (STEAF)”, Submitted by Germany, co-sponsored by Netherlands and Sweden, BWC/MSP/2019/MX.2/WP.1, 1 July 2019, <https://undocs.org/BWC/MSP/2019/MX.2/WP.1>; Eighth BWC Review Conference, “The BTWC Review Process of Science and Technology”, Submitted by the Islamic Republic of Iran, BWC/CONF.VIII/WP.12, 21 October 2016, <https://undocs.org/BWC/CONF.VIII/WP.12>; Eighth BWC Review Conference, Preparatory Committee, “Strengthening the Biological Weapons Convention: Proposal for the Establishment of a Scientific Advisory Committee”, Submitted by the Russian Federation, BWC/CONF.VIII/PC/WP.2/Rev.2, 4 July 2016, <https://undocs.org/BWC/CONF.VIII/PC/WP.2/Rev.2>; Eighth BWC Review Conference, Preparatory Committee, “Revisión de ciencia y tecnología en la CABT: elementos para un proceso políticamente independiente” [Science and Technology Review in the BTWC: Elements for a Politically Independent Process], Submitted by Spain, BWC/CONF.VIII/PC/WP.27, 10 August 2016, <https://undocs.org/BWC/CONF.VIII/PC/WP.27>; 2017 Meeting of the BWC States Parties, “Need to Establish a BWC Science and Technology Review Process”, Submitted by Switzerland, BWC/MSP/2017/WP.2, 17 November 2017, <https://undocs.org/BWC/MSP/2017/WP.2>; Eighth BWC Review Conference, Preparatory Committee, “Strengthening the BWC Science and Technology Review Process”, Submitted by Switzerland, BWC/CONF.VIII/PC/WP.8, 25 April 2016, <https://undocs.org/BWC/CONF.VIII/PC/WP.8>; Eighth BWC Review Conference, Preparatory Committee, “Strengthening the BWC Science and Technology Review Process: Considerations Regarding the Composition of an S&T Review Body”, Submitted by Switzerland, BWC/CONF.VIII/PC/WP.16, 19 July 2016, <https://undocs.org/BWC/CONF.VIII/PC/WP.16>; Eighth BWC Review Conference, Preparatory Committee, “A Future Science and Technology Review Process”, Submitted by the United Kingdom, BWC/CONF.VIII/PC/WP.4, 11 April 2016, <https://undocs.org/BWC/CONF.VIII/PC/WP.4>; and Eighth BWC Review Conference, Preparatory Committee, “Science and Technology Review for the BWC: Features of an Effective Process”, Submitted by the United States, BWC/CONF.VIII/PC/WP.3, 11 April 2016, <https://undocs.org/BWC/CONF.VIII/PC/WP.3>.

These proposals do not necessarily agree on the form and function of any S&T review process or mechanism. However, they illustrate the growing interest of States Parties in this area. Such interest is further reflected in the results of a voluntary UNIDIR survey of BWC States Parties' views around a mechanism. As figure 1 illustrates, all but 3 of the 42 BWC States Parties that responded to this survey indicated that an S&T review mechanism for the BWC was “essential” or “important”. As figure 2 indicates, the perception of a review mechanism as “essential” was strongest among members of the Western Group.

Figure 1. Respondents' views on the importance of a BWC science and technology review mechanism¹⁰

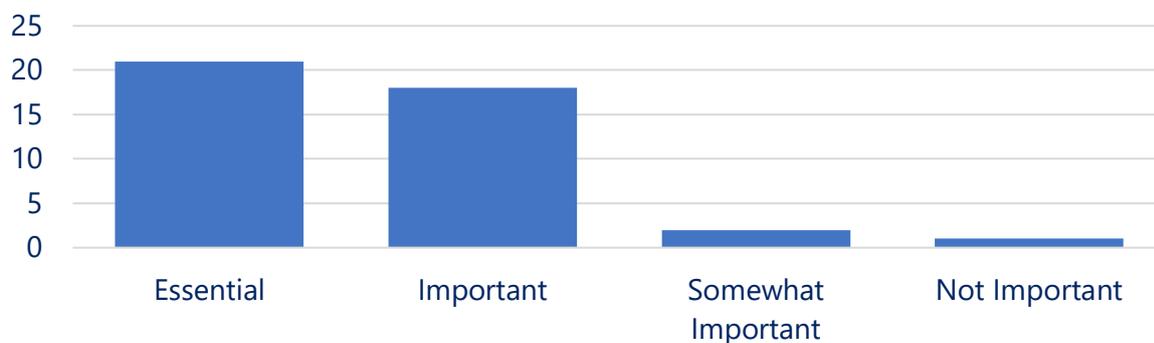
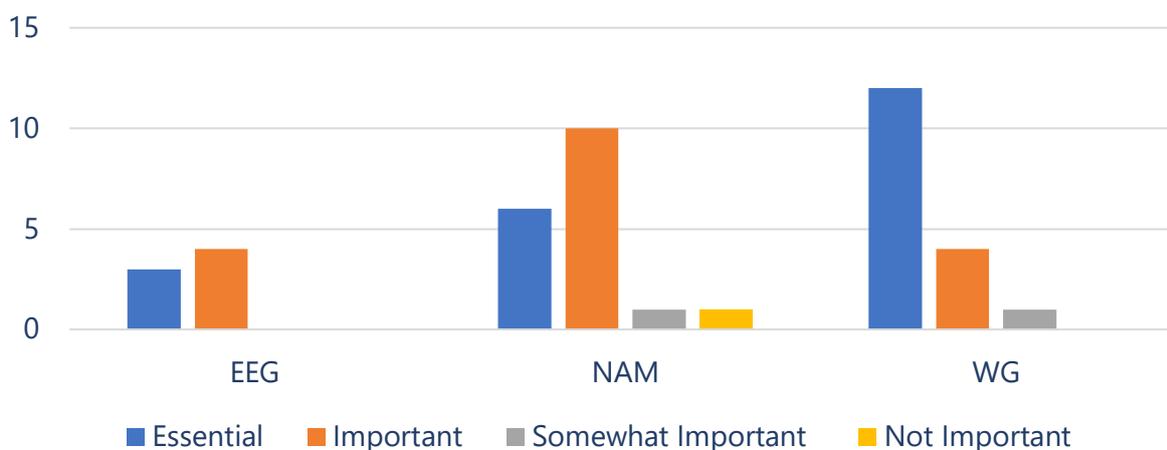


Figure 2. Respondents' views on the importance of a BWC science and technology review mechanism, by regional group



Those States that indicated that a mechanism was “not important” or only “somewhat important” explained that a mechanism was not justified in the “absence of a verification mechanism” or pending an “institutional mechanism for the implementation of [BWC] Article X”, which deals with international cooperation. For proponents of some form of S&T review mechanism, these views will be important to consider in preparations for the Ninth Review Conference.

10 This single-choice question was answered by all 42 survey respondents.

The 39 respondents that indicated that a mechanism was “important” or “essential” had varied reasons for this view. Some felt that a mechanism was necessary to “keep the BWC up-to-date”. Others indicated that a mechanism could usefully “inform policy makers . . . with respect to dual-use technologies”. Yet others indicated that a mechanism was required “to achieve a proper balance between preventing biological warfare and fostering economic cooperation and development”.

With a variety of other reasons for a review mechanism submitted, States Parties may need to build a cohesive, unified rationale for pursuing a mechanism to review S&T of relevance to the BWC. States Parties will also need to develop a shared understanding of the objective or objectives of a mechanism. This will require consultation between – and in some cases within – States Parties.

2. SPECIFIC ISSUES

2.1 OBJECTIVES

Beyond the BWC, the objectives of existing scientific advisory or review-type mechanisms vary, depending on the specific treaty or organizational objectives.¹¹ To achieve progress, BWC States Parties will need to agree on the objective or objectives of any prospective mechanism and forge a shared understanding of who the review is for, why States Parties require a review, and how any outputs or advice will be used.¹²

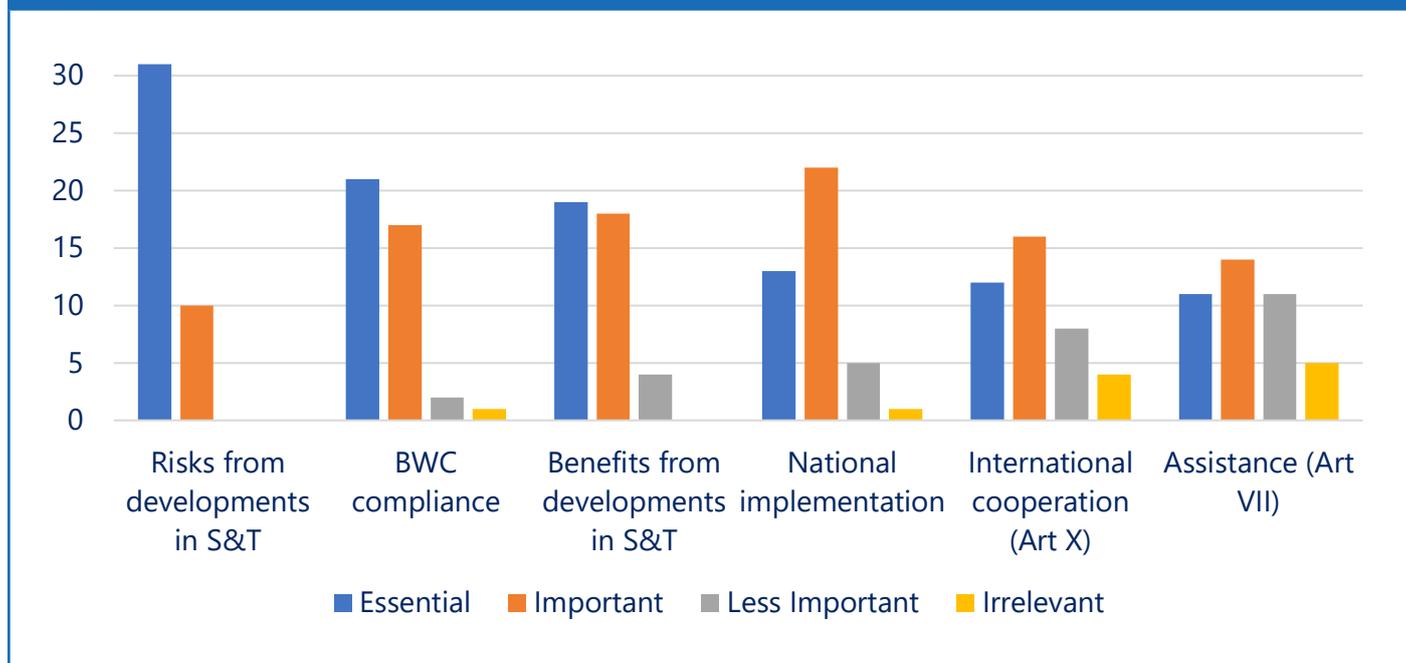
Past discussions within the BWC have identified several different possible objectives for a BWC S&T review mechanism. For example, the Russian Federation proposed the establishment of a Scientific Advisory Committee to assess developments in S&T that, among other things, “have potential for uses contrary to the provisions of the Convention”; “have potential benefits for the Convention”; or have potential for “strengthening national biological risk management”.¹³ The United Kingdom proposed that a group of government experts should meet “to review and assess science and technology developments and how they may impact on the operation of the Convention”;¹⁴ Iran emphasized the role of S&T reviews facilitating “enhanced cooperation and sharing of the related know-how and technologies”;¹⁵ and Germany, in a working paper co-sponsored by the Netherlands and Sweden, suggested that a Scientific and Technological Experts Advisory Forum (STEAF) should, among other things, provide “scientific and technological advice to inform [BWC] States Parties”.¹⁶

Responses to the UNIDIR survey (see figure 3) suggest that any BWC S&T review mechanism may need to address a range of different issues. All respondents agreed that it would be “important” or “essential” for any mechanism to address risks posed by advances in science and technology and 37 of the 41 respondents indicated that it would

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- 11 For example, the EU SAM was established to provide “timely and independent scientific advice for its policymaking activities and contribute to the quality of EU legislation”; whereas the functions of the OPCW SAB are multiple and include monitoring developments in S&T and assessing their impact on implementation of the Chemical Weapons Convention. See Scientific Advice Mechanism (SAM), Group of Chief Scientific Advisors, Informing European Commission Policy Making with Scientific Evidence: The Group of Chief Scientific Advisors 2015–2019, February 2020, <https://op.europa.eu/en/publication-detail/-/publication/d3d43012-5224-11ea-aece-01aa75ed71a1/language-en/format-PDF/source-138014209>; and OPCW, “Terms of Reference of the Scientific Advisory Board”, June 2011, https://www.opcw.org/sites/default/files/documents/SAB/en/SAB_ToR_RoP.pdf.
 - 12 As much is recognized by Jonathan Forman, whose presentation to the BWC Review Conference in 2016 queried: “Who is the advice for? Why is the advice needed? How does advice go forward?” See J. Forman, “Science Advice and Policy-Maker Engagement in Support of the Chemical Weapons Convention”, Presentation to the Eighth BWC Review Conference, 10 November 2016, https://documents.unoda.org/wp-content/uploads/2021/04/OPCW1_Science_Advice_Policy-Maker_Engagement_in_CWC.pdf. See also U. Gopinathan, S.J. Hoffman and T. Ottersen, “Scientific Advisory Committees at the World Health Organization: A Qualitative Study of How Their Design Affects Quality, Relevance, and Legitimacy”, *Global Challenges*, vol. 2, no. 9, (2018) 1700074, <https://doi.org/10.1002/gch2.201700074>; and Global Strategy Lab, “Optimizing the Institutional Design of Scientific Advisory Committees for Quality, Salience, and Legitimacy”, DATE, URL.
 - 13 Eighth BWC Review Conference, Preparatory Committee, “Strengthening the Biological Weapons Convention: Proposal for the Establishment of a Scientific Advisory Committee”, Submitted by the Russian Federation, BWC/CONF.VIII/PC/WP.2/Rev.2, 4 July 2016, <https://undocs.org/BWC/CONFVIII/PC/WP.2/Rev.2>, annex II, para. 2.
 - 14 Eighth BWC Review Conference, Preparatory Committee, “A Future Science and Technology Review Process”, Submitted by the United Kingdom, BWC/CONFVIII/PC/WP.4, 11 April 2016, <https://undocs.org/BWC/CONFVIII/PC/WP.4>, annex, para. 1.
 - 15 Eighth BWC Review Conference, “The BTWC Review Process of Science and Technology”, Submitted by the Islamic Republic of Iran, BWC/CONFVIII/WP.12, 21 October 2016, <https://undocs.org/BWC/CONFVIII/WP.12>, para. 2.
 - 16 Meeting of Experts on Review of Developments in the Field of Science and Technology Related to the Convention, “Rethinking the BTWC Science and Technology Review: A Renewed Case for a BTWC Scientific and Technological Experts Advisory Forum (STEAF)”, Submitted by Germany, co-sponsored by Netherlands and Sweden, BWC/MSP/2019/MX.2/WP.1, 1 July 2019, <https://undocs.org/BWC/MSP/2019/MX.2/WP.1>, para. 7.

also be “important” or “essential” for any mechanism to address potential benefits of scientific and technological developments. Of the 41 respondents, 38 felt that the scientific and technological implications for addressing compliance could be “important” or “essential” to consider. A significant number of respondents also identified national implementation (35 of 41 respondents), international cooperation under Article X (28 of 40 respondents) and assistance under Article VII (25 of 41 respondents) as “important” or “essential” areas to address.

Figure 3. Respondents’ views on the issues that a BWC science and technology review mechanism should address¹⁷



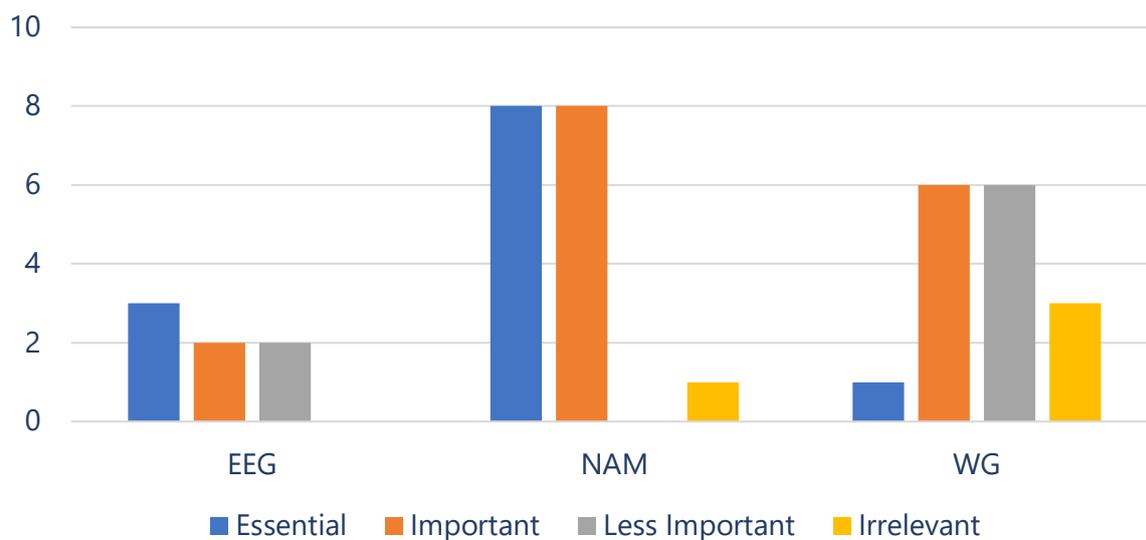
Addressing all these different issues through a single mechanism is possible. Moreover, developments in these different areas will evolve at varying rates and could therefore potentially be addressed within different time frames.¹⁸ As one survey respondent commented, “States Parties could consider S&T related to certain issues – such as risks – annually, while others – such as national implementation – could be taken up at the quinquennial review conference”. However, survey responses and past discussion suggest that any mechanism that seeks to address a wide range of issues will require commensurate access to a broad range of expertise.

The survey further suggests that the different regional groups will prioritize issues differently. As figure 4 indicates, 16 of a total of 17 respondents from NAM countries identified international cooperation as an “important” or “essential” area for a mechanism to consider. This compares with 7 of a total of 16 responses from WG countries that indicated this was “important” or “essential” for a mechanism to address.

17 41 survey respondents addressed at least one part of this rating question. Not all parts of this question were answered equally. Responses per option are as follows: risks from developments in S&T (41); BWC compliance (41); benefits from developments in S&T (41); national implementation (41); international cooperation (40); Assistance (41).

18 InterAcademy Partnership, The Biological and Toxin Weapons Convention: Considerations for a Science Advisory Mechanism, 2016, <https://royalsociety.org/-/media/policy/projects/biological-toxin-weapons-convention/biological-toxin-weapons-convention-btwc-april-2016-meeting-summary.pdf>.

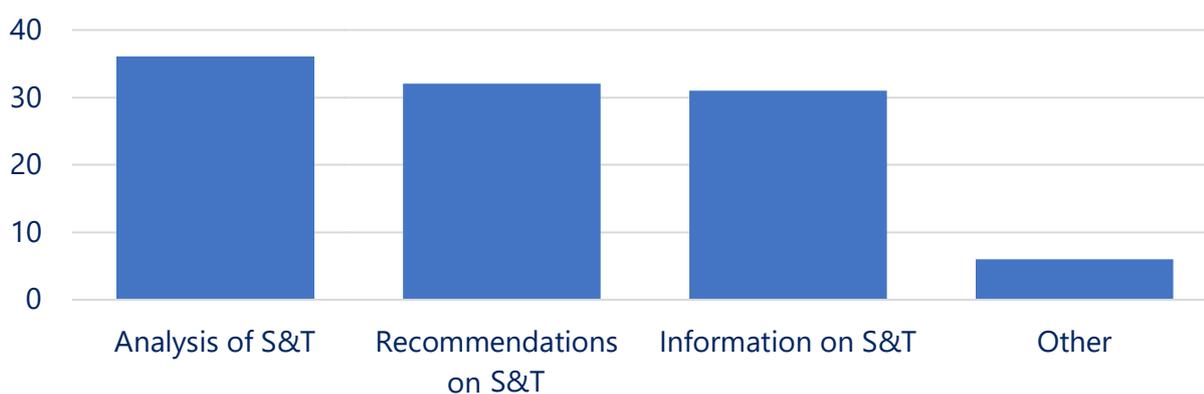
Figure 4. Respondents' views on the significance of international cooperation as an issue for consideration by a BWC science and technology review mechanism, by regional group¹⁹



2.1.1 Mandate

On the mandate for an S&T review mechanism (see figure 5), 36 of the 42 survey respondents suggested that it should be to provide analysis of scientific and technical issues; 32 suggested that it should be to provide recommendations on these issues; and 31 suggested that it should be to provide information on these issues. While the mandate of a S&T review mechanism can include a combination of different functions, it is essential to have clarity on what those functions will entail and what objective or objectives they serve.

Figure 5. Respondents' views on the mandate of a BWC science and technology review mechanism²⁰



¹⁹ 40 survey respondents answered the international cooperation part of the rating question illustrated in figure 3.
²⁰ This multiple-choice question was answered by all 42 survey respondents.

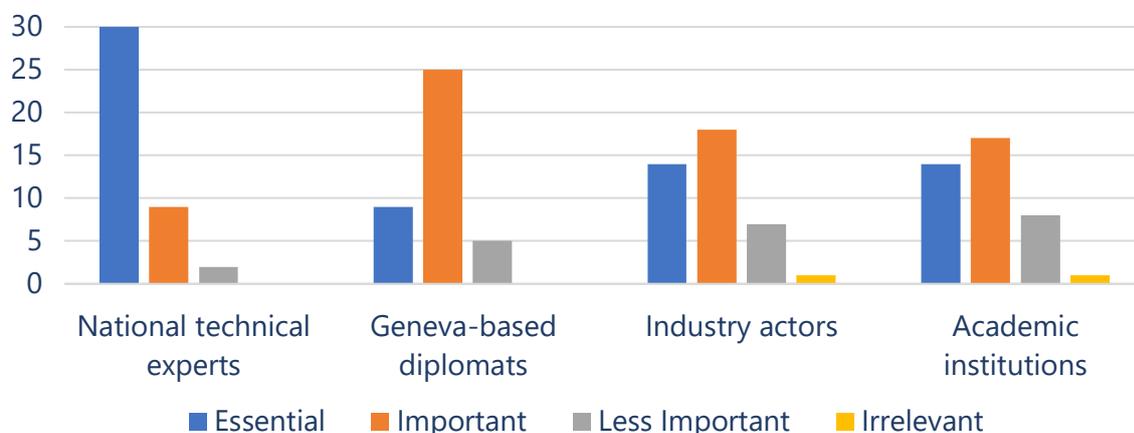
It is not entirely clear how BWC States Parties envisage using recommendations from an S&T review mechanism. International organizations are not always well positioned to generate science-based recommendations for implementation at the national level.²¹ Moreover, domestic policies will depend on a range of factors, including, but not limited to, scientific or technical considerations.

There are also important connections between the mandate of any mechanism, its structure and the nature of its participation. For example, scientific experts are not necessarily well placed to make policy recommendations as they may not be well versed in the wider political and policy context of the BWC.²² One survey respondent's comment also emphasized that balanced geographical representation would be a prerequisite for any "action-orientated" mechanism that produces recommendations.

2.1.2 Target audience

The primary audience for the outputs from a BWC science and technology review mechanism does not appear to have been the subject of significant discussion in the BWC context. However, understanding the audience or "end users" of written outputs can help inform the purpose, tone and technical content of written outputs from a mechanism. On the question of whether national technical experts should be an audience for these outputs, 30 of the 41 respondents that answered this question indicated that they would be an "essential" audience, with a further 9 indicating that they would be an "important" audience (see figure 6). On the similar question on Geneva-based diplomats, 34 out of the 39 respondents viewed them as an "important" or "essential" target audience. In addition, 14 survey respondents indicated that both industry and academic actors were "essential" audiences.

Figure 6. Respondents' views on the primary audience for a BWC science and technology review mechanism²³



21 J.A. Hutchings and N.C. Stenseth, "Communication of Science Advice to Government", *Trends in Ecology & Evolution*, vol. 31, no. 1 (2016), pp. 7–11, <https://doi.org/10.1016/j.tree.2015.10.008>.

22 U. Gopinathan, S.J. Hoffman and T. Ottersen, "Scientific Advisory Committees at the World Health Organization: A Qualitative Study of How Their Design Affects Quality, Relevance, and Legitimacy", *Global Challenges*, vol. 2, no. 9 (2018) 1700074, <https://doi.org/10.1002/gch2.201700074>. See also InterAcademy Partnership, *The Biological and Toxin Weapons Convention: Considerations for a Science Advisory Mechanism*, 2016, <https://royalsociety.org/-/media/policy/projects/biological-toxin-weapons-convention/biological-toxin-weapons-convention-btwc-april-2016-meeting-summary.pdf>.

23 41 survey respondents addressed at least one part of this rating question. Not all parts of this question were answered equally. Responses per option are as follows: national technical experts (41); Geneva-based diplomats (39); industry actors (40); academic institutions (40).

2.1.3 Determining priorities and questions to be addressed

In other existing review mechanisms, the director-general or equivalent often plays an important role in deciding priority areas for review or in the development of specific questions for review-type mechanisms to address. For example, in the case of the Scientific Advisory Board (SAB) of the Organisation for the Prohibition of Chemical Weapons (OPCW), the OPCW Director-General typically submits specific questions to the SAB. The SAB then provides expert advice to the Director-General, who transmits this advice to the States Parties.²⁴ In other cases, such as the SAB of the Office of the Prosecutor of the International Criminal Court (ICC), specific areas to address are determined by reference to strategic documents.²⁵

At present, the BWC has neither a director-general nor suitable strategic documents from which participants in a mechanism could extract focused topics or questions to address.²⁶ The negotiation of a rolling agenda for a mechanism is possible and could be agreed by consensus at a Review Conference. This could then provide an overarching objective or set of objectives for any mechanism. However, interviewees for this project suggested that this sort of approach lacked flexibility and could make it difficult to add something new to the agenda (or remove something).²⁷ As such, this approach may not be sufficiently responsive to the evolving demands of end users and the fast pace of biological science.²⁸

Accordingly, a BWC review mechanism may require a novel approach (or approaches) to the determination of priorities and questions. Based on earlier discussion within the BWC, there are several ways in which priorities and topics for a mechanism could be determined. Table 3 illustrates some of these options. These processes are not necessarily mutually exclusive.

24 For more details on the origins of the SAB see K. Lawand, “The Scientific Advisory Board of the Organization for the Prohibition of Chemical Weapons: The Role of Science in Treaty Implementation”, CBW Conventions Bulletin, no. 40, June 1998, <http://www.sussex.ac.uk/Units/spru/hsp/documents/cbwcb40.pdf>, p. 2.

25 Interviewee 3, 27 March 2020.

26 It is possible that the mandate agreed in 2017 for the Meeting of Experts on Review of Developments in the Field of Science and Technology Related to the Convention (MX2) could be used to inform specific areas of investigation. However, this would likely need to be translated and bound as the mandate of MX2 includes several broad areas of discussion. For example, it includes “Any other science and technology developments of relevance to the Convention and also to the activities of relevant multilateral organizations such as the WHO, OIE, FAO, IPPC and OPCW”.

27 Interviewee 5, 31 March 2020.

28 As was noted of the OPCW SAB, “the Basic Mandate remains the same and is enshrined in the convention but “the specific work evolves as per specific requests by the DG depending on the needs from the Convention”. Interviewee 8, 6 April 2020; and Interviewee 14, 20 April 2020.

Table 3. Options to determine priorities and topics to be addressed by a BWC science and technology review mechanism

<p>Selection of topics by the annual Meeting of States Parties</p>	<p>Earlier papers from Australia, Japan, New Zealand, the United Kingdom and the United States among others suggested that States Parties could agree on areas of focus for a mechanism at the annual Meeting of States Parties (MSP).²⁹ Assuming that the practice of holding MSPs is continued, this approach could make a mechanism more responsive or “nimble” to tasking from the States Parties.³⁰ However, this option is dependent upon States Parties identifying “on-the-horizon” scientific issues of potential relevance, developing suitable questions that can be answered by scientific review and taking decisions at annual meetings.³¹</p>
<p>Selection of topics by the quinquennial Review Conferences</p>	<p>Alternatively, States Parties could select topics at the quinquennial BWC Review Conferences. However, this route provides little scope to address urgent new developments that emerge in the years between Review Conferences. It may also be difficult to agree on suitable questions within the Review Conference and there remains a risk that changes to selected topics would become dependent on a wider consensus outcome at Review Conferences. This is not guaranteed and, as one survey respondent indicated, the selection of topics “must not be subject to ‘veto’ . . . as this would undermine the mechanism”.</p>
<p>Selection of topics by an intermediary body</p>	<p>Another option is the creation of an intermediary body to consider specific topics proposed by States Parties. The Russian Federation has referred to the possible role of a representative body to which additional requests could be submitted.³² Such an intermediary body could consider additional topics beyond those agreed at annual or quinquennial meetings and would therefore be a more agile and responsive mechanism. Such a body could also play a useful role in the shaping of suitable questions for any mechanism to address.</p>
<p>Selection of topics by the chair of annual meetings and the ISU</p>	<p>A fourth approach could involve the incumbent MSP chair, the chair of the Meeting of Experts on Review of Developments in the Field of Science and Technology Related to the Convention (MX2) and the Implementation Support Unit (ISU) serving as an intermediary between an S&T review mechanism and the States Parties. This approach may require some form of scientific post within the ISU but could provide flexibility and help with translating the concerns of States Parties into questions that could be addressed through science.³³</p>

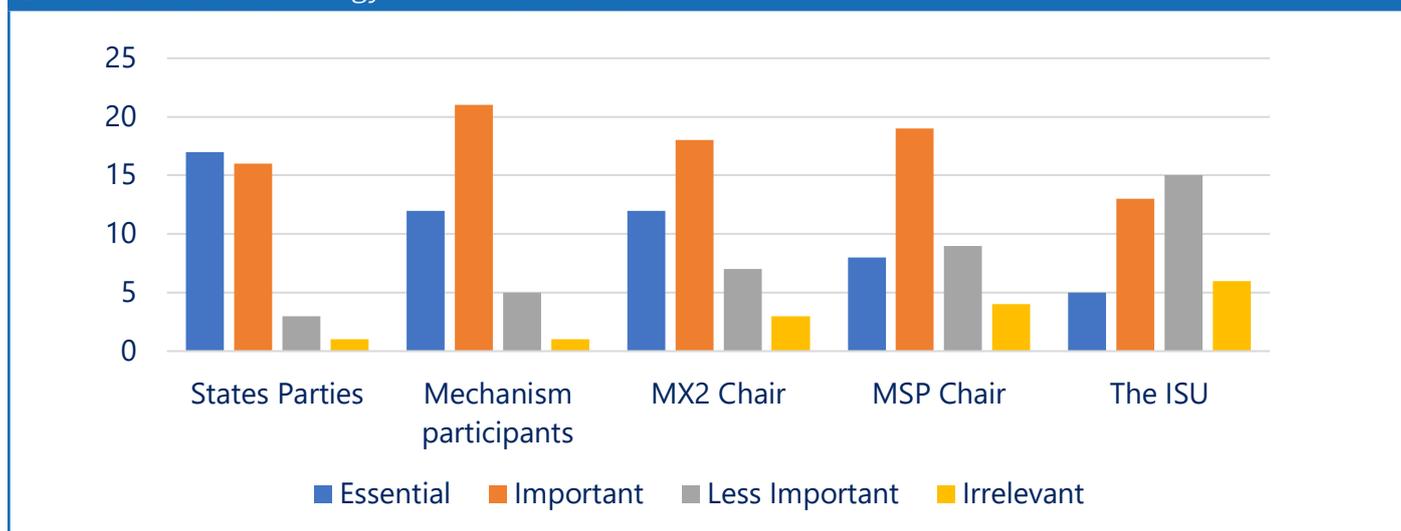
- 29 The United Kingdom suggested that a group “will respond to tasking from the annual Meeting of States Parties”. Eighth BWC Review Conference, Preparatory Committee, “A Future Science and Technology Review Process”, Submitted by the United Kingdom, BWC/CONFVIII/PC/WP.4, 11 April 2016, <https://undocs.org/BWC/CONFVIII/PC/WP.4>, annex, para. 2. The United States suggested that the group could “produce work products decided annually by States”. See Eighth BWC Review Conference, Preparatory Committee, “Science and Technology Review for the BWC: Features of an Effective Process”, Submitted by the United States, BWC/CONFVIII/PC/WP.3, 11 April 2016, <https://undocs.org/BWC/CONFVIII/PC/WP.3>, para. 3. See also Seventh BWC Review Conference, “Proposal for the Annual Review of Advances in Science and Technology Relevant to the Biological Weapons Convention”, Submitted by Australia, Japan and New Zealand, BWC/CONFVII/WP.13, 19 October 2011, <https://undocs.org/BWC/CONFVII/WP.13>.
- 30 Eighth BWC Review Conference, Preparatory Committee, “A Future Science and Technology Review Process”, Submitted by the United Kingdom, BWC/CONFVIII/PC/WP.4, 11 April 2016, <https://undocs.org/BWC/CONFVIII/PC/WP.4>.
- 31 As noted in a report by the National Research Council, “Translating a policy question into one amenable to the advisory process requires consultation between those who need the advice and someone who understands how to do the initial formulation of the task so that it is clear on which issues the advice and advisors might help.” National Research Council, *Knowledge and Diplomacy: Science Advice in the United Nations System*, National Academies Press, 2002, <https://doi.org/10.17226/10577>, p. 15.
- 32 Eighth BWC Review Conference, Preparatory Committee, “Strengthening the Biological Weapons Convention: Proposal for the Establishment of a Scientific Advisory Committee”, Submitted by the Russian Federation, BWC/CONF. VIII/PC/WP.2/Rev.2, 4 July 2016, <https://undocs.org/BWC/CONFVIII/PC/WP.2/Rev.2>.
- 33 Interviewee 1, 26 March 2020. Notably, other mechanisms have had to address questions not necessarily suited to scientific answers. For example, the OPCW SAB was at one point seen as “a ‘dumping ground’ for awkward ostensibly technical issues”. P. Mills, “Approaching the First CWC Review Conference”, 15th Workshop of the Pugwash Study Group on the Implementation of the Chemical and Biological Weapons Conventions, Pugwash Meeting no. 264, Oegstgeest, The Netherlands, 23–24 June 2001, <http://www.sussex.ac.uk/Units/spru/hsp/Pugwash/Pugwash15.html>.

Table 3. Options to determine priorities and topics to be addressed by a BWC science and technology review mechanism

<p>Selection of topics by participants in any mechanism</p>	<p>A fifth option could be to allow the participants in the mechanism to determine and prioritize the questions to address within a wider framework agreed by States Parties. This could ensure greater flexibility in the mechanism and ensure that policy questions were translated into questions “amenable to the advisory process”.³⁴ Although there is precedent for this model in other mechanisms, it may not be politically feasible in the context of the BWC.</p>
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The survey results (see figure 7) indicate that 33 of the 37 respondents view States Parties as “important” or “essential” in the determination of specific priority areas; 33 of 39 respondents suggested that it is “important” or “essential” that participants in a BWC mechanism determine priority areas; 30 of 40 respondents indicated that the MX2 chair would be “important” or “essential” in determining priority areas, whereas 27 of 40 respondents indicated that the chair of the Meeting of States Parties (MSP) would be “important” or “essential” in the determination of specific priority areas and questions.

Figure 7. Respondents’ views on the determination of specific priority areas and questions to be addressed by a BWC science and technology review mechanism³⁵



For an effective and responsive review mechanism, it would be beneficial to establish a clear process – or combination of processes – for determining priorities and topics. Notably, some existing mechanisms employ a bidirectional approach to determine priority areas. For example, the topics addressed by the European Union (EU) Scientific Advice Mechanism (SAM) can be proposed by senior managers of the SAM Unit as well as the seven Chief

34 National Research Council, Knowledge and Diplomacy: Science Advice in the United Nations System, National Academies Press, 2002, <https://doi.org/10.17226/10577>, p. 15.

35 40 survey respondents addressed at least one part of this rating question. Not all parts of this question were answered equally. Responses per option are as follows: States Parties (37); mechanism participants (39); MX2 chair (40); MSP chair (40); ISU (39).

Scientific Advisors who constitute part of the SAM.³⁶ Similarly, the OPCW SAB has frequently proposed topics that were subsequently addressed by a temporary working group.

It could also be useful to consider processes to translate policy questions into questions that can realistically be addressed by a scientific body. Indeed, experience in other mechanisms suggests that the effectiveness of scientific advice is contingent upon the nature of the questions asked.³⁷ Notably, the EU SAM develops a scoping paper to collectively define questions and ensure that the questions can reasonably be addressed by the scientific community.³⁸

2.2 PARTICIPATION

2.2.1 Number of participants

The number of participants in the existing mechanisms reviewed for this project varies considerably (see table 4). At the lower end of the spectrum, the EU SAM has 7 Chief Scientific Advisors supported by a team of 20 researchers. This “magical” number, seven, was based on research suggesting “odd numbers were preferable and below five was too limited to cover the range of science”.³⁹

In addition to reducing the costs, smaller groups are easier to manage.⁴⁰ However, small participant numbers also present problems. First, groups of fewer than 10 will lack geographical representation and disciplinary diversity. A second, yet related, problem is that groups with a small number of participants will have less capacity and expertise to address a wide range of topics. Third, small groups present fewer opportunities for the development of networks for knowledge transfer.

At the other extreme, mechanisms such as the Subsidiary Body for Scientific and Technological Advice (STA) of the United Nations Framework Convention on Climate Change (UNFCCC) and the Meetings of Military and Technical Experts (MMTE) under the Convention on Certain Conventional Weapons (CCW Convention) are open to participants from all States Parties. These open group models accommodate a wider range of expertise, thereby permitting broader coverage of topics.⁴¹ Opening participation also potentially enables greater geographical representation (resources permitting). However, larger groups may be more difficult to manage and open-ended participation, in which States can send whomever they wish, could result in a drift away from strictly technical considerations.⁴²

In between these poles, mechanisms such as the now defunct SAB for sustainable development of the United Nations Secretary-General and the SAB of the OPCW have 25 board members (the latter initially had 20 members).

36 For example, the EU SAM has a “proactive and reactive approach” to topic identification with the former shaped by Chief Scientific Advisors who constitute the SAM. Similarly, some aspects of the OPCW SAB’s work have been proposed by the SAB, one example being the establishment of the temporary working group on investigative technologies, which was established following a workshop on this topic.

37 K. Smallwood, “Truth, Science and Chemical Weapons: Expert Advice and the Impact of Technical Change on the Chemical Weapons Convention”, Doctoral thesis, University of Sussex, 2009, http://sro.sussex.ac.uk/id/eprint/2398/1/Smallwood_Katie.pdf; and National Research Council, Knowledge and Diplomacy: Science Advice in the United Nations System, National Academies Press, 2002, <https://doi.org/10.17226/10577>.

38 Scientific Advice Mechanism (SAM), Group of Chief Scientific Advisors, Scientific Advice to European Policy in a Complex World, Scientific Opinion no. 7, Sep. 2019, <https://op.europa.eu/en-GB/publication-detail/-/publication/5c-b9ca21-0500-11ea-8c1f-01aa75ed71a1/language-en>; and Interviewee 1, 26 March 2020.

39 Interviewee 1, 26 March 2020.

40 Interviewee 1, 26 March 2020.

41 Interviewee 14, 20 April 2020.

42 As one interviewee noted of large open meetings, “it can look like a political endeavour as [countries] will send who they want”. Interviewee 14, 20 April 2020.

One interview participant involved in one of these mechanisms suggested that such a number allowed awareness of “different dimensions and aspects of science, its disciplines and various schools of thought” while remaining “manageable” and geographically representative.⁴³

However, close observers of groups such as the OPCW SAB have also highlighted past challenges with this model, particularly in terms of the maintenance of independence amongst members.⁴⁴ Moreover, 25 individuals would be unable to cover the full range of possible scientific or technological topics of relevance to the BWC. Notably, other bodies, such as the OPCW SAB, have sought to draw on wider expertise through invitations to guest presenters, the establishment of temporary working groups and the co-organization of workshops with external bodies, such as the International Union of Pure and Applied Chemistry (IUPAC).⁴⁵

Table 4. Number of participants in selected science review mechanisms

Body	Number
CCW Meetings of Military and Technical Experts	Open-ended participation
ESCAP Science Technology and Innovation Advisory Board	10 board members
EU Scientific Advice Mechanism Chief Scientific Advisors	7 Chief Scientific Advisors ⁴⁶
ICC Scientific Advisory Board	16–18 board members
NATO Science & Technology Board	More than 100 individuals
OPCW Scientific Advisory Board	25 board members
United Nations Secretary-General’s Scientific Advisory Board for sustainable development	25 board members
UNEP Scientific Advisory Panel	28 panel members
UNFCCC Subsidiary Body for Scientific and Technological Advice	Open-ended participation
WHO Malaria Vaccine Advisory Committee	12 members

Past discussions within the BWC suggest that there is a divergence in the views of States Parties on participant numbers. On the one hand, the Russian Federation has proposed a Scientific Advisory Committee consisting of 20 members “appointed by the three regional groups of States Parties to the Convention”.⁴⁷ Similarly, in 2019 Germany, the Netherlands and Sweden proposed a STEAF consisting of 21 members “from all three regional groups”.⁴⁸

43 Interviewee 12, 14 April 2020.

44 Smallwood, for example, argues that in the OPCW SAB, “some Board members have maintained or developed very close relationships with their national delegations”. K. Smallwood, “Truth, Science and Chemical Weapons: Expert Advice and the Impact of Technical Change on the Chemical Weapons Convention”, Doctoral thesis, University of Sussex, 2009, http://sro.sussex.ac.uk/id/eprint/2398/1/Smallwood_Katie.pdf, section 6.6.

45 G.W. Parshall et al., “Impact of Scientific Developments on the Chemical Weapons Convention (IUPAC Technical Report)”, *Pure and Applied Chemistry*, vol. 74, no. 12 (2002), pp. 2323–2352, <https://doi.org/10.1351/pac200274122323>; M. Balali-Mood et al., “Impact of Scientific Developments on the Chemical Weapons Convention (IUPAC Technical Report)”, *Pure and Applied Chemistry*, vol. 80, no. 1 (2008), pp. 175–200, <https://doi.org/10.1351/pac200880010175>; and K. Smallwood et al., “Impact of Scientific Developments on the Chemical Weapons Convention (IUPAC Technical Report)”, *Pure and Applied Chemistry*, vol. 85, no. 4 (2013), pp. 851–881, <https://doi.org/10.1351/PAC-REP-12-11-18>.

46 As noted above, these advisors are supported by the SAM Unit, which is comprised of 20 EU career staff, and SA-PEA (Science Advice for Policy by European Academies), a consortium of 100 science academies.

47 Eighth BWC Review Conference, Preparatory Committee, “Strengthening the Biological Weapons Convention: Proposal for the Establishment of a Scientific Advisory Committee”, Submitted by the Russian Federation, BWC/CONF.VIII/PC/WP.2/Rev.2, 4 July 2016, <https://undocs.org/BWC/CONFVIII/PC/WP.2/Rev.2>, annex II, para. 3.

48 Meeting of Experts on Review of Developments in the Field of Science and Technology Related to the Convention, “Rethinking the BTWC Science and Technology Review: A Renewed Case for a BTWC Scientific and Technologi-

This model of a limited number of participants rotating every couple of years will provide stability and may prove more manageable and cost efficient than larger groups. It also “provides consistency and a more nuanced understanding of the policy framework”.⁴⁹ However, a group of 20–25 participants would lack the breadth of expertise required to address a wide range of topics; although, as noted above, this model could be augmented by guest presenters, temporary working groups or workshops with a wider range of participants. Alternatively, it could be augmented by some form of roster system to provide a wider range of expertise.⁵⁰ In addition, this approach would be likely to require a process and criterion for the selection of eligible participants, as well as a “selector”.

On the other hand, the United States, the United Kingdom, and, in a 2016 working paper, Finland, Norway and Sweden, have proposed a more open-ended S&T review process in which all States Parties could nominate technical experts to participate.⁵¹ This model was also outlined in the draft proposal of the President of the Eighth Review Conference for the decisions and recommendations section of the Final Document.⁵² This model would have the advantage of greater flexibility to address a broader range of scientific questions. Larger and more geographically diverse groups could also better support international cooperation and knowledge transfer between participants. Additionally, for some States Parties, open participation by representatives of all States Parties is a matter of principle. However, this model could be more expensive, depending on who funds the participants. It may also require more organizational and logistical support to cater to a larger group of participants. The more fluid nature of participation could also complicate the development of policy-relevant advice.

The survey results reflect these differences in the views of States Parties. As illustrated in figure 8, just over half of the survey respondents (23 respondents) favoured limited participation, with the 10–30 category receiving particularly strong support. A total of 12 respondents favoured some sort of open-ended model of participation. Additional qualitative responses also indicated explicit support for the open-ended model. For example, one response stated “All states parties have the right to participate in any discussion under the convention”, another stated that a mechanism should generally be “...open to all relevant experts, unless a particular issue is deemed best discussed in a closed session.”

cal Experts Advisory Forum (STEAF)”, Submitted by Germany, co-sponsored by Netherlands and Sweden, BWC/MSP/2019/MX.2/WP.1, 1 July 2019, <https://undocs.org/BWC/MSP/2019/MX.2/WP.1>, para. 9.

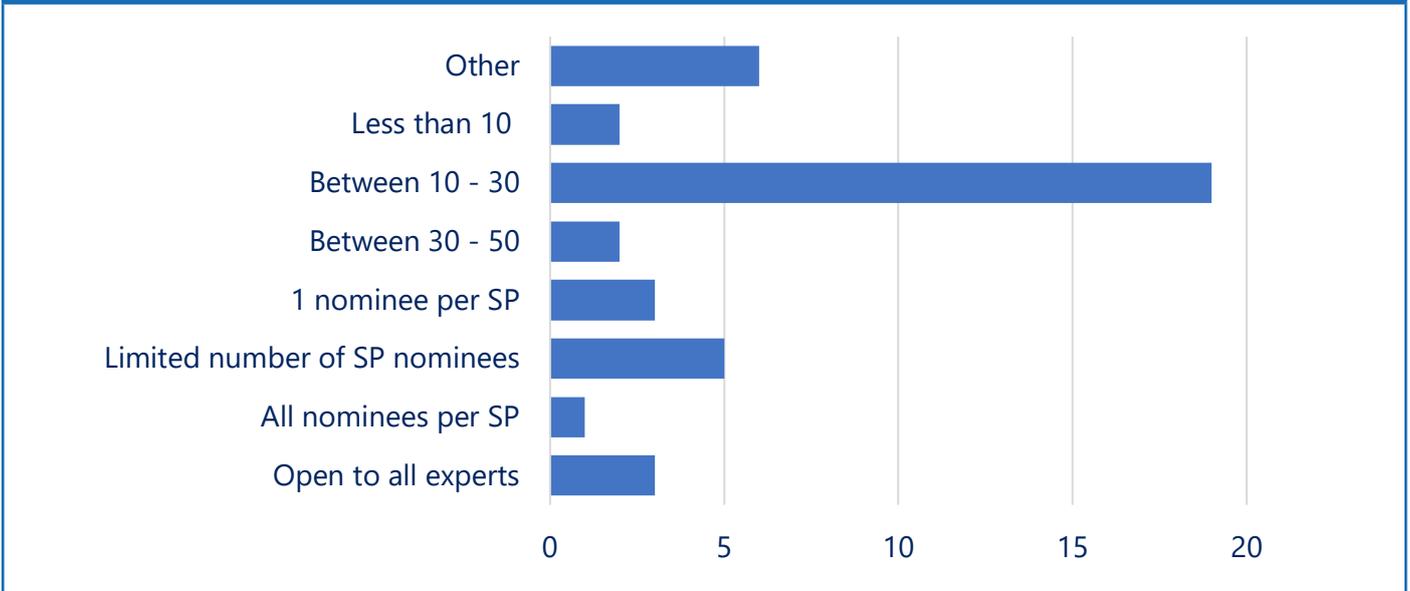
49 InterAcademy Partnership, The Biological and Toxin Weapons Convention: Considerations for a Science Advisory Mechanism, 2016, <https://royalsociety.org/-/media/policy/projects/biological-toxin-weapons-convention/biological-toxin-weapons-convention-btwc-april-2016-meeting-summary.pdf>.

50 The STEAF model, for example, proposes a “broad roster of international experts could be managed by the ISU listing up to 20 experts from each regional group on which to call for specific expertise”. Meeting of Experts on Review of Developments in the Field of Science and Technology Related to the Convention, “Rethinking the BTWC Science and Technology Review: A Renewed Case for a BTWC Scientific and Technological Experts Advisory Forum (STEAF)”, Submitted by Germany, co-sponsored by Netherlands and Sweden, BWC/MSP/2019/MX.2/WP.1, 1 July 2019, <https://undocs.org/BWC/MSP/2019/MX.2/WP.1>.

51 The United States, for example, stated that “All States Parties could nominate technical experts to the body” but added that “For practical reasons, appointees should probably be limited to one or two per State Party so the body is not unwieldy”. Eighth BWC Review Conference, Preparatory Committee, “Science and Technology Review for the BWC: Features of an Effective Process”, Submitted by the United States, BWC/CONFVIII/PC/WP.3, 11 April 2016, <https://undocs.org/BWC/CONFVIII/PC/WP.3>, para. 5.

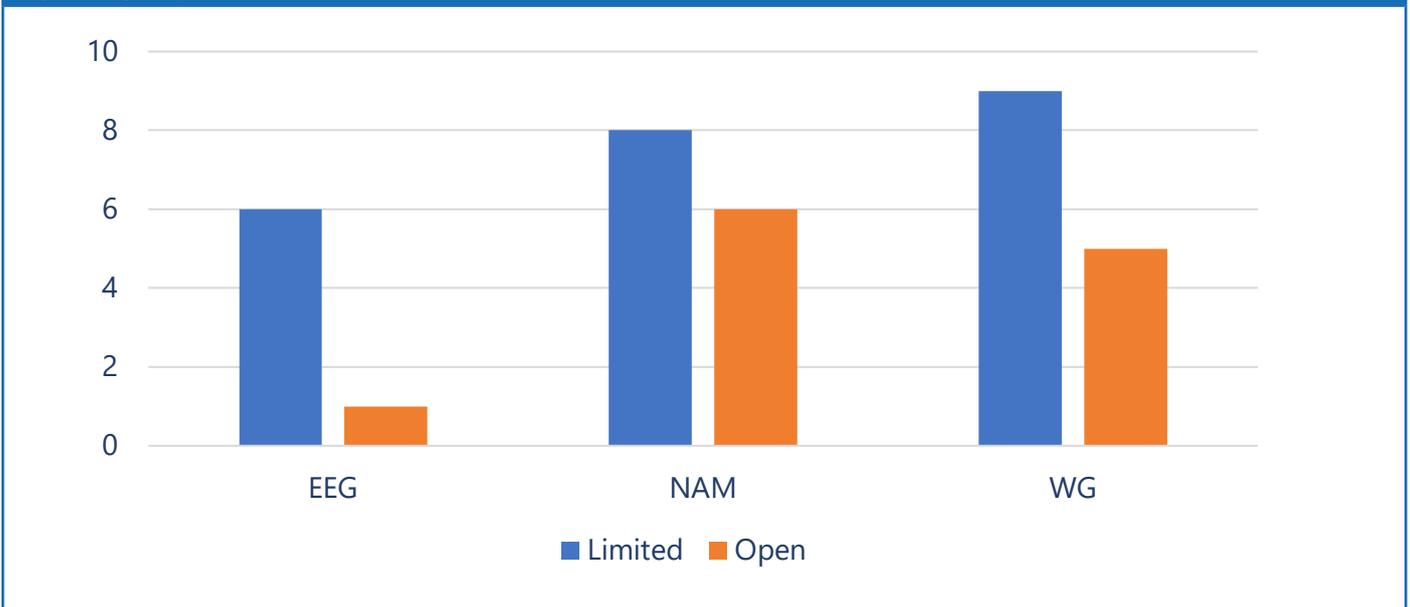
52 Eighth BWC Review Conference, “President’s Proposal”, Submitted by the President, BWC/CONFVIII/CRP.3, 28 November 2016, <https://undocs.org/BWC/CONFVIII/CRP.3>.

Figure 8. Respondents' views on the number of participants in a BWC science and technology review mechanism⁵³



Breaking down survey results further by region showed that States Parties from both the WG and NAM that submitted responses were divided in terms of support for closed or open participation (see figure 9).

Figure 9. Respondents' views on limited versus open participation in a BWC science and technology review, by regional group



53 This single-choice question was answered by 41 survey respondents.

2.2.2 Participant selection (in cases where numbers are limited)

Should States Parties wish to limit the participation in a review mechanism, a process and criteria for the selection of participants will be necessary.⁵⁴ Models in other review mechanisms include criteria such as disciplinary diversity, level of expertise, and geographic and gender diversity. However, there is “special value” to “scientific merit-based processes” of selection.⁵⁵

In some review mechanisms, participants are nominated by States. In other cases, participants self-nominate in response to an open call before selection based on institutional criteria. Drawing on the World Health Organization (WHO) experience, scholars have suggested that the latter open-call model enables a “transparent recruitment process and facilitate[s] diverse representation”.⁵⁶

Interviews with individuals involved in other mechanisms suggest that competencies such as experience in communicating and advising were also important.⁵⁷ Table 5 outlines the various criteria for selection in other review mechanisms, along with an indication of who is responsible for the selection of participants. Several interview participants also emphasized the importance of selecting members carefully, taking into account relevant technical expertise, but also geographical representation and gender with a view to building a “panel that is balanced and credible”.⁵⁸

Achieving balance across participants can be difficult. For example, one interviewee suggested that, in cases where participants are nominated by States, it can “limit the pool of possible participants”.⁵⁹ Interview participants further noted that it takes time to get people from different disciplines to work together. This process can require careful management by the chair. Several interviewees remarked that personalities matter in this process. Research on scientific advisory committees in WHO further suggests that, in circumstances of limited – as opposed to open – membership of a mechanism, trade-offs are made between technical expertise and geographical representation.⁶⁰

54 Russia has proposed “Such persons should be selected based on their qualifications and experience, taking into account their publications, scientific, academic or professional activities, distinctions and international experience with due regard to the area of specialty”. Eighth BWC Review Conference, Preparatory Committee, “Strengthening the Biological Weapons Convention: Proposal for the Establishment of a Scientific Advisory Committee”, Submitted by the Russian Federation, BWC/CONFVIII/PC/WP.2/Rev.2, 4 July 2016, <https://undocs.org/BWC/CONFVIII/PC/WP.2/Rev.2>, para. 6. Germany, Netherlands and Sweden have proposed that the STEAF “requires broad geographical as well as professional diversity”. To this end, “The members of the STEAF shall be nominated on the basis of their expertise in the particular scientific fields relevant to the implementation of the BTWC”. They also pointed out that gender balance should be ensured. Meeting of Experts on Review of Developments in the Field of Science and Technology Related to the Convention, “Rethinking the BTWC Science and Technology Review: A Renewed Case for a BTWC Scientific and Technological Experts Advisory Forum (STEAF)”, Submitted by Germany, co-sponsored by Netherlands and Sweden, BWC/MSP/2019/MX.2/WP.1, 1 July 2019, <https://undocs.org/BWC/MSP/2019/MX.2/WP.1>, paras 8, 10, 11.

55 National Research Council, “Knowledge and Diplomacy: Science Advice in the United Nations System”, National Academies Press, 2002, <https://doi.org/10.17226/10577>, p. 16.

56 U. Gopinathan, S.J. Hoffman and T. Ottersen, “Scientific Advisory Committees at the World Health Organization: A Qualitative Study of How Their Design Affects Quality, Relevance, and Legitimacy”, *Global Challenges*, vol. 2, no. 9, (2018) 1700074, <https://doi.org/10.1002/gch2.201700074>.

57 Interviewee 1, 26 March 2020.

58 Interviewee 1, 26 March 2020; Interviewee 12, 14 April 2020; and Interviewee 10, 8 April 2020.

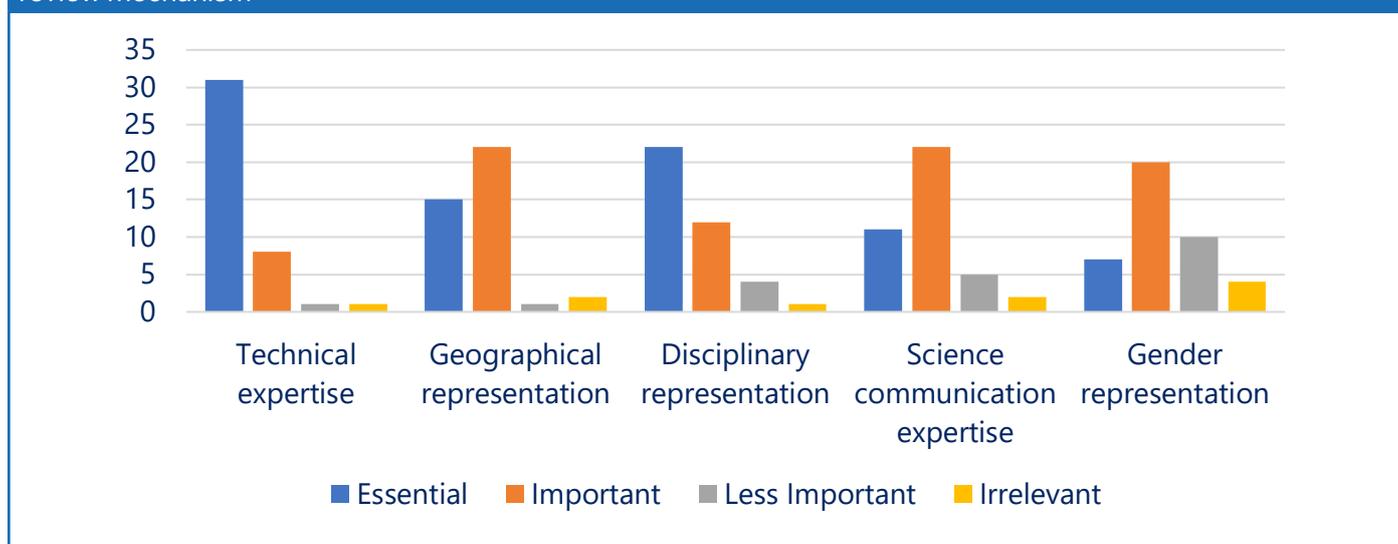
59 Interviewee 14, 20 April 2020.

60 For example, “in very technical areas, you have very few experts around the world, and if you want to put geographic balance as a priority you may miss the science and the expertise that you need”. U. Gopinathan, S.J. Hoffman and T. Ottersen, “Scientific Advisory Committees at the World Health Organization: A Qualitative Study of How Their Design Affects Quality, Relevance, and Legitimacy”, *Global Challenges*, vol. 2, no. 9, (2018) 1700074, <https://doi.org/10.1002/gch2.201700074>.

Table 5. Participant-selection processes and criteria in other models of science review mechanisms

Body	Criteria or basis for selection	Selected by
EU Scientific Advice Mechanism	Merit; regional diversity; gender, age and disciplinary balance	SAM Unit selects the Chief Scientific Advisors
ICC Scientific Advisory Board	Leaders or representatives of constituent organizations	Office of the Prosecutor
OPCW Scientific Advisory Board	Expertise and technical competence; geographic diversity	OPCW Director-General based on nominations from States Parties
UNEP Scientific Advisory Panel	Gender balance; geographical diversity	Secretariat
WHO Malaria Vaccine Advisory Committee	Scientific and technical expertise; geographic diversity; gender balance	Director of Immunization, Vaccines and Biologicals

The results of the survey (see figure 10) suggest that States Parties prioritize technical expertise as the key criterion for participant selection, with 39 of the 41 respondents viewing this as “important” or “essential”. Geographical representation was viewed as “important” or “essential” by 37 of 40 respondents, and 39 respondents indicated that breadth of disciplinary representation was “important” or “essential”.

Figure 10. Respondents’ views on key criteria for selection of participants in a BWC science and technology review mechanism⁶¹

If States Parties prefer limited membership in the mechanism, they will also need to consider how participants are selected. As the BWC lacks both a secretariat body and a director-general-type position it is unclear who presently would be tasked to undertake selection. In addition, States Parties will need to determine how often participants will be rotated.

61 41 survey respondents addressed at least one part of this rating question. Not all parts of this question were answered equally. Responses per criterion are as follows: technical expertise (41); geographical representation (40); disciplinary representation (39); science communication expertise (40); gender representation (41).

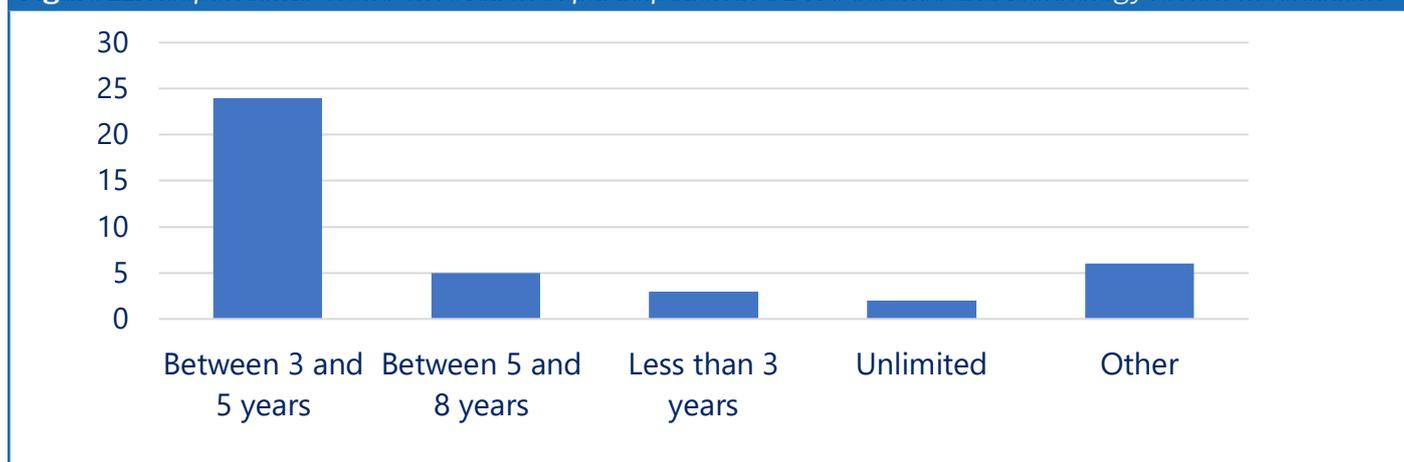
2.2.3 Rotation of participants

In the existing mechanisms analysed in this study, participants served for a limited period. For example, members of the OPCW SAB serve for a term of three years (with the possibility of one three-year extension). Members of the United Nations Commission on Science and Technology for Development (CSTD, a subsidiary body of the Economic and Social Council, ECOSOC) serve for a four-year term. The duration of service in both cases is informed by the wider organizational timelines. As one interviewee noted, with the BWC's five-yearly Review Conferences, "a six-year staggered cycle is not unreasonable".⁶²

Some interviewees felt that rotation of participants was important to ensure "fresh blood" and, in some cases, replace individuals who were not fully engaged in the mechanism.⁶³ Others felt that the rotation process was problematic as it took time for participants to become accustomed to the ways of working.⁶⁴ Other interviewees indicated that a staggered rotation process was helpful as it facilitated continuity of expertise and experience. Notably, concern over "a severe gap in the expertise of the [OPCW SAB]" resulted in the OPCW Director-General issuing an exceptional extension to five members of the SAB to enable continuity of expertise.⁶⁵

Discussion on participant rotation has been limited in the BWC context, although the Russian Federation as well as Germany, the Netherlands and Sweden have proposed a five-year period of service.⁶⁶ In the survey (see figure 11), a majority of 24 of the 40 respondents supported a three-to-five-year period of service.

Figure 11. Respondents' views on rotation of participation in a BWC science and technology review mechanism⁶⁷



62 Interviewee 14, 20 April 2020.

63 Interviewee 10, 8 April 2020.

64 Interviewee 8, 6 April 2020.

65 OPCW Conference of States Parties, 14th Session, "Opening Statement by the Director-General to the Conference of the States Parties at its Fourteenth Session", C-14/DG.13, 30 November 2009, https://www.opcw.org/sites/default/files/documents/CSP/C-14/en/c14dg13_en.pdf, para. 139.

66 One specific proposal from the Russian Federation has suggested that "The term of office of members of the Committee is five years". Eighth BWC Review Conference, Preparatory Committee, "Strengthening the Biological Weapons Convention: Proposal for the Establishment of a Scientific Advisory Committee", Submitted by the Russian Federation, BWC/CONFVIII/PC/WP.2/Rev.2, 4 July 2016, <https://undocs.org/BWC/CONFVIII/PC/WP.2/Rev.2>, para. 7. Another proposal from Germany, Netherlands and Sweden has suggested that "Each regional group should nominate seven members for a term of five years for appointment by States Parties at each Review Conference ensuring a reasonable gender balance." This proposal does not take into account the number of countries in each regional group. Meeting of Experts on Review of Developments in the Field of Science and Technology Related to the Convention, "Rethinking the BTWC Science and Technology Review: A Renewed Case for a BTWC Scientific and Technological Experts Advisory Forum (STEAF)", Submitted by Germany, co-sponsored by Netherlands and Sweden, BWC/MSP/2019/MX.2/WP.1, 1 July 2019, <https://undocs.org/BWC/MSP/2019/MX.2/WP.1>, para. 11.

67 This single-choice question was answered by 40 survey respondents.

2.2.4 Independence and technical focus

In BWC-related discussions, several States Parties have emphasized the importance of mechanisms remaining technically focused, with participants maintaining independence. For example, Spain has stated that an “S&T body should be independent, both functionally and politically . . . it has to be purely technical and constituted by well-reputed, appropriate technical experts”.⁶⁸

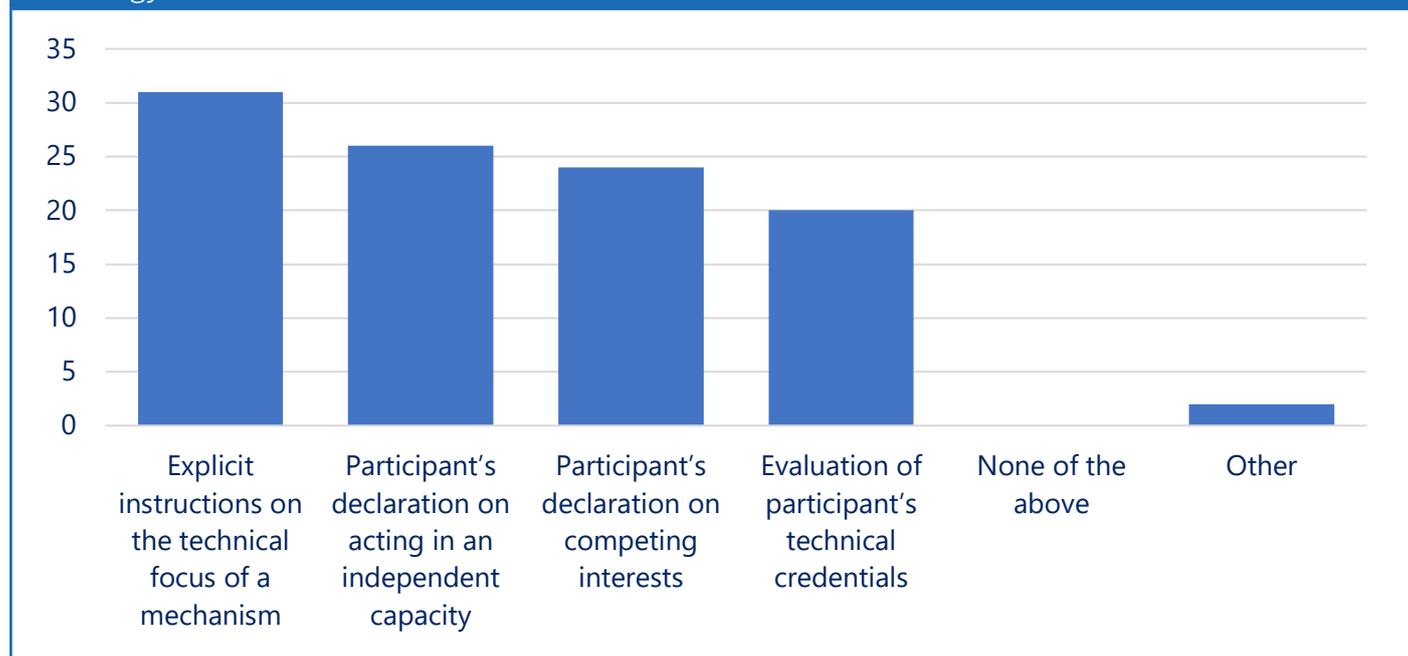
Several interview participants also emphasized the importance of a mechanism maintaining an independent, technical focus in order to be both “effective”⁶⁹ and “credible”.⁷⁰ This is particularly important to prevent science being “hijacked” in support of political objectives.⁷¹ According to one interviewee, commercial and political independence should not preclude the involvement of government or industry scientists.⁷² However, achieving a credible independent mechanism requires that participants should not be unduly influenced by States Parties or industry stakeholders and that the mechanism should avoid entering into political discussion as far as possible.⁷³

Existing review mechanisms rely on a variety of measures to ensure independence and to maintain a technical focus. For example, the EU SAM obliges its Chief Scientific Advisors to declare any conflicts of interest;⁷⁴ some WHO advisory committees require members to “complete a declaration of interest form”;⁷⁵ other bodies include stipulations in their terms of references prescribing that members “shall neither seek nor accept instructions . . . from any government or other authority external to or within WHO”.⁷⁶ As interviewees pointed out, the chair can also play an important role in setting the tone of meetings and ensuring a technical focus in order to draw participants away from politicization.⁷⁷ So too can the framing of the question; as one study of the OPCW SAB remarked, “the way a question is posed to a board of advisors influences directly the types of advice the board will be able to render”.⁷⁸

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- 68 See Eighth BWC Review Conference, Preparatory Committee, “Revisión de ciencia y tecnología en la CABT: elementos para un proceso políticamente independiente” [Reviewing science and technology within the BWC: elements for a politically independent process], Submitted by Spain, BWC/CONFVIII/PC/WP.27, 10 August 2016, <https://undocs.org/BWC/CONFVIII/PC/WP.27>, para. 4. A Swiss proposal posits that “S&T review debates should be organized and structured in a way that ensures that discussions are technical”. Eighth BWC Review Conference, Preparatory Committee, “Strengthening the BWC Science and Technology Review Process: Considerations Regarding the Composition of an S&T Review Body”, Submitted by Switzerland, BWC/CONFVIII/PC/WP.16, 19 July 2016, <https://undocs.org/BWC/CONFVIII/PC/WP.16>.
- 69 Interviewee 1, 26 March 2020.
- 70 Interviewee 14, 20 April 2020.
- 71 For more on this see K. Smallwood, “Truth, Science and Chemical Weapons: Expert Advice and the Impact of Technical Change on the Chemical Weapons Convention”, Doctoral thesis, University of Sussex, 2009, http://sro.sussex.ac.uk/id/eprint/2398/1/Smallwood_Katie.pdf.
- 72 Interviewee 14, 20 April 2020.
- 73 Interviewee 14, 20 April 2020.
- 74 Interviewee 1, 26 March 2020.
- 75 World Health Organization, “Malaria Vaccine Advisory Committee (MALVAC): Terms of Reference and Membership”, <https://www.who.int/immunization/research/committees/malvac/en/>.
- 76 World Health Organization, “Terms of Reference for the Independent Oversight and Advisory Committee for the WHO Health Emergencies Programme”, https://www.who.int/about/who_reform/emergency-capacities/oversight-committee/Terms-of-Reference-Independent-Oversight-Committee.pdf?ua=1. Gopinathan et al. writing in the scholarly literature also propose “Procedures for disclosing any interests (financial, intellectual, institutional) with the potential to unduly influence the judgement of the experts involved, and for implementing appropriate measures for managing the reported conflict of interest”. U. Gopinathan, S.J. Hoffman and T. Ottersen, “Scientific Advisory Committees at the World Health Organization: A Qualitative Study of How Their Design Affects Quality, Relevance, and Legitimacy”, *Global Challenges*, vol. 2, no. 9, (2018) 1700074, <https://doi.org/10.1002/gch2.201700074>.
- 77 Interviewee 14, 20 April 2020. See also U. Gopinathan, S.J. Hoffman and T. Ottersen, “Scientific Advisory Committees at the World Health Organization: A Qualitative Study of How Their Design Affects Quality, Relevance, and Legitimacy”, *Global Challenges*, vol. 2, no. 9, (2018) 1700074, <https://doi.org/10.1002/gch2.201700074>.
- 78 K. Smallwood, “Truth, Science and Chemical Weapons: Expert Advice and the Impact of Technical Change on the Chemical Weapons Convention”, Doctoral thesis, University of Sussex, 2009, http://sro.sussex.ac.uk/id/eprint/2398/1/Smallwood_Katie.pdf, p. 123.

In the BWC context, possible tools to facilitate independence could include explicit instructions to participants; declarations of conflicts of interest; or evaluations of participant credentials and technical expertise. The survey results (see figure 12) suggest that there was strong support from 31 of 39 respondents for the inclusion of explicit instructions for participants on the technical focus of a mechanism. Many survey respondents also supported participant declarations on acting in an independent capacity (26 respondents) or declarations on competing interests (24 respondents). Just under half of the respondents supported some form of evaluation of participants' technical credentials, although this requires further consideration around who conducts such an evaluation and on what basis.

Figure 12. Respondents' views on tools to facilitate independence of participants in a BWC science and technology review mechanism⁷⁹



2.3 LEADERSHIP

All existing review mechanisms studied for this report incorporate some form of chair-type position (see table 6). In most cases, the chair is supported by one or two co- or vice-chairs. These leadership teams set the agenda for meetings; liaise with members, secretariat-type bodies and States; facilitate meetings (including guiding participants towards consensus); review meeting reports; draft outputs; and represent the mechanism at external events.

The estimated workload of chairs in other mechanisms varies. In some cases, it was suggested that the workload was not “super heavy”.⁸⁰ In other cases, the chair needed to be “available 60 days a year”, reflecting a considerable commitment.⁸¹

Some interviewees argued that the chair required technical knowledge for a mechanism to have credibility. As one interviewee remarked, “if your science board is supposed to be a science board and look at science . . . you need

79 This multiple-choice question was answered by 39 survey respondents.

80 Interviewee 3, 27 March 2020.

81 Interviewee 1, 26 March 2020.

somebody who has scientific credibility at the helm.”⁸² Other interviewees suggested that it was more important for leaders to be process-focused and carry high-level political weight.⁸³ Yet other interviewees suggested that “soft skills” were important, as the chair needs to set the tone for discussions, foster an inclusive working culture, shield technical discussions from politics and work with mechanism members to build consensus.⁸⁴

Table 6. Leadership models of selected science and technology review mechanisms

Body	Leadership model	Duration of role
ESCAP Science Technology and Innovation Advisory Board	Chair	Selected by ESCAP every two years
EU Scientific Advice Mechanism	Chair and co-chair	Unlimited duration
ICC Scientific Advisory Board	Chair and vice-chair	Three years
OPCW Scientific Advisory Board	Chair and vice-chair	Elected by board members every year
UNFCCC Subsidiary Body for Scientific and Technological Advice	Chair and vice-chair	Three years
WHO Malaria Vaccine Advisory Committee	Chair	Appointed by the Director for three years (possibility of one renewal)

2.3.1 Appointment of leadership

The process for appointing a leadership team varies across the different mechanisms reviewed in this research. In some cases, selection is undertaken through internal voting among members of the mechanisms; for example, the members of the OPCW SAB elect a chair every year.⁸⁵ This approach is consistent with proposals from the Russian Federation and Germany, the Netherlands and Sweden in the context of the BWC.⁸⁶ In other cases, chairs are appointed by director-level positions within the secretariat or department. The chair of the WHO Malaria Vaccine Advisory Committee, for instance, is appointed by the Director of the WHO Immunization, Vaccines and Biologicals department and serves for three years with the possibility of one renewal.⁸⁷

The appointment of a leadership team by a director is not an option available to the BWC. However, States Parties could appoint a chair, as proposed in a working paper by the United Kingdom.⁸⁸ Alternatively, a mechanism could

82 Interviewee 14, 20 April 2020. A report by the InterAcademy Partnership (IAP) states that in the BWC context any chair “will need to be familiar with technical materials and the culture of more technical processes and seen as a credible lead by those involved in this process”. See InterAcademy Partnership, *The Biological and Toxin Weapons Convention: Considerations for a Science Advisory Mechanism*, 2016, <https://royalsociety.org/-/media/policy/projects/biological-toxin-weapons-convention/biological-toxin-weapons-convention-btwc-april-2016-meeting-summary.pdf>, p. 7.

83 Interviewee 3, 27 March 2020.

84 Interviewee 14, 20 April 2020.

85 Interviewee 14, 20 April 2020.

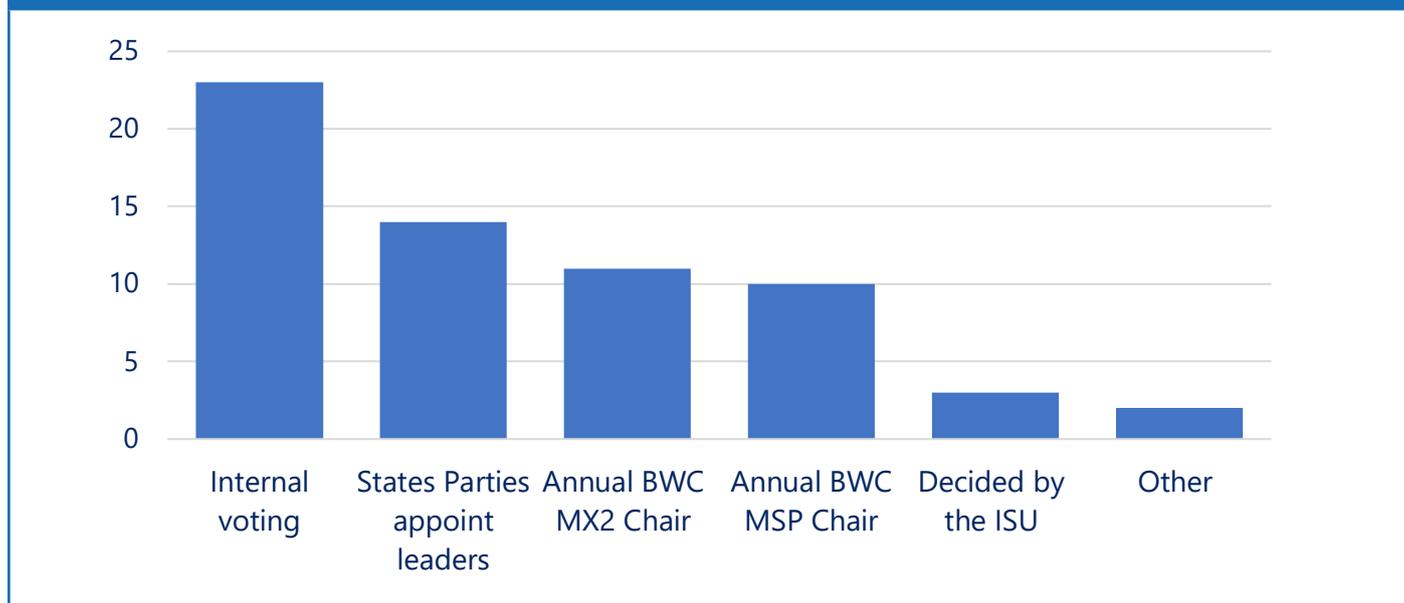
86 Meeting of Experts on Review of Developments in the Field of Science and Technology Related to the Convention, “Rethinking the BTWC Science and Technology Review: A Renewed Case for a BTWC Scientific and Technological Experts Advisory Forum (STeAF)”, Submitted by Germany, co-sponsored by Netherlands and Sweden, BWC/MSP/2019/MX.2/WP.1, 1 July 2019, <https://undocs.org/BWC/MSP/2019/MX.2/WP.1>; and Eighth BWC Review Conference, Preparatory Committee, “Strengthening the Biological Weapons Convention: Proposal for the Establishment of a Scientific Advisory Committee”, Submitted by the Russian Federation, BWC/CONFVIII/PC/WP.2/Rev.2, 4 July 2016, <https://undocs.org/BWC/CONFVIII/PC/WP.2/Rev.2>.

87 World Health Organization, “Malaria Vaccine Advisory Committee (MALVAC): Terms of Reference and Membership”, <https://www.who.int/immunization/research/committees/malvac/en/>.

88 The British paper states that “The group will be Chaired by a scientific expert nominated and agreed by the States Parties”. Eighth BWC Review Conference, Preparatory Committee, “A Future Science and Technology Review Process”, Submitted by the United Kingdom, BWC/CONFVIII/PC/WP.4, 11 April 2016, <https://undocs.org/BWC/CONFVIII/PC/WP.4>.

be “placed under the responsibility of the annual BWC Chairman”, a model proposed in working papers by both the United States and Spain.⁸⁹ As illustrated in figure 13, 23 of the 40 survey respondents support the appointment of a leadership team through internal voting, while 14 support States Parties appointing a team.

Figure 13. Respondents’ views on appointment of leadership of a BWC science and technology review mechanism⁹⁰



2.3.2 Rotation of leadership

In most other mechanisms, the role of the chair typically rotates after a two- to three-year term. Interviewees saw this model as advantageous as it is conducive to, as one interviewee put it, “fresh new ideas” and gives “all regions an opportunity to engage”.⁹¹ Additionally, interviewees involved in treaty-based mechanisms stressed that having a rotation model for the chair is desirable given the “political nature of the discussions”, where the perception of the chair can have a significant impact on the success of the discussions.

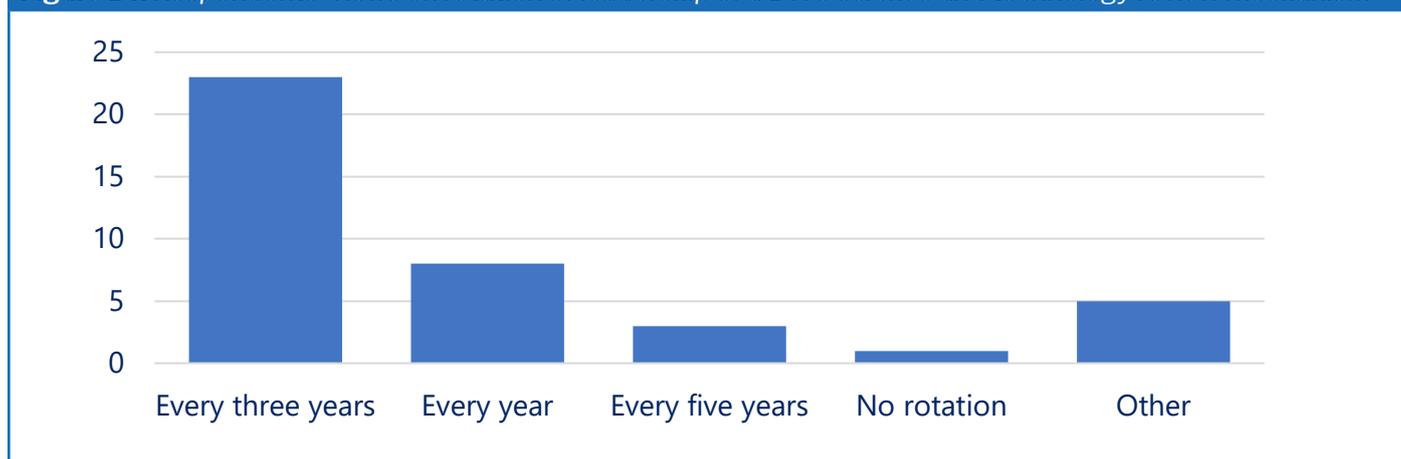
In the survey (see figure 14), more than half of the respondents favoured a three-year rotation cycle for the leadership team. This would allow enough time for the team to become fully acquainted with the dynamics of the mechanism. Qualitative responses to this question submitted under the “other” category of responses highlighted the importance of a staggered leadership cycle to ensure that leadership positions do not conclude simultaneously, thereby enabling some continuity to an S&T review mechanism.

89 Eighth BWC Review Conference, Preparatory Committee, “Science and Technology Review for the BWC: Features of an Effective Process”, Submitted by the United States, BWC/CONFVIII/PC/WP.3, 11 April 2016, <https://undocs.org/BWC/CONFVIII/PC/WP.3>, para. 5. A Spanish working paper states “under the functional guidance of the BWC Chairman”. Eighth BWC Review Conference, Preparatory Committee, “Revisión de ciencia y tecnología en la CABT: elementos para un proceso políticamente independiente” [Reviewing science and technology within the BWC: elements for a politically independent process], Submitted by Spain, BWC/CONFVIII/PC/WP.27, 10 August 2016, <https://undocs.org/BWC/CONFVIII/PC/WP.27>.

90 This multiple-choice question was answered by 40 survey respondents.

91 Interviewee 4, 31 March 2020.

Figure 14. Respondents' views on rotation of leadership of a BWC science and technology review mechanism⁹²



2.4 WAYS OF WORKING

The mechanisms reviewed in the first phase of this study illustrate a range of working methods, with different arrangements for meetings, differing levels of autonomy and differing approaches to developing consensus outputs.

2.4.1 Meetings

A review of other mechanisms illustrates that the frequency and duration of meetings vary (see table 7). For example, the UNFCCC STA meets twice a year; once for a technical meeting over two weeks and once for six days to develop decisions to be submitted to the Conference of Parties.⁹³ The EU SAM meets five or six times a year, with additional ad hoc meetings convened when urgent advice is needed. Moreover, participants maintain contact virtually throughout the year.⁹⁴

Table 7. Number, duration and location of meetings in selected mechanisms

Mechanism	Number of annual meetings	Duration of meetings	Location
Convention on Biological Diversity's Subsidiary Body on Scientific, Technical and Technological Advice	As necessary	No longer than 5 days	Montreal
NATO Science & Technology Board	2	2.5–3.5 days	Brussels
UNFCCC Subsidiary Body for Scientific and Technological Advice	2	One meeting of two weeks, a second meeting of one week	Paris

92 This single-choice question was answered by 40 survey respondents.

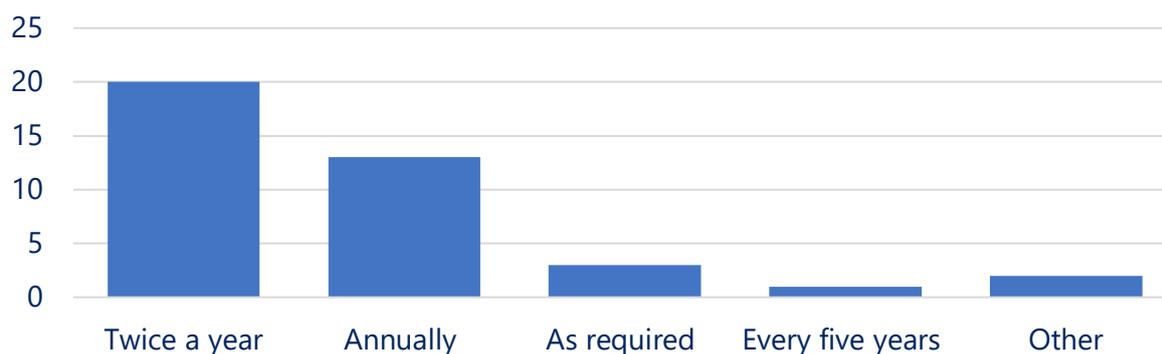
93 Interviewee 5, 31 March 2020.

94 Scientific Advice Mechanism (SAM), Group of Chief Scientific Advisors, Informing European Commission Policy Making with Scientific Evidence: The Group of Chief Scientific Advisors 2015–2019, February 2020, <https://op.europa.eu/en/publication-detail/-/publication/d3d43012-5224-11ea-aece-01aa75ed71a1/language-en/format-PDF/source-138014209>.

There has been limited discussion in the BWC about meeting arrangements for any mechanism. However, some convergence has emerged around having at least one annual in-person meeting. For example, the United Kingdom has proposed a one-week meeting of government experts in the spring of each year; the German STEAF proposal referred to an annual five-day meeting prior to the Meetings of Experts;⁹⁵ the Russian Federation has proposed “one annual session of the [Scientific Advisory] Committee of five days”;⁹⁶ and the United States has proposed “one annual in-person meeting”, further noting that a mechanism could also use email and teleconferencing.⁹⁷

In the survey, as figure 15 illustrates, 20 of the 39 survey respondents supported a mechanism meeting twice a year, whereas 13 respondents supported an annual meeting process.

Figure 15. Respondents’ views on frequency of meetings of a BWC science and technology review mechanism⁹⁸



2.4.2 Meeting location

Most mechanisms reviewed in this study largely appear to co-locate mechanism meetings with organization bases. For example, meetings of the OPCW SAB take place in The Hague. However, there are exceptions. The United Nations Secretary-General’s SAB hosted regional meetings to enable engagement with a wider audience;⁹⁹ and the OPCW has also hosted special workshops outside The Hague. Interviewees noted that these special OPCW SAB meetings were well received and provided the board with an opportunity to engage a different audience and “talk to people from ministries”.¹⁰⁰

There has been limited discussion within the BWC about the location of review mechanism meetings. Among 40 survey respondents (see figure 16), 18 favoured Geneva-based meetings and 16 were open to alternative meeting locations. Additional suggestions submitted by survey respondents include virtual meetings; meetings in “United Nations offices in rotating locations and determined by offers from potential host States”; and meetings “located

95 Meeting of Experts on Review of Developments in the Field of Science and Technology Related to the Convention, “Rethinking the BTWC Science and Technology Review: A Renewed Case for a BTWC Scientific and Technological Experts Advisory Forum (STEAF)”, Submitted by Germany, co-sponsored by Netherlands and Sweden, BWC/MSP/2019/MX.2/WP.1, 1 July 2019, <https://undocs.org/BWC/MSP/2019/MX.2/WP.1>.

96 Eighth BWC Review Conference, Preparatory Committee, “Strengthening the Biological Weapons Convention: Proposal for the Establishment of a Scientific Advisory Committee”, Submitted by the Russian Federation, BWC/CONF.VIII/PC/WP.2/Rev.2, 4 July 2016, <https://undocs.org/BWC/CONF.VIII/PC/WP.2/Rev.2>, annex I, para. 4.

97 Eighth BWC Review Conference, Preparatory Committee, “Science and Technology Review for the BWC: Features of an Effective Process”, Submitted by the United States, BWC/CONF.VIII/PC/WP.3, 11 April 2016, <https://undocs.org/BWC/CONF.VIII/PC/WP.3>, para. 5.

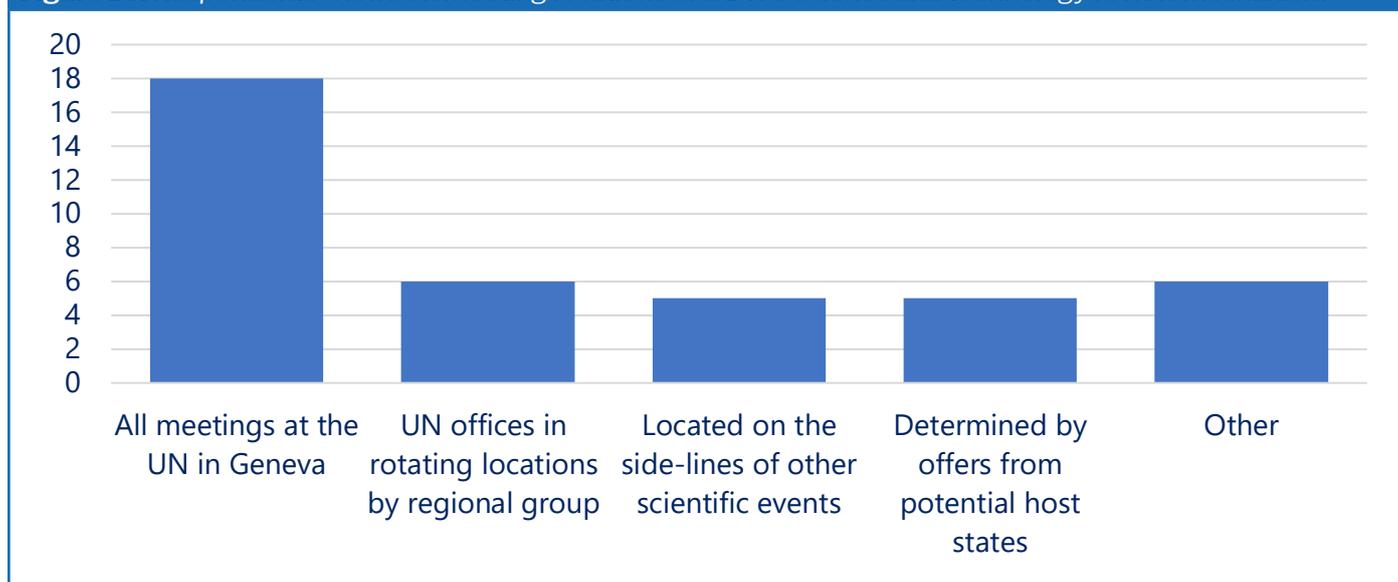
98 This single-choice question was answered by 39 survey respondents.

99 Interviewee 12, 14 April 2020.

100 Interviewee 14, 20 April 2020.

on the sidelines of other external scientific events and conferences and determined by offers from potential host States”.

Figure 16. Respondents’ views on meeting locations of a BWC science and technology review mechanism¹⁰¹



Rotating locations could be particularly appealing for States Parties that value international cooperation or knowledge transfer, especially if some meetings of the mechanism were co-located with international scientific events. Moreover, such a model may be cheaper to organize outside Geneva and could help “foster greater buy in for the treaty around the world”.¹⁰² However, such a rotation may be more difficult to organize. This approach could also limit the participation of some nationals who are restricted by resources available for travel, political sensitivities or security concerns.

2.4.3 Consensus

Most of the science and technology review mechanisms analysed in the first phase of the project operate through consensus. Interviewees indicated that consensus had generally been achieved in existing mechanisms even when dealing with difficult or divisive topics. However, in some cases, this required facilitation by the chair to nuance language¹⁰³ or further interrogate the scientific data.¹⁰⁴

Several interview participants indicated that divergences among mechanism participants should be explicitly acknowledged in any formal output.¹⁰⁵ The EU Group of Chief Scientific Advisors, for example, highlights the importance of reflecting “uncertainties, gaps and limitations in available knowledge” in its outputs.¹⁰⁶ Notably, in

101 This multiple-choice question was answered by 40 survey respondents.

102 InterAcademy Partnership, The Biological and Toxin Weapons Convention: Considerations for a Science Advisory Mechanism, 2016, <https://royalsociety.org/-/media/policy/projects/biological-toxin-weapons-convention/biological-toxin-weapons-convention-btwc-april-2016-meeting-summary.pdf>.

103 Interviewee 4, 31 March 2020.

104 Interviewee 8, 6 April 2020.

105 As indicated by interviewee 3, “when conflict comes up . . . resort to scientific publications and see what would be already accepted practices and if there is still no consensus, the conflict is noted and then we decide whether to use that or not”. Interviewee 3, 27 March 2020. Also raised by Interviewee 1, 26 March 2020; Interviewee 8, 6 April 2020; and Interviewee 14, 20 April 2020.

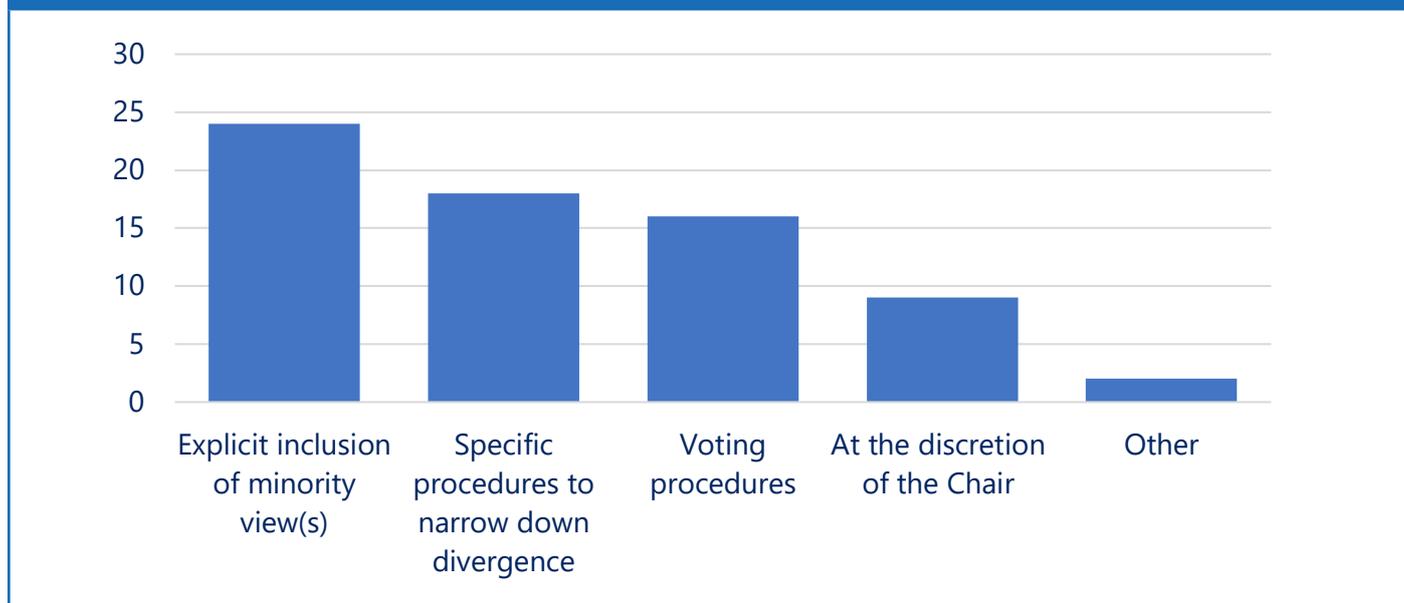
106 Scientific Advice Mechanism (SAM), Group of Chief Scientific Advisors, Scientific Advice to European Policy in a Complex World, Scientific Opinion no. 7, Sep. 2019, <https://op.europa.eu/en-GB/publication-detail/-/publication/5c->

the case of the Secretary-General’s SAB, a Delphi Study process was applied to focus participants discussion and address areas of disagreement.¹⁰⁷

Statements and working papers within the context of the BWC suggest that at least one State Party would prefer reports by consensus. For example, the Russian Federation’s proposal suggests that “the conclusions and recommendations are developed through a consensus process”. However, it continues with the proviso that, “If consensus on the conclusions and recommendations can not be achieved, the report reflects any minority view(s), as appropriate”.¹⁰⁸ Similarly, Germany, the Netherlands and Sweden suggest that the outputs produced by the proposed STEAF should report both “agreements as well as differences of opinions among experts on the issues considered”.¹⁰⁹

In the survey (see figure 17), 24 of the 40 respondents supported the inclusion of minority views in any final report; 18 respondents supported some form of specific procedure to narrow down divergences; and 16 expressed support for voting procedures. Whichever approach is chosen, defining decision-making rules around consensus in advance as part of a wider set of rules of procedure would be beneficial and avoid ad hoc measures.¹¹⁰

Figure 17. Respondents’ views on measures to facilitate consensus in a BWC science and technology review mechanism¹¹¹



[b9ca21-0500-11ea-8c1f-01aa75ed71a1/language-en](https://undocs.org/b9ca21-0500-11ea-8c1f-01aa75ed71a1/language-en), p. 10.

107 Delphi is based on the principle that forecasts (or decisions) from a structured group of individuals are more accurate than those from unstructured groups. The experts answer questionnaires in two or more rounds. After each round, a facilitator or change agent provides an anonymized summary of the experts’ forecasts from the previous round as well as the reasons they provided for their judgments. Interviewee 12, 14 April 2020.

108 Eighth BWC Review Conference, Preparatory Committee, “Strengthening the Biological Weapons Convention: Proposal for the Establishment of a Scientific Advisory Committee”, Submitted by the Russian Federation, BWC/CONF.VIII/PC/WP.2/Rev.2, 4 July 2016, <https://undocs.org/BWC/CONFVIII/PC/WP.2/Rev.2>, appendix, rule 5.

109 Meeting of Experts on Review of Developments in the Field of Science and Technology Related to the Convention, “Rethinking the BTWC Science and Technology Review: A Renewed Case for a BTWC Scientific and Technological Experts Advisory Forum (STEAF)”, Submitted by Germany, co-sponsored by Netherlands and Sweden, BWC/MSP/2019/MX.2/WP.1, 1 July 2019, <https://undocs.org/BWC/MSP/2019/MX.2/WP.1>, para. 19.

110 U. Gopinathan, S.J. Hoffman and T. Ottersen, “Scientific Advisory Committees at the World Health Organization: A Qualitative Study of How Their Design Affects Quality, Relevance, and Legitimacy”, *Global Challenges*, vol. 2, no. 9, (2018) 1700074, <https://doi.org/10.1002/gch2.201700074>.

111 This multiple-choice question was answered by 40 survey respondents.

2.5 INSTITUTIONAL SUPPORT

Most interview participants emphasized the need for a secretariat-type body for any review mechanism to be effective. To paraphrase one participant, “great Secretariat support is very important [it is] the soul of the mechanism”.¹¹² In existing mechanisms, secretariat-type bodies play an ongoing role in facilitating communications; organizing meetings; selecting participants; contributing to the formulation of draft reports;¹¹³ and outreach to technical experts and even publics.¹¹⁴

In some cases, these bodies also play a substantive role. For example, in the case of the United Nations Secretary-General’s SAB, secretariat staff with technical expertise were invited to contribute to expert discussions. Other studies have suggested that institutional support bodies or individuals can also “assist in the recognition of policy issues that require science advice, in the formulation of the science questions in obtaining the science advice, and in interpreting the resulting scientific advice and in using it in the ensuing policy process”.¹¹⁵

Past BWC discussions indicate that most States Parties recognize the importance of secretariat-type support for any S&T review mechanism. As one United States working paper stated, “a capable secretariat is critical to a technical body’s success”.¹¹⁶ This is also reflected in survey findings, wherein most respondents agreed on the need for additional institutional support for any mechanism.

However, there was less clarity on what form such additional support should take. Many survey respondents (see figure 18) recognized the limited capacity of the BWC ISU in its current three-person form and 17 of the 40 survey respondents supported the addition of a full-time post. Eight respondents supported the creation of a part-time technical post to support any mechanism. This is consistent with past discussions, in which several States Parties have proposed a modest expansion of the ISU to establish an S&T-related position within the Unit.¹¹⁷ However, seven respondents suggested that a dedicated secretariat would be required, while five respondents indicated this task could be undertaken by the current three-person ISU.

112 Interviewee 8, 6 April 2020; and Interviewee 12, 14 April 2020.

113 Adapted from various interviews.

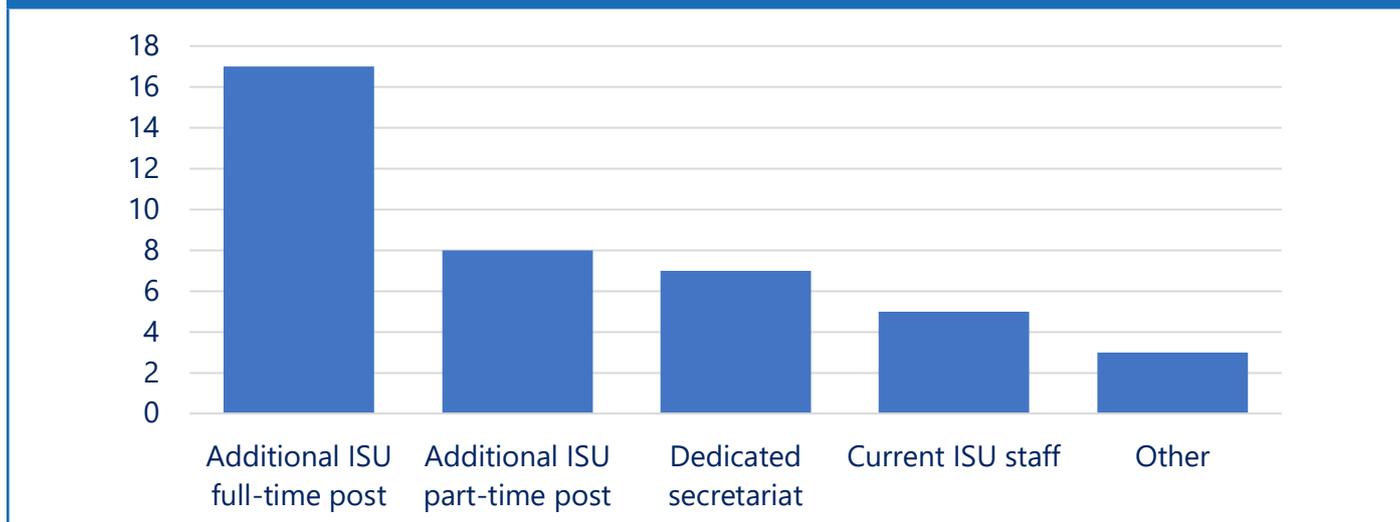
114 As an early IAP report indicated “Such individuals would also need to interact with the broader scientific and technological communities, requiring an expanded travel budget”. InterAcademy Partnership, *The Biological and Toxin Weapons Convention: Considerations for a Science Advisory Mechanism*, 2016, <https://royalsociety.org/-/media/policy/projects/biological-toxin-weapons-convention/biological-toxin-weapons-convention-btwc-april-2016-meeting-summary.pdf>, p. 7.

115 National Research Council, *Knowledge and Diplomacy: Science Advice in the United Nations System*, National Academies Press, 2002, <https://doi.org/10.17226/10577>, p. 4.

116 Eighth BWC Review Conference, Preparatory Committee, “Science and Technology Review for the BWC: Features of an Effective Process”, Submitted by the United States, BWC/CONFVIII/PC/WP.3, 11 April 2016, <https://undocs.org/BWC/CONFVIII/PC/WP.3>, para. 5.

117 For example, the United Kingdom proposed a GGE be established and “supported by a scientific officer to be based in the Implementation Support Unit”. Eighth BWC Review Conference, Preparatory Committee, “A Future Science and Technology Review Process”, Submitted by the United Kingdom, BWC/CONFVIII/PC/WP.4, 11 April 2016, <https://undocs.org/BWC/CONFVIII/PC/WP.4>, annex, para. 4. Spain has suggested an S&T body should be “assisted by a technical expert of the ISU, in order to properly prepare and plan the work of the S&T body, so that it is useful and successful”. Eighth BWC Review Conference, Preparatory Committee, “Revisión de ciencia y tecnología en la CABT: elementos para un proceso políticamente independiente” [Science and Technology Review in the BTWC: Elements for a Politically Independent Process], Submitted by Spain, BWC/CONFVIII/PC/WP.27, 10 August 2016, <https://undocs.org/BWC/CONFVIII/PC/WP.27>, para. 6. The United States referred to a role for a “technical specialist in the ISU”. Eighth BWC Review Conference, Preparatory Committee, “Science and Technology Review for the BWC: Features of an Effective Process”, Submitted by the United States, BWC/CONFVIII/PC/WP.3, 11 April 2016, <https://undocs.org/BWC/CONFVIII/PC/WP.3>, para. 5.

Figure 18. Respondents' views on the source of institutional support for a BWC science and technology review mechanism¹¹⁸



Survey respondents appeared more supportive of any institutional support body playing a largely administrative role, rather than a substantive function. Organizing meetings was seen as “important” or “essential” by 38 of 39 respondents and facilitating communication between stakeholders was seen as “important” or “essential” by 39 of 40 respondents. There was also considerable support for an institutional body to formulate draft reports and engage with external experts. Indeed, one survey respondent identified the latter as essential if the reach of “the collective network is limited”.

Survey respondents appear to be less supportive of an institutional support body providing substantive technical contributions, although one respondent conceded that such a body could play a useful role in identifying potential topics to be addressed. Just under half of the survey respondents indicated support for a secretariat-type body selecting participants in the event a limited participant model was preferred (see figure 19).¹¹⁹

118 This single-choice question was answered by 40 survey respondents.

119 Notably, one survey comment suggested “technical screening – yes, selection – no”.

Figure 19. Respondents' views on the role of institutional support for a BWC science and technology review mechanism¹²⁰



2.6 OUTPUTS

2.6.1 Written outputs

Outputs from existing mechanisms reviewed in this project include detailed factual technical reports, “scientific opinion[s]”,¹²¹ “research dialogues”,¹²² annual reports, recommendations and, in some cases, draft resolutions. Discussions within the BWC have also referred to several possible types of written outputs. These are outlined in table 8. These options are not mutually exclusive; a mechanism could produce different outputs for different end users. For example, technical reports could be produced for national experts and recommendations could be provided for policymakers to consider.

Table 8. Possible outputs of a BWC science and technology review mechanism

Type	Description
Technical reports	These are more detailed technical documents to provide States Parties with technical information. For example, the British proposal refers to technical reports that “set out the issues discussed in a comprehensive and balanced manner. Such reports are to provide a more robust and comprehensive technical basis to inform the deliberations of other meetings held in the intersessional programme”. ¹²³

¹²⁰ 40 survey respondents addressed at least one part of this rating question. Not all parts of this question were answered equally. Responses per option are as follows: organization of meetings (39); communications (40); formulation of draft reports (39); engagement with external experts (39); substantive technical contributions (37); selecting and screening of participants (37).

¹²¹ Interviewee 1, 26 March 2020.

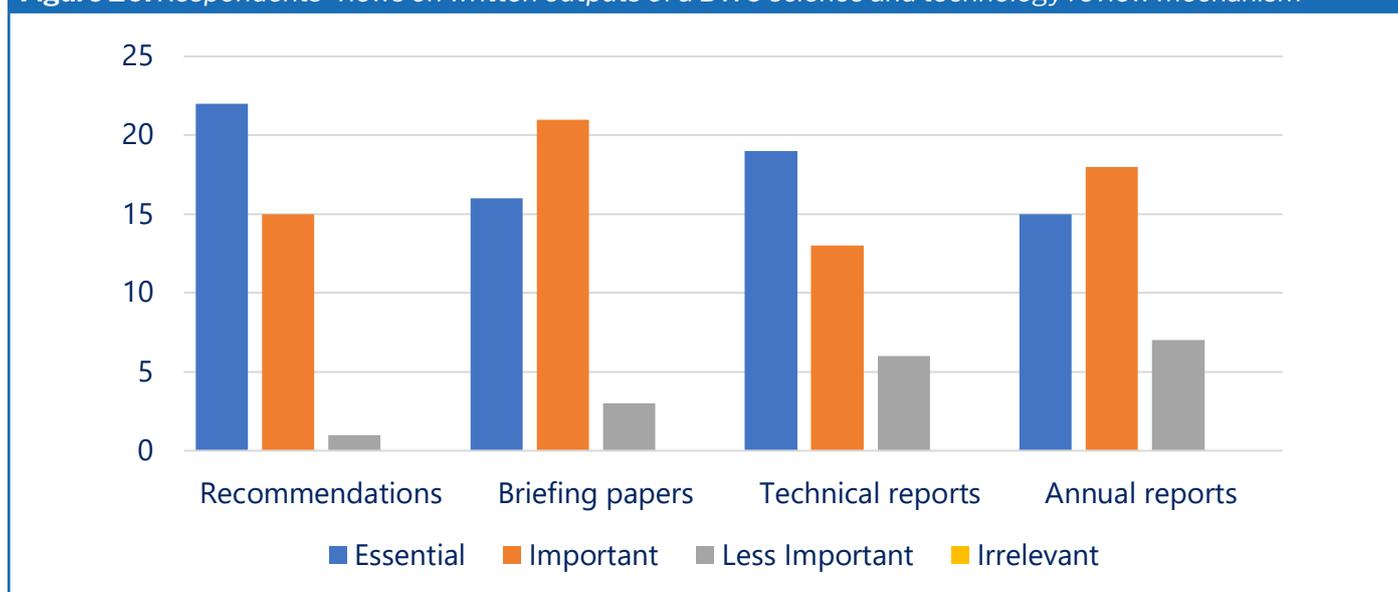
¹²² Interviewee 5, 31 March 2020.

¹²³ Eighth BWC Review Conference, Preparatory Committee, “A Future Science and Technology Review Process”, Submitted by the United Kingdom, BWC/CONF.VIII/PC/WP.4, 11 April 2016, <https://undocs.org/BWC/CONF.VIII/PC/WP.4>, annex, para. 2.

Table 8. Possible outputs of a BWC science and technology review mechanism

Type	Description
Annual reports	The Russian Federation has proposed that the Scientific Advisory Committee could provide, among other things, an annual “report of its activities including an account of its contributions during the year”. ¹²⁴
Recommendations	Finland, Norway, and Sweden have referred to a mechanism developing “concrete recommendations to the States Parties”; ¹²⁵ whereas a Russian working paper also referred to “conclusions and recommendations”.
Briefing papers	Summary briefings for States Parties could distil technical discussion into accessible policy-friendly materials. The United States, for example, has argued that a mechanism should “produce useful products written in plain language”. ¹²⁶

In the survey, 37 out of 38 survey respondents indicated that recommendations were “essential” or “important”, and briefing papers were considered by 37 of 40 respondents as “essential” or “important”. In-depth technical reports were considered an “essential” or “important” output by 32 of 38 respondents, and 33 of 40 respondents indicated that annual reports outlining the activities and outputs of the mechanism would be “essential” or “important” (see figure 20).

Figure 20. Respondents’ views on written outputs of a BWC science and technology review mechanism¹²⁷

124 Eighth BWC Review Conference, Preparatory Committee, “Strengthening the Biological Weapons Convention: Proposal for the Establishment of a Scientific Advisory Committee”, Submitted by the Russian Federation, BWC/CONF.VIII/PC/WP.2/Rev.2, 4 July 2016, <https://undocs.org/BWC/CONFVIII/PC/WP.2/Rev.2>, annex II, para. 13.

125 Eighth BWC Review Conference, Preparatory Committee, “Elements on Science and Technology for the 2016 Review Conference – The Importance of an Active Review Process”, Submitted by Finland, Norway and Sweden, BWC/CONF.VIII/PC/WP.7, 25 April 2016, <https://undocs.org/BWC/CONFVIII/PC/WP.7>, para. 3.

126 Eighth BWC Review Conference, Preparatory Committee, “Science and Technology Review for the BWC: Features of an Effective Process”, Submitted by the United States, BWC/CONF.VIII/PC/WP.3, 11 April 2016, <https://undocs.org/BWC/CONFVIII/PC/WP.3>, para. 2.

127 40 survey respondents addressed at least one part of this rating question. Not all parts of this question were answered equally. Responses per option are as follows: recommendations (38); briefing papers (40); technical reports (38); annual reports (40).

States Parties will need to further consider and potentially prioritize outputs. Choices around outputs are closely connected with other factors, including the objectives, end users, costs and participants in any mechanism. For example, if multiple outputs are desired, participants in any mechanism may require more resources; if accessible briefings are required, competent science communicators become an important criterion for at least some participants in order for findings to be translated into policy language while maintaining credibility¹²⁸ and avoiding “dumbing down” of the science.¹²⁹ If credible recommendations are expected, institutional support may be required along with wider expertise that takes into account other, non-scientific factors.

Choosing appropriate outputs and making them useable also requires participants in a mechanism to understand the target audience and acquire end user feedback on outputs.¹³⁰ One interview participant indicated this had been problematic in their experience, noting that “it was difficult for the authors [of outputs] to know who they were writing for”.¹³¹

2.6.1 Non-written outputs

Any review mechanism might usefully consider non-written outputs, including presentations, lunchtime briefings for delegates and other “hands-on” activities, such as interactive scientific events. Interviewees with experience in other mechanisms felt that these non-written outputs were useful and, in some cases, allowed participants to connect with end users, get feedback and improve the mechanism’s visibility.¹³² Briefings and presentations further provided space for end users to ask questions, an approach deemed preferable to a process of “lecturing” diplomats. One novel output explored by the OPCW was the notion of “science for diplomats” events—that is, “regularly scheduled lectures at OPCW Headquarters on scientific topics relevant to the [Chemical Weapons] Convention” that often include a hands-on or interactive component.¹³³

In the survey (see figure 21), 36 of the 40 respondents indicated support for side-events with a question-and-answer component. There was also considerable support (29 respondents) for a mechanism providing outreach to the wider scientific community.

128 Interviewee 12, 14 April 2020

129 Interviewee 10, 8 April 2020

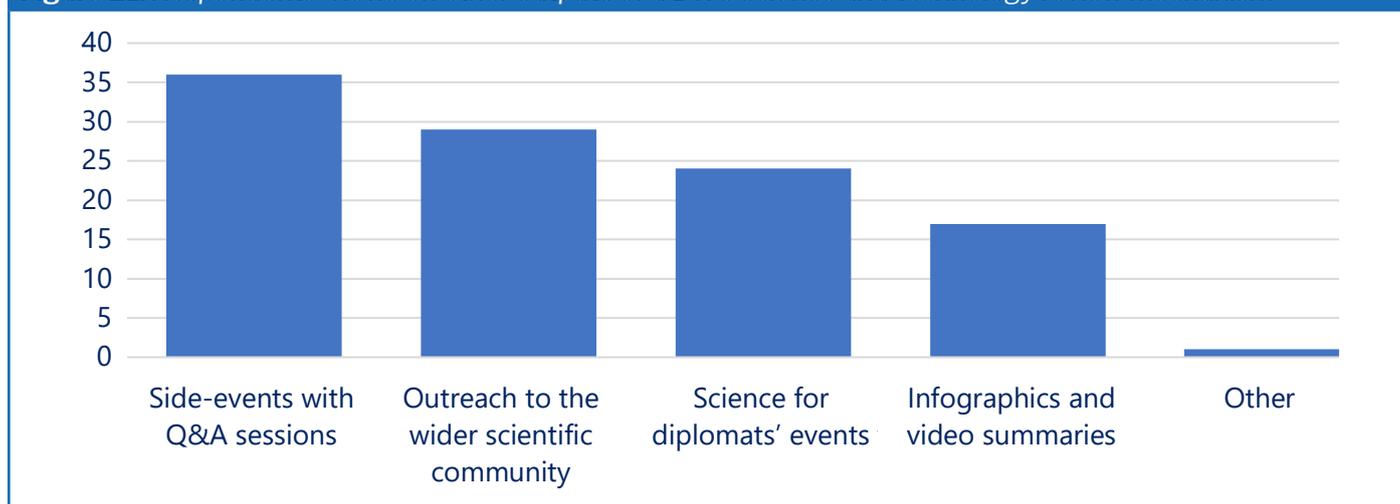
130 See, for example, J. Forman, “Science Advice and Policy-Maker Engagement in Support of the Chemical Weapons Convention”, Presentation to the Eighth BWC Review Conference, 10 November 2016, https://documents.unoda.org/wp-content/uploads/2021/04/OPCW1_Science_Advice_Policy-Maker_Engagement_in_CWC.pdf.

131 Interviewee 13, 15 April 2020.

132 Interviewee 14, 20 April 2020.

133 C.M. Timperley et al., “Advice from the Scientific Advisory Board of the Organisation for the Prohibition of Chemical Weapons on Isotopically Labelled Chemicals and Stereoisomers in Relation to the Chemical Weapons Convention”, *Pure and Applied Chemistry*, vol. 90, no. 10 (2018), pp. 1647–1670, <https://doi.org/10.1515/pac-2018-0803>, p. 1657.

Figure 21. Respondents' views on other outputs of a BWC science and technology review mechanism¹³⁴



2.7 FUNDING

Most existing mechanisms require funding primarily to cover the basic costs of travel and accommodation for participants.¹³⁵ As illustrated in table 9, the costs of existing mechanisms vary. The travel and lodging for the 15 members of the ICC SAB costs 20,000–30,000 euros per year (roughly \$24,000–36,000);¹³⁶ higher-profile meetings, including regional events for a larger board, such as the 25-member SAB of the United Nations Secretary-General, costs an estimated \$140,000 per meeting.¹³⁷ Interviewees indicated that a long-term stable funding process is important. Approaches based on voluntary funding can undermine long-term planning.¹³⁸

Table 9. Funding sources in selected science and technology review mechanisms

Body	Funding	Amount
EU Scientific Advice Mechanism ¹³⁹	The expenses of the Chief Scientific Advisors and the SAM Unit are covered by the European Commission. The Chief Scientific Advisors are provided with a per diem and travel and subsistence costs.	The estimated cost for Chief Scientific Advisors is €100,000–150,000 per year (roughly \$120,000–180,000).
ICC Scientific Advisory Board	The ICC's Office of the Prosecutor funds the annual meeting. The board members are provided travel cost, accommodation and daily subsistence.	The annual estimated cost of meetings is €20,000–30,000 per 2-day meeting (roughly \$24,000–36,000), excluding the cost of ICC staff.
OPCW Scientific Advisory Board	The OPCW regular budget supports normal sessions of the SAB. In addition, a voluntary trust fund supports events, including workshops. Travel and daily subsistence allowances for SAB members are covered by the OPCW.	The estimated cost for SAB meetings is \$45,000 per meeting. Hosting of the meeting is provided at no cost by the OPCW.

134 This multiple-choice question was answered by 40 survey respondents.

135 For example, in the ICC and OPCW SABs, costs primarily cover travel of board members and a daily subsistence allowance (DSA).

136 Interviewee 4, 31 March 2020.

137 Interviewee 12, 14 April 2020.

138 As one interviewee remarked in the context of the UNEP Scientific Advisory Panel (SAP), the “lack of the surety of budget is a big drawback for the success of the working of the SAP – getting people together was very hard. Long-term planning was a bit of a problem.” Interviewee 13, 15 April 2020.

139 The SAM is comprised of the Chief Scientific Advisors, the SAM Unit and SAPEA (Science Advice for Policy by European Academies).

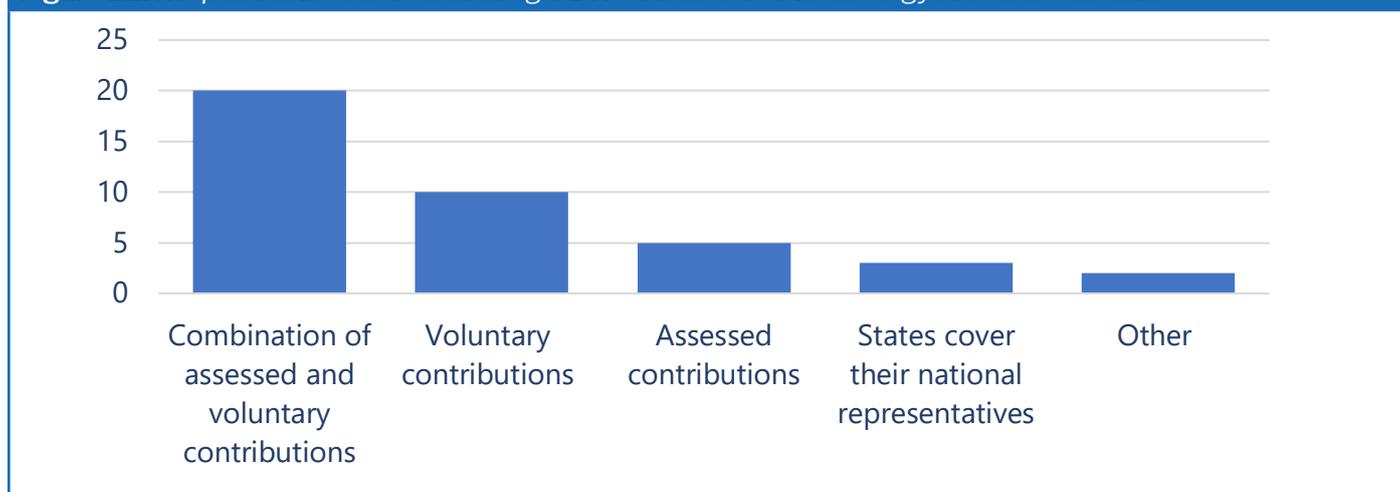
Table 9. Funding sources in selected science and technology review mechanisms

Body	Funding	Amount
United-Nations Secretary-General's Scientific Advisory Board on sustainable development	All activities pertaining to the board and meetings of the board were funded from extrabudgetary resources and voluntary contributions.	The estimated cost of \$140,000 per meeting included secretariat costs.

BWC States Parties have proposed several routes to funding an S&T review mechanism, including:¹⁴⁰

- Assessed contributions covering costs, including meetings, venue hire and additional staff
- Voluntary contributions, possibly through the establishment of some form of voluntary trust fund
- States Parties funding of nominees, and
- A sponsorship programme for meeting participants to ensure wider geographical representation.

Any BWC mechanism would be likely to require a combination of funding options.¹⁴¹ This could be through a mix of assessed and voluntary contributions as applied in the OPCW model.¹⁴² Indeed, 20 of 40 survey respondents supported funding a BWC S&T review mechanism through a combination of assessed contributions and voluntary funds. Ten survey respondents favoured using only voluntary contributions (see figure 22).

Figure 22. Respondents' views on funding a BWC science and technology review mechanism¹⁴³

140 The Swiss working paper is particularly useful in this regard. Eighth BWC Review Conference, Preparatory Committee, “Strengthening the BWC Science and Technology Review Process: Considerations Regarding the Composition of an S&T Review Body”, Submitted by Switzerland, BWC/CONFVIII/PC/WP.16, 19 July 2016, <https://undocs.org/BWC/CONFVIII/PC/WP.16>.

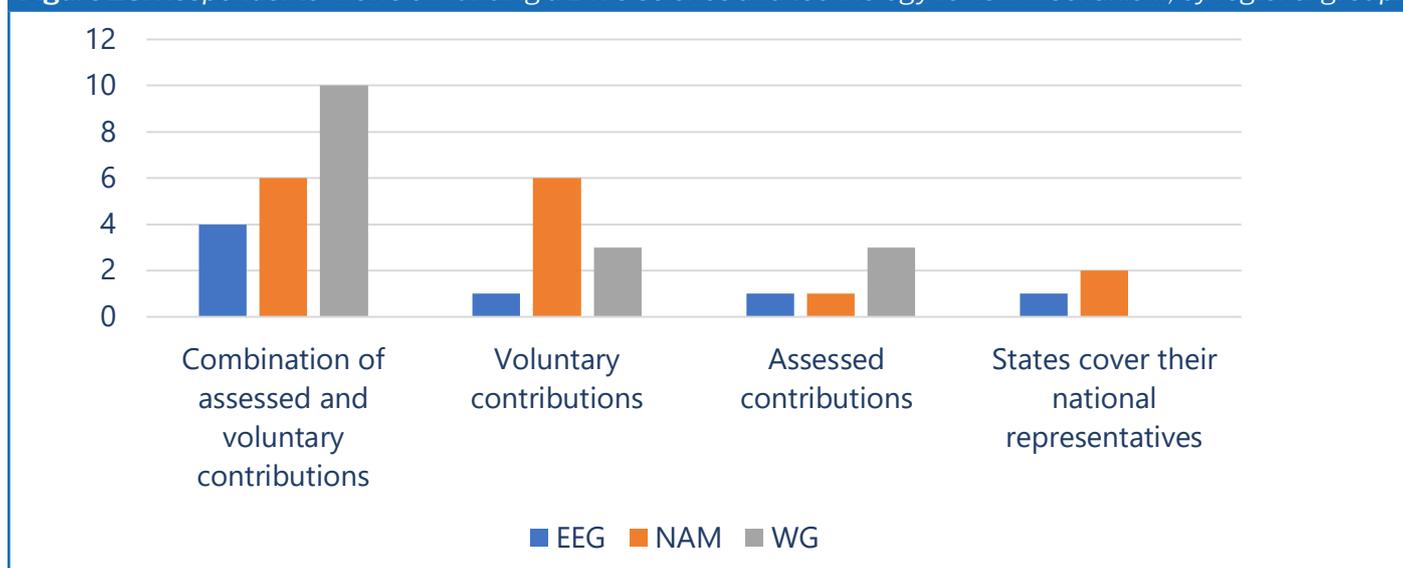
141 For example, the Russian Federation has proposed that “States Parties will cover expenses necessary for holding one annual session of the Committee of five days from the costs of the programme of work . . . any other sessions of the Committee or meetings of its temporary working groups will be at no additional cost to States Parties”. Eighth BWC Review Conference, Preparatory Committee, “Strengthening the Biological Weapons Convention: Proposal for the Establishment of a Scientific Advisory Committee”, Submitted by the Russian Federation, BWC/CONFVIII/PC/WP.2/Rev.2, 4 July 2016, <https://undocs.org/BWC/CONFVIII/PC/WP.2/Rev.2>, annex I, para. 4.

142 The OPCW SAB relies on a combination of the OPCW’s regular budget, voluntary contributions, and a trust fund for the board that was set up in 2006. See C.M. Timperley et al., “Advice from the Scientific Advisory Board of the Organisation for the Prohibition of Chemical Weapons on Isotopically Labelled Chemicals and Stereoisomers in Relation to the Chemical Weapons Convention”, *Pure and Applied Chemistry*, vol. 90, no. 10 (2018), pp. 1647–1670, <https://doi.org/10.1515/pac-2018-0803>.

143 This single-choice question was answered by 40 survey respondents.

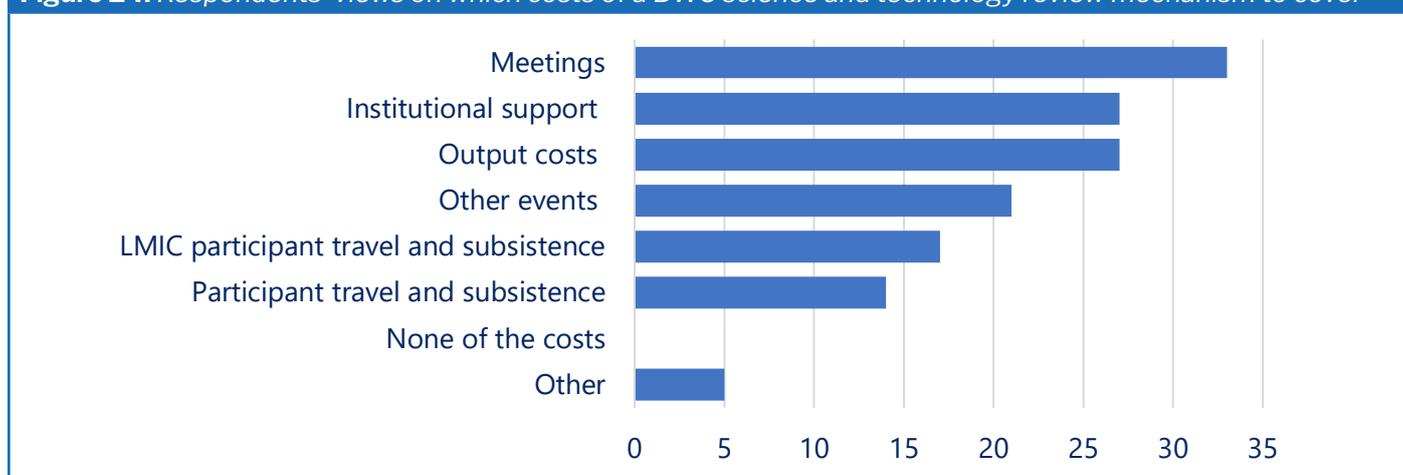
The survey responses suggest that there will be regional differences in approaches to funding any S&T review mechanism. As illustrated in figure 23, NAM States Parties appear comparatively more supportive of using voluntary contributions.

Figure 23. Respondents' views on funding a BWC science and technology review mechanism, by regional group.



In terms of what States Parties were willing to fund (see figure 24), of the 40 survey respondents to this question, 33 indicated support for covering the costs of meetings of a mechanism; 27 favoured covering the costs of institutional support; and 27 indicated support for covering the costs of the production and translation of outputs. Half of the survey respondents supported covering the costs of other events related to the work of the mechanism. There was also some support from 17 respondents for covering the costs of travel and subsistence for participants from low- and middle-income countries (LMICs) and from 14 respondents for travel and subsistence for all participants. Additional qualitative inputs for this question in the survey further emphasized the importance of providing travel and subsistence as required, particularly for experts from LMICs.

Figure 24. Respondents' views on which costs of a BWC science and technology review mechanism to cover¹⁴⁴



144 This multiple-choice question was answered by 40 survey respondents.

3. OPTIONS FOR SCIENCE AND TECHNOLOGY REVIEWS

Not all States Parties support the idea of a BWC science and technology review mechanism. Nor do those that support such a mechanism necessarily agree on its details. Indeed, based on past discussions and the survey results, two models for a BWC mechanism for reviewing science and technology are evident. Both models have distinct advantages and disadvantages. There is, however, a third model that potentially combines these advantages. These three models are outlined in turn below.

3.1 LIMITED-PARTICIPATION MODEL

The limited-participation model would loosely resemble mechanisms used in organizations such as the OPCW. It would draw from a group of 20–30 qualified geographically representative technical experts nominated by States Parties. Participants would be explicitly instructed to maintain a technical focus and act in an independent capacity, although not necessarily through a formal declaration of independence. Participants could serve for a maximum of two three-year terms to allow for changes in the composition to be staggered.

A process of internal voting would identify a leadership team comprised of a chair and two vice-chairs, one from each of the three regional groups. This team would lead the review process with administrative support from an additional full time ISU position.

In this model, States Parties would determine topics for the review group to address at each quinquennial Review Conference. An intermediary body, comprised of the chairs of the MSP and MX2 meetings, supported by the ISU, could consider additional topics in between Review Conferences. The review mechanism would meet twice a year in Geneva, first for a substantive technical meeting of one week and subsequently for three days to draft the required outputs. Additional virtual interaction could be undertaken as required to draft outputs. During the COVID-19 pandemic, virtual meetings have become more widely accepted because of restrictions on physical gatherings. These outputs would include a technical report along with, where appropriate, recommendations for national technical experts and Geneva-based delegates to consider. The report would aim for consensus but would include minority views, where required.

The costs of meetings, travel and subsistence for mechanism members and of an additional ISU position would be primarily covered by States Parties through assessed contributions. The estimated costs of such a package would total \$405,090, including the provision of a full-time P4 position within the ISU (see table 10). This figure is illustrative. Costs may fluctuate as the costs of travel and daily subsistence allowances (DSAs) change. Moreover, this figure does not include the costs of interpretation. Additional savings could be accrued through virtual interaction around report drafting instead of a second annual in-person meeting. This would reduce costs by \$75,460 resulting in an estimated annual cost of \$329,630. If divided in accordance with the distribution of assessed contributions, this would realistically amount to less than \$100 a year for many States Parties.

Table 10. *Estimated costs of two meetings of the limited participation model¹⁴⁵*

COST	DETAILS	TOTAL
Participant travel and subsistence	Ticket cost, DSA and terminal expenses for travel of 25 experts to Geneva for one meeting of 1 week	\$93,000
	Ticket cost, DSA and terminal expenses for travel of 25 experts to Geneva for one meeting of 3 days	\$73,150
Meeting room costs	One meeting of 1 week	\$3,850
	One meeting of 3 days	\$2,310
Outputs	Translation of 40-page technical report into the other 5 UN languages	\$44,200
Additional ISU position	ISU P4 position full time	\$188,580
		With a second annual in-person meeting: \$405,090 Without a second annual in-person meeting: \$329,630

In practice, the limited participation model would reflect an OPCW SAB model and corresponds loosely with proposals submitted earlier by the Russian Federation and others.¹⁴⁶ It would have the advantage of a steady, stable representative set of participants. Over time, these participants could develop a more nuanced understanding of the BWC and the requirements of end users. This could enable tailored advice and outputs.

This model would, however, lack the broader capacity to address new topics as they emerge. Accordingly, temporary working groups would be required to address a range of specific topics. Alternatively, a roster of possible participants in a review mechanism would need to be established, as suggested in the STEAF model.

3.2 OPEN-ENDED MODEL

An open-ended model would allow any interested State Party to send (and fund) a maximum of one or two expert participants. Participants would be explicitly instructed to maintain a technical focus and act in an independent capacity. The chair of the MSP would further appoint a leadership team from the nominees comprised of a chair and two vice-chairs, one from each of the three regional groups. This team would lead the review process, with administrative support from an additional position within the ISU.

The Review Conference would provide an overarching mandate for the open-ended mechanism. However, individual States Parties could submit specific topics or questions on emerging issues for consideration by the MSP chair working with the ISU and the mechanism's leadership team. Collectively, where appropriate, this group could agree on a scoping paper to determine the suitability of new issues to address and to develop appropriate questions for the open-ended group.

The group would meet for one week once a year, in Geneva. The meeting would focus on assessing the relevant data for trends and implications. Outputs could then be assembled subsequently through online interaction. The outputs would include a technical report along with, where appropriate, recommendations for States Parties and

145 The figures in tables 10, 11 and 12 are illustrative. Costs may fluctuate as travel and DSA costs change. Moreover, these figures do not include the costs of interpretation. The figures are based on estimations that draw on UNIDIR and wider United Nations travel cost estimates.

146 Eighth BWC Review Conference, Preparatory Committee, "Strengthening the Biological Weapons Convention: Proposal for the Establishment of a Scientific Advisory Committee", Submitted by the Russian Federation, BWC/CONF. VIII/PC/WP.2/Rev.2, 4 July 2016, <https://undocs.org/BWC/CONFVIII/PC/WP.2/Rev.2>.

national technical experts to consider. The report would aim for consensus but would include minority views where consensus is not forthcoming.

An estimate of the cost of an open-ended group model is \$319,030 (see table 11). This figure is illustrative since costs may fluctuate as travel and DSA costs change. Moreover, this figure does not cover interpretation. It includes the estimated costs of a P4 position to support the process. The cost of the open-ended participation model would require resources from a combination of funding streams, including assessed contributions to cover the basic meeting costs as well as voluntary contributions and some form of sponsorship programme to support the participation of experts from LMICs. As with the limited participation model discussed above, if divided in accordance with the distribution of assessed contributions, this would realistically amount to less than \$100 a year for many States Parties. To save further costs and to take the BWC to different audiences, meetings could perhaps be organized on the sidelines of scheduled scientific conferences or workshops.

Table 11. *Estimated costs of a one-week meeting of the open-ended participation model*

COST	DETAILS	TOTAL
Participant travel and subsistence	Ticket cost, DSA and terminal expenses for the travel of 20 LMIC technical experts to Geneva for one meeting of 1 week	\$82,400
Meeting room costs	Meeting room costs for one meeting of 1 week	\$3,850
Outputs	Translation of 40-page technical report into the other 5 UN languages	\$44,200
Additional institutional support	ISU P4 position full time	\$188,580
		\$319,030

The open-ended model would allow for a far greater number of technical experts to participate from around the world. This would address the point raised in survey comments that “all States Parties have the right to participate in any discussion under the Convention”. With a larger and more flexible set of participants, this mechanism would have greater capacity to address emerging topics and questions. This could enable it to be more responsive and flexible to the needs of States Parties. Larger meetings with a range of experts could also facilitate knowledge transfer and raise awareness of the Convention.

The open model would also have disadvantages. First it could require considerable organizational effort and resources to set up a larger gathering of experts. Second, a continuous flow of technical experts, not all of whom would have a nuanced understanding of the BWC, could complicate the process of developing feasible recommendations for States Parties to consider.

3.3 HYBRID MODEL

Past reports on this topic have, on occasion, presented the two approaches above as a binary choice.¹⁴⁷ Yet, in operational terms, the number of participants in each model may actually turn out to be closer than expected: a limited-participation model will probably need to establish temporary working groups with additional expertise; whereas an open-ended participation model will not necessarily involve participants from all States Parties. Moreover, States Parties could potentially combine elements of these two models to generate a hybrid process of reviewing science and technology of relevance to the BWC.

In this hybrid model, an open-ended meeting of one week could be organized, potentially in conjunction with an existing international scientific conference on a topic of relevance to the BWC. This technically focused meeting would be open to all nominated, qualified experts, as well as selected international experts from outside government. A rapporteur from the ISU could then develop a factual technical report drawing on insights from the proceedings. The report might also include provisional analysis and policy implications where these emerged from the discussion.

Akin to the IUPAC reports that informed aspects of the work of the OPCW's SAB in the past, this technical report would be transmitted to States Parties.¹⁴⁸ The report would also be transmitted to a BWC S&T Committee comprised of a limited number of 20 qualified experts nominated by States Parties and selected by the chair of the MSP (with support from the ISU), based on expertise, disciplinary diversity and geographical and gender representation. This committee would be responsible for synthesizing the technical report into accessible briefing materials and developing the implications and, where appropriate, recommendations for consideration by States Parties. A leadership team comprised of a chair and two vice-chairs (one from each of the three regional groups) would then be responsible for the delivery of the report and its presentation during a dedicated session of the MSP in Geneva.

The estimated annual cost of such a hybrid process would be in the range of \$399,873 (see table 12). This figure is illustrative, and costs may fluctuate as travel and DSA costs change. Moreover, this figure does not include interpretation. It includes the estimated cost of a P4 position in the ISU as well as the costs of sponsorship for 20 low-middle income country technical experts. A hybrid approach would require a combination of funding sources, including assessed contributions to cover the basic meeting costs as well as voluntary contributions in cases where additional specific questions were addressed.

147 For example, a useful report by the InterAcademy Partnership identifies two models based on an analysis of BWC working papers submitted to the 2016 Preparatory Committee by States Parties. See InterAcademy Partnership, *The Biological and Toxin Weapons Convention: Considerations for a Science Advisory Mechanism*, 2016, <https://royalsociety.org/-/media/policy/projects/biological-toxin-weapons-convention/biological-toxin-weapons-convention-btwc-april-2016-meeting-summary.pdf>.

148 As Smallwood notes, reports from IUPAC workshops “were studied and heavily influenced the SAB’s advice to the two Review Conferences”. See K. Smallwood, “Truth, Science and Chemical Weapons: Expert Advice and the Impact of Technical Change on the Chemical Weapons Convention”, Doctoral thesis, University of Sussex, 2009, http://sro.sussex.ac.uk/id/eprint/2398/1/Smallwood_Katie.pdf, p. 125. See also G.W. Parshall et al., “Impact of Scientific Developments on the Chemical Weapons Convention (IUPAC Technical Report)”, *Pure and Applied Chemistry*, vol. 74, no. 12 (2002), pp. 2323–2352, <https://doi.org/10.1351/pac200274122323>; M. Balali-Mood et al., “Impact of Scientific Developments on the Chemical Weapons Convention (IUPAC Technical Report)”, *Pure and Applied Chemistry*, vol. 80, no. 1 (2008), pp. 175–200, <https://doi.org/10.1351/pac200880010175>; and K. Smallwood et al., “Impact of Scientific Developments on the Chemical Weapons Convention (IUPAC Technical Report)”, *Pure and Applied Chemistry*, vol. 85, no. 4 (2013), pp. 851–881, <https://doi.org/10.1351/PAC-REP-12-11-18>.

Table 12. *Estimated costs of two meetings of the hybrid model*

COST	DETAILS	TOTAL
Participant travel and subsistence	Ticket cost, DSA and terminal expenses for the travel of 20 LMIC technical experts to Geneva for one meeting of 1 week	\$77,400
	Ticket cost, DSA and terminal expenses for travel of 25 experts to Geneva for one meeting of 3 days	\$73,150
	Additional DSA and terminal expenses for 2 members to travel to Geneva once a year to present results at MSP	\$4,858
Meetings	One meeting of 1 week in Geneva	\$3,850
	One meeting of 3 days in Geneva	\$2,310
Outputs	Translation of 40-page technical report into the other 5 UN languages	\$44,200
	Translation of 5-page working paper into the other 5 UN languages	\$5,525
Additional institutional support	ISU P4 position full time	\$188,580
		\$399,873

There are several possible variants on such a hybrid approach. For example, rather than starting with open-ended participation and moving to a closed group, the process could be reversed and begin with a closed group discussion before opening up participation. Although hybrid models may appear unorthodox, existing mechanisms with a closed set of participants, such as the OPCW SAB, have occasionally co-organized events to solicit wider technical input.¹⁴⁹

This would entail additional costs and require a considerable logistical and organizational effort to manage. However, the process could mitigate some of the concerns around both the limited-participation and open-ended models while reaping some of the benefits of these two approaches.

149 For example, in preparation for the first three CWC Review Conferences, the IUPAC “co-organised workshops with the SAB that contribute[d] to the scientific review and provide[d] inputs for the report delivered to States Parties”. A. Wafi, “Building Broader and Deeper Links Between OPCW and IUPAC”, OPCW, 2019, <https://www.opcw.org/sites/default/files/documents/2019/07/OPCW-IUPAC%20Cooperation.pdf>.

4. REFLECTIONS

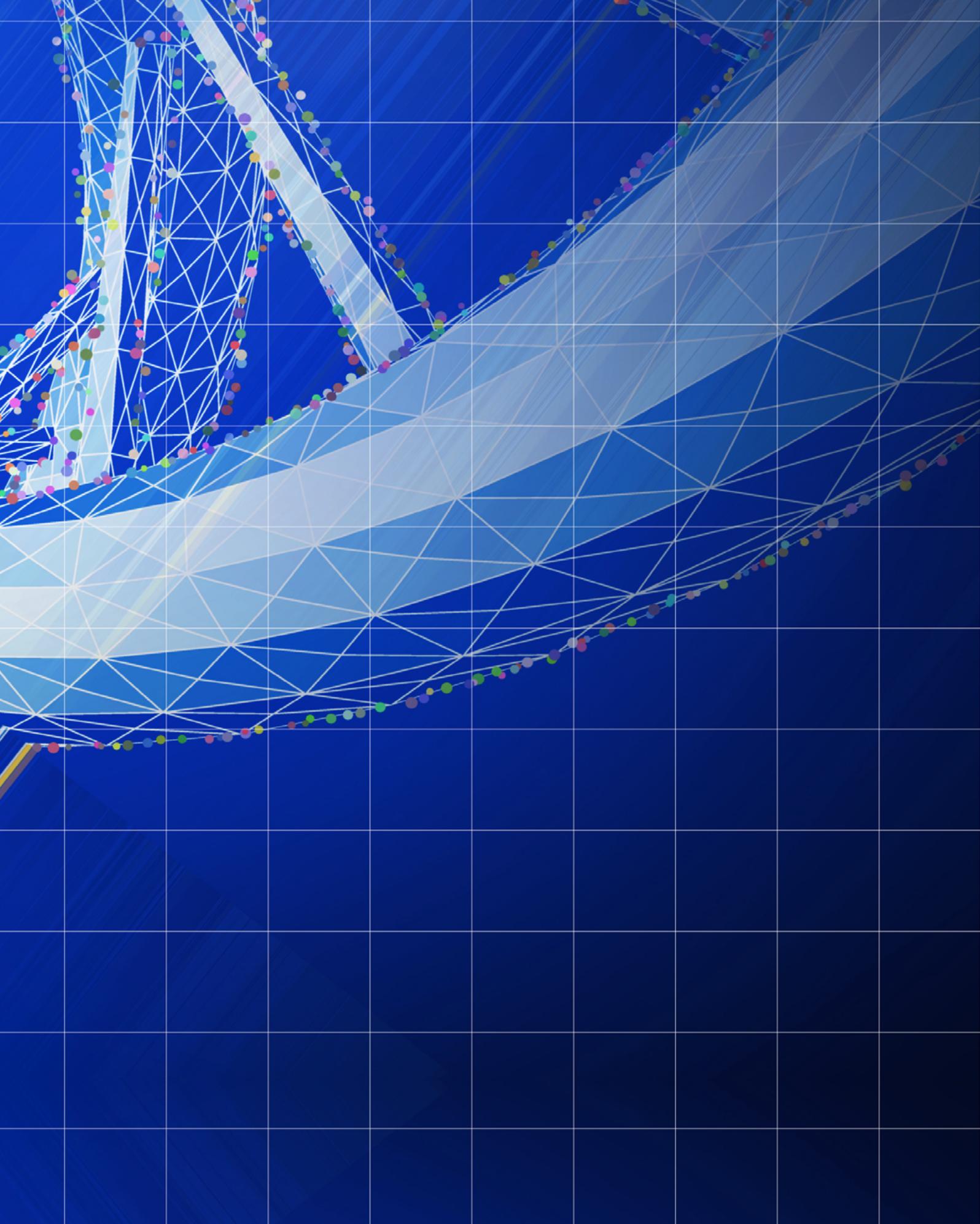
Scientific and technological review bodies are a common feature in the work of international and regional regimes. Within these regimes, S&T review mechanisms perform several functions, from monitoring risks, via promoting dialogue and fostering partnerships, to implementing agreements.

For science-based treaties, such as the BWC, there is a logic to developing a mechanism to monitor science and technology and assess the implications of developments, positive and negative, for all articles of the Convention. The Ninth BWC Review Conference provides a unique opportunity for progress in this area. However, for States Parties to develop a mechanism that meets their collective needs, consultation will be required to forge a common understanding on why States Parties require a review, who the review is for, and how any outputs or advice will be used.

Consultation will also be required on key areas of divergence, including participation, the determination of questions and priorities for any mechanism, its independence, and the resourcing of any mechanism. None of these issues are insurmountable and, as with other mechanisms, refinements can be undertaken later. Moreover, in exploring how a mechanism would operate in practice, some of these issues, such as participation, may be less divisive than they might seem. While the cost of a mechanism could be relatively significant in the context of the BWC's current budget, no State would carry the full burden of all costs. If a mechanism were to be funded even partially through assessed contributions, the actual costs of the three options above (and other options) would probably be less than \$100 for many States Parties.

While there is therefore scope for the Ninth BWC Review Conference to make progress with some form of mechanism, discussion on an S&T review mechanism cannot be detached from the wider politics of the BWC. An S&T review mechanism can facilitate the exchange of scientific and technological information for peaceful purposes, but it is unlikely to achieve consensus at the Ninth Review Conference unless it forms part of a wider package of measures that reflects the interests of all States Parties. This underlines the fundamental importance of States Parties preparing early for success at the Ninth Review Conference to strengthen the BWC in a period of considerable change in the security and scientific contexts.¹⁵⁰

150 J. Reville, J. Borrie, R. Lennane and E. Saunders, 2021. "Preparing for Success at the Ninth Biological and Toxin Weapons Convention Review Conference: A Guide to the Issues", UNIDIR, Geneva. <https://doi.org/10.37559/WMD/21/BWC/01>.



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