BTWC: Learning from Alternative Models of Science and Technology Review

Policy Paper 7

Biochemical Security 2030 Project

July 2014

Dr Catherine Rhodes

Research Fellow in Science Ethics, Institute for Science, Ethics and Innovation; Faculty of Life Sciences, University of Manchester.

Email: catherine.rhodes-2@manchester.ac.uk

ACKNOWLEDGEMENTS

The author, as well as the project organizers, would like to thank those who have reviewed or commented upon drafts of this paper. In particular this includes Malcolm Dando, as well as those who provided comments on aspects of this work during meetings organized by the Biochemical Security 2030 Project held at the University of Bath in October 2013 and May 2014.

We are also grateful to the Economic and Social Research Council as well as the Defence Science and Technology Laboratory Futures and Innovation Domain for funding this project.

The views expressed in this publication are those of the author alone and institutional affiliations are provided for the purposes of identification only and do not imply endorsement of the content herein.

Brett Edwards, *Research Officer (Series Editor)*

Prof. David Galbreath, *Principal Investigator*

Biochemical Security 2030 Project, Department of Politics, Languages and International Studies, University of Bath, United Kingdom.

CONTENTS

EXECUTIVE SUMMARY

This paper discusses characteristics that are particularly desirable in science and technology review processes and relates these to the design and function of two examples of international science advisory bodies. The first is the Convention on Biodiversity's Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA). The second are the Specialist Commissions of the World Animal Health Organisation. The paper draws out a series of lessons for policy-makers designing and amending review processes in the biochemical security context. The most important recommendation is that this work should start by defining a clear purpose and set of expectations for the advisory process, and use those to structure its procedures and operation.

Key recommendations from this paper include the need for States Parties to:

- Learn from scientific advisory processes used in other international regimes. This can provide information about the range of options available, and facilitate selection of those most likely to be effective, appropriate to objectives, and acceptable to States Parties. A first step in the context of the Biological Weapons Convention would be to invite organisations such as the Food and Agriculture Organisation, World Animal Health Organisation, and World Health Organisation to present their views on best practice in science advisory processes to meetings of States Parties.
- Start with a clearly defined purpose. Other decisions, such as the structure of an advisory body, the type of outputs it should produce, and its relationship with States Parties and other audiences, should all follow from this purpose.
- Be aware of potential budgetary constraints which are important when designing scientific advisory processes. These considerations should guide decisions on the size and composition of any advisory body, the scope of its agenda, as well as the frequency and duration of meetings. These factors will, in turn, influence the outputs that a review is capable of producing.
- Prepare for discussions about the S&T review process at the Eighth Review Conference of the Biological Weapons Convention. It would be useful for States Parties to provide clear suggestions relating to the purpose, structure and expectations of an amended S&T review process. States Parties should also consider the appropriate level of resourcing for such a process, before addressing other aspects of its design.

1. INTRODUCTION

Within both the Biological and Chemical Weapons Convention a range of formal and informal processes designed to take into account the impact of advances in Science and Technology (S&T) have emerged. The processes which exist to today can be understood as a product of the distinct histories of these regimes.

This paper examines scientific advisory processes used in the context of other international regimes to see if any lessons can be learnt for application to the biochemical security context, and in particular in the context of the Biological and Weapons Convention (BWC). The paper begins with an outline of the significance of scientific and technology review in the context of other international regimes. The paper then goes on to provide a more detailed examination of two particular instances of science advisory processes: the Subsidiary Body on Scientific, Technical and Technological Advice to the Convention on Biodiversity (SBSTTA); and the Specialist Commissions of the World Animal Health Organisation. This is followed by an outline of elements that are considered useful and valuable in science advisory processes. The intention is not to put forward one particular model as something which should be transferred into the biological and chemical security regimes, but to identify the reasons why particular elements might be selected, and the advantages and disadvantages these may bring. This involves presenting a range of options that can be considered in the biochemical security context.

2. WHY UNDERTAKE SCIENCE AND TECHNOLOGY REVIEW?

Many international treaties and international organisations have processes for scientific input and advice, and, while the exact purpose of these processes depends on specific provisions of the relevant treaty or terms of reference, they serve some common functions (See Box.1). Many international regimes cover subject matter which is directly impacted by science and technology and / or include implementation measures that require up-to-date scientific information to retain relevance and effectiveness. Processes for scientific input, advice or review can provide knowledge vital for the operation of such regimes. This knowledge is generally provided in report form and can include work that synthesises the existing state of scientific knowledge (e.g. through reviews of the literature), but may also include new data and assessments. Even where science plays a strong role in such regimes, they remain primarily policy-based, and so while the review process may include provision of recommendations and options for action, decision-making authority remains with States Parties or member states. The processes of scientific advice therefore incorporate at least one

(and usually several) stages at which consideration and / or approval by policy makers is required.

Box.1. EXAMPLES OF SPECIFIC FUNCTIONS OF SCIENCE AND TECHNOLOGY REVIEW PROCESSES

- Providing information and evidence on specific technical issues
- Identifying gaps in knowledge and significant emerging issues
- Generating new knowledge
- Assessing data (against targets)
- Systematically reviewing scientific publications and evaluating the significance of particular findings
- Guiding decisions on the application and operation of a treaty
- Providing a platform for interactions between various disciplines and integrating expertise
- Classifying priority topics / areas for action
- Assisting communication with and engagement of broader S&T audiences (and other groups)
- Developing methods and tools for implementation
- Building understanding about the effectiveness of interventions

3. ALTERNATIVE MODELS

Lessons for the biochemical security area can be drawn from a range of models of S&T review. Covering all of these would inevitably mean a sacrifice of depth for range, and so this paper focuses on two in particular – the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) of the Convention on Biodiversity (CBD) and the Specialist Commissions of the World Animal Health Organisation (OIE). These have been selected because they provide quite distinct examples in terms of design and function and because they have particular elements that are also found in the biochemical security area. The CBD treats science (and biotechnology in particular) as something that can both support the operation of the Convention and which can threaten its overarching goal of conserving biodiversity (CBD, Articles 8, 16 & 19); in a similar way the Chemical Weapons Convention (CWC) and BWC recognise the relevance of science / scientific developments both in contributing to the threat of misuse and having uses that can support the operation and implementation of the conventions. The OIE has responsibility for the international control of animal diseases and thus has a direct interest in controlling infectious disease agents (that can affect animal health, human health and food safety) including in terms of biosecurity, and will play a role in identifying and dealing with any incidents of misuse (OIE, January 2012).

For both of the examples the following main areas are reviewed:

- Purpose
- Contributors

- Decision-makers
- Process / practices

Each of these elements requires careful consideration when designing new / adapting existing science and technology review processes, and they each have implications in relation to achieving the type of characteristics that are generally valued within the context of S&T review processes (see section 4).

3.1 The Subsidiary Body on Scientific, Technical and Technological Advice (to the Convention on Biodiversity)

The main objectives of the Convention on Biodiversity are "the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources" (Article 1). The Subsidiary Body on Scientific, Technical and Technological Advice was established by Article 25 of the Convention to provide timely advice on its implementation in relation to each of these goals. So far, it has met 17 times and has produced 179 recommendations.

3.1.1 Purpose

The SBSSTA was set up to:

> "(a) Provide scientific and technical assessments of the status of biological diversity;
> (b) Prepare scientific and technical assessments of the effects of types of measures taken in accordance with the provisions of this Convention;
> (c) Identify innovative, efficient and state-of-the-art technologies and know-how relating to the conservation and sustainable use of biological diversity and advise on the ways and means of promoting development and/or transferring such technologies;
> (d) Provide advice on scientific programmes and international cooperation in research and development related to conservation and sustainable use of biological diversity; and
> (e) Respond to scientific, technical, technological and methodological questions that the Conference of the Parties and its subsidiary bodies may put to the body."
>
> (Article 25, Convention on Biodiversity)

SBSTTA has a key role in keeping the implementation of the Convention up-to-date with changes both in the status of biodiversity and the status of scientific and technological advance, in monitoring and evaluating the effect of implementation measures, and in capacity building. The *Consolidated Modus Operandi* for the SBSTTA added a further item to the above list - "identify new and emerging issues relating to the conservation and sustainable use of biological diversity" (CBD, no date[1], Appendix A, point d). Due to concern about

overloading the body's agenda, a specific set of criteria have been adopted for use in this task[1]. The development of such criteria also helps to clarify expectations of the process.

3.1.2 CONTRIBUTORS

Members of the SBSTTA are government representatives rather than independent experts (CBD, no date[2]). Membership is open to all CBD States Parties and it is therefore a comparatively large body. SBSTTA also has a smaller 'Bureau' elected by the CBD's conference of the parties (COP), which assists the Executive Secretary (head of the CBD Secretariat) with preparatory work for the larger SBSTTA meetings. Independent expertise is brought in through convening Ad Hoc Technical Expert Groups (although at least half of their membership is state nominated), and through opportunities provided for peer review of preparatory documents and Ad Hoc Technical Expert Group (AHTEG) reports. In its work the Bureau can set up liaison groups with, hold meetings with, or attend meetings of relevant international and regional organisations, subject to guidance from the COP (CBD, no date[1]). Such cooperation should broaden engagement in the SBSTTA process and help to minimise duplication of existing work in such organisations.

The *Consolidated Modus Operandi* contains an appendix of suggestions for improving the quality of the SBSTTA's advice, in particular in terms of enhancing its engagement with the S&T community. The production of such advice suggests that there have been concerns about the strength of the scientific base for SBSTTA recommendations, and that requirements to engage the broader S&T community have not been adequately fulfilled. Suggestions include: providing material in a format accessible and relevant to the S&T community; active dissemination of its work in scientific literature; and engagement of the S&T community in scientific assessments (CBD, no date [1] Appendix C).

The *Consolidated Modus Operandi* also suggests improving debate in SBSTTA meetings on scientific, technical and technology matters by: "raising delegates' awareness about, and encouraging informal debate on, key issues through the provision of scientific and technical publications, keynote speakers, poster sessions, round-table debates and other side events during meetings" and "dedicating sufficient time to the consideration of the results of scientific and technical assessments" (CBD, no date[1]).

[1] These include: relevance; "new evidence of unexpected and significant impacts on biodiversity"; urgency, magnitude, and potential impact on biodiversity, human well-being, productive sectors, and economic well-being; "geographic coverage and potential spread, including rate of spread"; and "absence or limited availability of tools to limit or mitigate the negative impacts." (CBD Conference of the Parties, 1998, Decision IX/29, Section II).

The duration of SBSTTA annual meetings is set by the COP, and generally does not exceed five days; this poses significant constraints on the scope and depth of what can be effectively considered, and perhaps an extension of this will be necessary in order to achieve the desired level of interaction with the S&T community. It is also the reason why criteria have been introduced to try to reduce the number of items being put onto the SBSTTA agenda.

3.1.3 DECISION-MAKERS

States Parties, through the COP, retain decision-making power throughout the scientific advisory process. They:

- decide on the topics to be considered (often in two stages, first requesting a preliminary study and then deciding on whether and how to take a topic forwards);
- nominate at least half of the AHTEG members; provide representatives to SBSTTA meetings and select the chair of its bureau;
- set the overall strategy and multi-year work programmes of the Convention; select themes for SBSTTA meetings; and consider and decide whether or not to endorse recommendations produced by SBSTTA.

The process is strongly policy-driven, focusing on needs identified by States Parties. This means that its findings are likely to have policy relevance, but while the assessments produced may have a reasonable basis in science, issues and actions identified as important by the scientific community may not be addressed if this is politically controversial or undesirable. The expectation in the *Consolidated Modus Operandi* that SBSTTA will "endeavour to constantly improve the quality of its scientific, technical and technological advice" (CBD, no date[1]) may be difficult to achieve given this strong emphasis on the policy side.

3.1.4 PROCESS / PRACTICES

The SBSTTA is an 'open-ended' advisory body which, rather than having a standing agenda, considers and addresses issues on an ad hoc basis (although broadly with relevance to CBD's multi-year work programmes). Assessment needs are recognised by the Conference of the Parties, which then provides a mandate to the SBSTTA to conduct work in a particular area. Consideration of issues on an ad hoc basis can provide flexibility and is useful for addressing emerging issues. It may also be a method of strengthening policy control over the process, as states can determine which issues the body may address at any one time.

Rather than scientific expertise being contained within the SBSTTA it draws on relevant expertise through the establishment of Ad Hoc Technical Expert Groups by the COP, with members nominated by States Parties. The Body considers reports from those groups and incorporates them in its reporting to the COP. This method has the advantage of allowing for a greater range of expertise to be drawn on than a body with standing expert membership, and is particularly appropriate for a body considering issues in an ad hoc manner. It may, again, strengthen policy control as states can nominate and approve the experts consulted by SBSTTA.

The SBSTTA provides reports to each of the CBD's Conferences of the Parties (which take place every two years). The full SBSTTA meets annually, with two meetings between each COP. SBSTTA and AHTEG reports are published online – which increases transparency. The reports are required to be in the form of "concrete, focused draft technical reports and… [to] include proposed conclusions and recommendations for consideration" by the COP (CBD, no date[1]). These criteria should ensure policy relevance and usefulness of SBSTTA reports.

Where appropriate SBSTTA and AHTEG reports can be peer reviewed via an 'expert liaison group' established by the CBD's Executive Secretary and "comprising a balanced range of experts qualified in all fields relating to the conservation and sustainable use of biodiversity", where appropriate including scientific institutions and societies (CBD, no date[1]). This can promote broader engagement with the scientific community and enhance the perceived validity of the report. Further SBSTTA engagement with external audiences is encouraged, with the *Consolidated Modus Operandi* stating that contributions from NGOs and cooperation with relevant organisations are strongly encouraged, in order that best use is made of existing knowledge and experience; this remains "under the guidance of the Conference of the Parties" (CBD, no date[1]). AHTEGs are also expected to draw on existing knowledge and liaise with international, regional and national governmental, non-governmental, and private sector organisations, as appropriate (CBD, no date[1]). This should avoid duplication of effort, provide additional engagement opportunities, and promote collaboration with relevant groups.

The CBD Secretariat and Executive Secretary have an intermediary role between the COP and SBSTTA, preparing background documentation (on instruction by the COP) and inviting evidence from the scientific community. This preparatory stage thus allows for engagement of the wider scientific community. Where an AHTEG is established it will generally consider

the documentation, review (including possible peer review) and revise it before it is considered by the SBSTTA.

SBSTTA assessments are expected to be "regionally balanced, carried out in an objective and authoritative manner, according to terms of reference that clearly establish the mandate, duration of operation and expected outcomes, and undertaken according to the process outlined [in the *Consolidated Modus Operandi*]" (CBD, no date[1]). There are thus clear expectations for how the SBSTTA should operate and a desire for its work to be representative and credible. The AHTEGs are also expected to be geographically representative and gender balanced. Where financial resources allow, regional / sub-regional preparatory meetings for the SBSTTA can be held, but these depend on voluntary contributions (CBD, no date[1]).

The SBSTTA's reports develop conclusions and recommendations based on any assessments it or its AHTEGs have made. These are submitted to the COP, which decides whether to endorse the recommendations in full, in part or in modified form. Final decision-making authority thus clearly remains with states.

SUMMARY OF THE PROCESS FOR SBSTTA CONDUCT OF ASSESSMENT (BASED ON APPENDIX C OF THE CONSOLIDATED MODUS OPERANDI – CBD, NO DATE[1])

This includes the following steps:

- Recognition of an assessment need and provision of a mandate by the COP (needs are, for example, identified through review or during implementation of work programmes or after an initial assessment).
- Preparation of a background document by the Executive Secretary (generally providing notice of intention to undertake the assessment, inviting submission of evidence by the scientific community, and then drafting the document).
- Consideration of the document by an AHTEG established by the COP (including review, gap identification and revision).
- Peer review of the revised document (by selected reviewers from a wide audience including governmental representatives, nominated experts, organisations, and staff of relevant international conventions).
- Consideration of the resulting document by the SBSTTA.
- Development of conclusions and recommendations by the SBSTTA, submitted to the COP.
- Consideration by the COP, with possible inclusion of the recommendations in a decision.

Because most of these stages involve the production of documentation which is published online, participants from the S&T community can see whether and how their input is used, which may help to keep them engaged in the process, and helps external audiences judge the level of independence and quality and scope of scientific input.

3.2 THE OIE SPECIALIST COMMISSIONS

The World Animal Health Organisation (OIE[2]) was established in 1924 and is the main international organisation with responsibility for animal health and welfare, with a particular focus on international trade in animals and animal products. It provides standards, guidelines, and reporting and monitoring systems for disease control purposes. The OIE's four core standards-based documents are: the Terrestrial Animal Health Code; the Aquatic Animal Health Code; the Manual of Diagnostic Tests and Vaccines for Terrestrial Animals (Terrestrial Manual); and the Manual of Diagnostic Tests for Aquatic Animals (Aquatic Manual). These are primarily directed to national veterinary services and their content is generally technical in nature.

Science plays a large role in the overall work of the OIE and the S&T community is engaged in a number of ways including through its network of reference laboratories, in house peer-reviewed scientific journal [3], and – with a particular role in reviewing and updating OIE standards – four specialist commissions, the:

- Aquatic Animal Health Standards Commission (Aquatic Commission);
- Biological Standards Commission (Laboratories Commission);
- Scientific Commission on Animal Diseases (Scientific Commission); and
- Terrestrial Animal Health Standards Commission (Code Commission).

While each carries out distinct tasks, the commissions' terms of reference share many common elements and their work is mutually supportive. Interaction between the commissions is considered necessary to their work, and joint meetings and other forms of cooperation are mandated.

3.2.1 PURPOSE

> "The role of the OIE's Specialist Commissions is to use current scientific information to study problems of epidemiology and the prevention and control of animal diseases, to develop and revise OIE's international standards and to address scientific and technological issues raised by members." (OIE, no date [2])

The Code Commission and Scientific Commission provide information and advice relating to the updating of the Terrestrial Code; the Scientific Commission is also responsible for recognising the official disease status of OIE member states[4]. The Aquatic Commission

[2] The Organisation was originally called the Office International des Epizooties and while it changed its name to the World Animal Health Organisation in 2003 it has retained the acronym OIE.

[3] The *Scientific and Technical Review*, freely accessible online at http://www.oie.int/publications-and-documentation/scientific-and-technical-review-free-access/list-of-issues/.

[4] The OIE has specific reporting requirements and import / export control measures for a set of 'listed' animal diseases (those that pose a significant threat to animal and/or human health). To assist in application of

covers the updating of both the Aquatic Code and Aquatic Manual; and the Laboratories Commission assists development of the Terrestrial Manual and has responsibility for "approval of standard sera and the certification of diagnostic assays" (OIE, 2011, p.4).

3.2.2 CONTRIBUTORS

Each Commission is made up of six members who are elected by the World Assembly (OIE's governing body, made up of its member states) for three year terms. Commission members, while often associated with national veterinary services or related government departments, serve in their capacity as experts not government representatives. They are required to declare any conflicts of interest in the form of connections to commercial entities. Both requirements should help to ensure independence, which is particularly important given that the main audience for OIE standards is scientific.

The terms of reference for each commission contain specific requirements in terms of members' experience and qualifications. For example the Scientific Commission's terms of reference stipulate that:

> "Members of the Commission shall be specialists internationally recognised in a field relevant to the control of infectious diseases of animals and shall have appropriate experience in animal disease control… Members of the Commission should have a curriculum vitae and scientific publication record appropriate to an international specialist in a field or fields relevant to the control of infectious diseases of animals."
>
> (OIE, no date[1])

Use of such requirements should enhance the authority of the commissions and the credibility of their work. There is also a requirement that the commissions' membership should be geographically and gender balanced.

Their standard-setting work is supported by permanent and ad hoc working groups established with approval of the World Assembly. There are currently three permanent and several ad hoc working groups. The permanent working groups are: the Animal Welfare Working Group and Animal Production Food Safety Working Group (which both feed into the Code and Aquatic Commissions' work), and the Wildlife Diseases Working Group (which reports to the Scientific Commission) (OIE, 2011, p.5). The ad hoc working groups have a more specific focus relating to "initial drafting of a new standard… [or] significant revision of an existing standard" and "normally comprise up to six scientists with internationally recognised expertise" in the relevant disease / topic (OIE, 2011, p.6). These

---

appropriate import / export control measures countries notify OIE of their disease status in relation to six of these diseases.

scientists can be drawn from the OIE's laboratory network, academia, industry, NGOs and OIE partner organisations[5]. The OIE's Director-General sets their terms of reference and nominates their members (in consultation with the World Assembly and the relevant commission). While members are, in principle, selected with a view to geographical balance, it is recognised that this may not be possible because of requirements for scientific excellence and specific expertise (OIE, 2011, p.6).

Staff from the OIE have noted that the organisation aims "to strengthen the capacity of members' Veterinary Services to participate in the development of international standards and guidelines and to implement them" (Domenech & Vallat, 2011, p.3). Its reference laboratories and collaborating centres play an important role in such capacity building; if effective it should boost engagement with the OIE's science review processes and enable greater geographic representativeness within the Specialist Commissions and associated working groups.

3.2.3 DECISION-MAKERS

While there is a greater and more direct role for scientific experts in the Specialist Commissions than in the SBSTTA, states remain the key decision-makers. It is for OIE member states to decide which revised or new standards are adopted and subsequently published in the codes and manuals. This is usually done by consensus, but where necessary a vote with a two-thirds majority can be used. Member states can also provide some direction to the commissions on what topics they should look at and they have a role in the selection of commission members.

3.2.4 PROCESS / PRACTICES

All meetings of the commissions and working groups report to the Director General of the OIE. Any texts (e.g. draft chapters for the codes and manuals, new standards) that require approval by the World Assembly are circulated at least 3 months in advance of its General Session to member states. The Assembly's views may also be sought on earlier drafts. The General Session then discusses and adopts the texts, which are incorporated into the next edition and usually put online in advance of this.

The commissions generally meet twice a year, with the February meetings feeding into the annual meeting of the World Assembly (held in May). Requests for the development of new / revision of existing standards mostly come from OIE member states, but may come from the

[5] These include, for example, the World Health Organisation, Food and Agriculture Organisation and World Bank, and regional organisations such as the European Union, Pan American Health Organisation, and Association of Southeast Asian Nations.

commissions themselves, or from international and regional organisations which have agreements with OIE (see footnote 5 for examples of such organisations) and from other organisations.

The relevant commission will often set up an ad hoc group to develop recommendations on the requested standard. The ad hoc group will report back to the commission, generally with a draft text. This text will be reviewed (and potentially revised) by the commission and then provided to member states for comments (within its meeting report). A 60 day period is usually allowed for submission of written comments by states. Those comments are also reviewed by the commission, which may pass them on to the ad hoc group for further advice. Once a draft text reaches the stage at which it is considered ready for adoption, it will be included in the report of the February commission meeting, and sent out to states so that they can consider it before the World Assembly meeting in May.

The Assembly meeting provides a further opportunity for comments and requests for clarification; and new or revised standards are adopted in the form of resolutions. In most cases the process from request to adoption / amendment of standards takes two years and includes between two and four opportunities for member states to make comments (OIE, 2011, p.5). In cases of urgency or where suggested amendments are minor, it is possible to use a more rapid procedure (OIE, 2011, p.2).

4. What is Useful and Valued in Scientific Advisory Processes?

A number of characteristics are viewed as particularly useful and valuable in scientific advisory processes and these relate to interactions between three main groups: the policy-makers who request scientific input (and may or may not act upon it); the scientific and technical experts who provide input; and external audiences who have an interest in the issue area and will often scrutinise the basis on which policy is made. Six important characteristics are outlined here. These overlap and interact with each other, are linked with the design and function of scientific advisory processes, and need careful consideration when developing new or adapting existing processes.

i. Independence

Independence of the experts participating in such processes is important to all three groups. The scientific community generally values independence in scientific research and is likely to consider science which is not determined by political (or private interests) as being of better quality. This does not necessarily require that experts have no connection to government or

private interests, but that they should be able to act in their individual capacity, and that any such connections are openly declared. A similar point was made by UNEP in its 1998 report on scientific advisory processes: "scientific independence is not about separating science from policy-making, but about 'intellectual independence', that is the freedom to base scientific advice on objective information unbiased by political pressures" (section 2.3).

This concern is often addressed by requiring declarations of conflicts of interest, and by having transparent processes of selection. Because advisory processes generally feed into policy processes, independence of scientists from any one country's national interests is important, particularly because full geographical representation is often difficult to achieve both in terms of limits to the size of advisory bodies and of differences between states in capacity for providing such expertise. External audiences also value independence and are likely to consider the reports and assessments produced by advisory processes more valid and authoritative where such independence exists. Mechanisms for demonstrating independence to such audiences are important.

ii. Policy relevance

Because scientific advisory processes generally have a role in informing policy, the work they do and the outputs that they produce are expected to be relevant to (though not deterministic) of policy. Where they have clear relevance and can be framed as recommendations or options for action they are more likely to be taken on board by policy makers (Larigauderie & Mooney, 2010, p.9; Vohland et al, 2011, p.1190). Such requirements can be problematic, particularly as scientific experts may have to develop new skills in order to communicate findings in a way viewed as useful and relevant by policy-makers. Indeed, experts may not be comfortable with such requirements, as they may not leave appropriate scope for reflecting uncertainties or knowledge gaps, and they may require statements that go beyond the scope of what can be scientifically tested. Expectations of the process from both the policy and science side need to be clearly stated, and shared, to ease interactions between the two groups.

iii. Validity

The perceived validity of the scientific review process and its outputs are closely connected with several of the other characteristics. Independence of the experts involved, for example, will generally affect perceptions of the validity of their findings. For policy makers, validity will be partly determined by the degree to which the findings are relevant to policy. This can conflict with general scientific notions of validity which concentrate more on the process of

producing the findings, with expectations, for example, of use of scientific methods and presentation of research in a way which allows reproducibility and validation by peers. Methods which can be used to enhance validity include, from the policy side, clear establishment of expectations along with awareness and understanding of scientific practice and providing scope for outputs to explicitly deal with uncertainty and dissent, rather than requiring expert consensus. Other mechanisms include having clear selection criteria that ensure quality and relevance of expertise and inclusion of relevant disciplines, and processes for broader engagement of the scientific community, such as submitting reports to a wider peer-review group before presentation to decision-making bodies.

iv. Authority / Credibility

This characteristic also links closely to independence, relevance and validity. It can be useful for the outputs of advisory processes to carry authority in relation to the three groups mentioned earlier: for policy makers so that the work is not simply disregarded or findings easily dismissed; for the experts involved so that they view it as a productive exercise in which they are happy to continue participating; and for wider groups so that they can have confidence that policy is based on high quality evidence, and that implementing measures are justified. Authority, similar to validity, can be compromised if experts do not feel able to openly discuss areas of uncertainty.

v. Representativeness

Because of the global nature of science and the international nature of the related policy processes, scientific advisory bodies are expected to be geographically representative, contain an appropriate disciplinary balance, and be gender-balanced. In practice this has been difficult to achieve, particularly because the size of advisory groups is usually quite small and the selection requirements in terms of qualifications and experience are often very specific (for reasons connected to authority and validity of expertise among others – see UNEP, 1998, section 2.3).

There have been demands, particularly in the environmental governance area, for such bodies to expand their disciplinary expertise to include more social science and humanities areas, and other, e.g. traditional, forms of knowledge. While this may be a worthwhile aim, particularly where there are strong interactions between socio-economic factors and the types of impact scientific and technology advances may have, for many existing science advisory processes it is currently impractical, largely because of resource and time constraints. There are, however, supplementary ways in which additional expertise can at least be engaged or

consulted. This includes basic awareness-raising and communication about the existence and operation of scientific advisory processes, as well as opening up the peer review process to additional disciplines, and inviting experts into meetings when particular themes call for additional knowledge. Several S&T review processes have built up standing lists or networks of experts who may be brought in when more specialised knowledge is needed.

vi. Efficiency

Scientific advisory processes are expected to be efficient in producing the outputs requested by policy makers. This partly speaks to timeliness – as science and technology are fast-moving, if the process takes too long, the findings may lose relevance. This can conflict with demands for thorough, large-scale assessments and the desire for persuasive evidence to support decision-making. The other element of efficiency relates to cost. International regimes, of which advisory bodies are one part, are generally subject to quite severe budgetary constraints. Some core funding may be devoted to the work of the scientific advisory body, but it may also rely on voluntary donations. The group is generally kept quite small, which keeps costs down, but reduces scope for representativeness. Meetings are often limited in duration and frequency, this constrains what the bodies can achieve and their agendas are often overloaded. It is important that the expectations of all groups involved are realistic given these constraints on capacity.

5. The Present Process for S&T Review for the Biological Weapons Convention

Following long-standing concern amongst States Parties and other groups about the adequacy of existing procedures for review of S&T developments relevant to the Biological Weapons Convention, the 2011 Seventh Review Conference introduced, as one of three standing agenda items (SAIs) for the 2012-2015 Intersessional Process (ISP): "Review of developments in the field of science and technology related to the Convention." (United Nations, 13 January 2012, p.21). Various topics are to be considered within this SAI:

> "22. The Conference decides that the following topics will be addressed under the Standing Agenda Item on review of developments in the field of science and technology related to the Convention:
> (a) new science and technology developments that have potential for uses contrary to the provisions of the Convention;
> (b) new science and technology developments that have potential benefits for the Convention, including those of special relevance to disease surveillance, diagnosis and mitigation;

(c) possible measures for strengthening national biological risk management, as appropriate, in research and development involving new science and technology developments of relevance to the Convention;
(d) voluntary codes of conduct and other measures to encourage responsible conduct by scientists, academia and industry;
(e) education and awareness-raising about risks and benefits of life sciences and biotechnology.
(f) science- and technology-related developments relevant to the activities of multilateral organizations such as the WHO, OIE, FAO, IPPC and OPCW;
(g) any other science and technology developments of relevance to the Convention.

23. The following topical scientific subjects will be considered in the years indicated:
(a) advances in enabling technologies, including high-throughput systems for sequencing, synthesizing and analyzing DNA; bioinformatics and computational tools; and systems biology (to be considered in 2012);
(b) advances in technologies for surveillance, detection, diagnosis and mitigation of infectious diseases, and similar occurrences caused by toxins in humans, animals and plants (to be considered in 2013).
(c) advances in the understanding of pathogenicity, virulence, toxicology, immunology and related issues (to be considered in 2014);
(d) advances in production, dispersal and delivery technologies of biological agents and toxins (to be considered in 2015);"

(United Nations, 13 January 2012, p.22).

The overall purpose of the Intersessional Process is "to discuss, and promote common understanding and effective action" on the particular issues under consideration (United Nations, 13 January 2012, p.21). As noted by Nixdorff (November 2013, p.4), there is therefore an expectation that the Meetings of Experts would make "proposals that could promote common understanding and effective action for the MSP to consider", and that the Meeting of States Parties would "consider the MX proposals and make recommendations to the 2016 Eighth Review Conference of the BWC for effective action.".

However, indications from progress at the 2012 and 2013 ISP meetings are that, while further common understandings will be built, the Intersessional Process will produce few concrete proposals that might feed into recommendations for effective action (Dando, May 2014, p.15; Nixdorff, November 2013, p.11). South Africa, for example, noted in 2012 that better engagement with expert presentations on scientific issues, and more focused, in-depth technical discussions within the Meeting of Experts could boost the Meeting of States Parties ability to 'promote common understanding and effective action' (South Africa, 5 December 2012). There was no substantive move towards this objective in the 2013 ISP (further

analysis on this point can be found in Policy Papers 2 and 5 of this series – Nixdorff, November 2013; and Dando, May 2014).

It is clear, however, that many States Parties still strongly support reform of the S&T review process for the BWC (Dando, May 2014, pp.13-14). This means that the topic should receive further serious consideration at the Eighth Review Conference. Those States Parties and other groups working to support the Convention have some time to prepare for that review conference to ensure the most can be made of the opportunity for substantive, action-oriented progress, building on the common understandings emerging from the ISP. They can also work to promote more effective use of the 2014 and 2015 ISP meetings to feed into deliberations at the Eighth Review Conference.

6. Conclusions and Recommendations

The objective of this paper was not to focus on transferring a particular model from another regime into the biochemical security context, but to prompt consideration of important questions and issues during the development of improved S&T review processes. The paper points to some basic questions to be considered, such as:

- Should the body be permanent, open-ended or ad hoc, or take the form of a permanent advisory body that can establish working groups to draw in additional expertise as required?
- Should the body have a mandate with a fixed set of issues it may consider or should it consider issues on an ad hoc basis?
- Who should have authority to identify issues that may be addressed?
- Should members serve in a personal, expert capacity or as governmental representatives?
- What size should the body be?
- What criteria should be used for selection of its members?
- How frequently should it meet, and for how long?
- How will the body be funded?
- What are the expectations of reporting, documentation and whether it should make recommendations?
- What opportunities should there be for comment and approval by states at different stages in the development of outputs?

- How will the advisory body relate to the treaty's governing body or meetings of States Parties?
- What relationship should the body have with external groups?

General Recommendations:

- Perhaps most importantly, design of S&T review processes should start with a clearly defined purpose. Other decisions, such as the structure of the advisory body, the types of output it should produce, and its relationship with States Parties and other audiences, should all follow from this purpose.
- It is important to connect the main audiences of the outputs with design of the advisory process. This is both in terms of the immediate policy audience – to fulfil the needs they have identified – and the audience targeted by governance efforts. In the biochemical security context, where one of the main targets of governance is scientists there should be structures in place to promote experts' independence and authority and the scientific quality and validity of outputs (such as specific requirements for high-standing and relevant qualifications and experience, instruction to act in expert capacity, declaration of conflicts of interest, and use of broader peer-review).
- Scientific advisory processes carry potential to serve capacity-building roles, for example by helping to train new expert participants (UNEP, 1998, section 2.3), and in the biochemical security context this could contribute to the desired awareness-raising activities relating to scientific responsibility to prevent misuse of research.
- Any scientific advisory process is likely to be subject to budgetary constraints – it is worth being aware of what these are likely to be before designing the process, because it should guide decisions on the size and composition of the advisory body, the scope of its agenda, and the frequency and duration of meetings. These factors will in turn influence the outputs that it is capable of producing.
- There is scope to learn from other international regimes and good use can be made of existing connections between international organisations. A first step could be to invite organisations such as the OIE, WHO and FAO to present their views on best practice in science advisory processes to meetings of the States Parties to the BWC and CWC.
- There may be potential efficiencies in cooperating / collaborating with existing science advisory systems at national and regional levels as well.

- Learning from what is going on elsewhere should help identify any processes covering relating topics and minimise duplication of effort. It can also provide information about the range of options available, and facilitate selection of those most likely to be effective, appropriate to objectives, and acceptable to States Parties (and other participating groups and audiences). For example, study of alternative models may highlight particular forms of reporting and structure of advisory body that will fit well with existing processes for review of the conventions and regularity of meetings of States Parties[6].
- The mix of expertise to include depends on the type of outputs that are wanted. If the aim is simply to get assessments on the state of scientific knowledge, then including only scientists is justifiable (though there will still need to be further consideration of which disciplines are relevant to include); if information is also wanted on, for example, socio-economic drivers of technological change, then it will be appropriate to include social science expertise; if assessments of security risks associated with scientific advances are wanted, then security experts need to be included. It is worth noting that including a breadth of expertise, while desirable, is likely to mean that more time is required for discussion and deliberation and for the production of outputs, as the experts need not only to be able to formulate outputs understandable and useable by policy-makers, but which can also be communicated and understood across the disciplines involved.

<u>Recommendations for the S&T Review for the BWC:</u>

In preparation for the Eighth Review Conference the following steps would be useful:

- States Parties should provide clear suggestions relating to the purpose of an amended S&T review process (likely to include, but not be limited to: review of advances; engagement with the scientific community; capacity-building; awareness-raising; and exchange of best practice in implementation). This should link to audience expectations (of policy-makers; the scientific community; and broader stakeholders).
- States Parties should consider what the appropriate resourcing for such a process can be – it will only be worth putting a new process in place if it can be adequately and sustainably resourced.

[6] In terms of literature on international S&T review processes, substantial work has been published in the environmental governance area on 'science-policy interfaces', with a particular focus on the Intergovernmental Panel on Climate Change and the recently established Intergovernmental science-policy Platform for Biodiversity and Ecosystem Services.

- With this clear view of the purpose and resourcing for a new review process work can begin on its design – addressing such matters as those listed in the questions and recommendations above. This might include establishment of an interim body.

Beyond the Eighth Review Conference, lessons should be identified from the use of any interim mechanism to establish a more long-standing approach to S&T review. Sustainability in the long-term will need to be ensured in terms of provision of both financial resources and necessary training of participants, alongside other capacity-building activities to promote representativeness in participation.

REFERENCES

CBD Secretariat. No date [1]. *Consolidated Modus Operandi of the Subsidiary Body on Scientific, Technical and Technological Advice.* www.cbd.int/convention/sbstta-modus.shtml, accessed 29.01.14.

CBD Secretariat. No date[2]. *Subsidiary Body on Scientific, Technical and Technological Advice*. http://www.cbd.int/sbstta/, accessed 29.01.14.

CBD Conference of the Parties. 2008. *Decision IX/29 Operation of the Convention.* http://www.cbd.int/decision/cop/default.shtml?id=11672, accessed 29.01.14.

Dando, M. May 2014. "To What Extent was the Review of Science and Technology Made More Effective and Efficient at the 2013 Meeting of the BTWC States Parties?" *Biochemical Security 2030 Project – Policy Paper 5.* Available through http://biochemsec2030.org/policy-outputs/. Accessed 09.05.14.

Domenech, J. & Vallat, B. 2011. The World Organisation for Animal Health (OIE) and the Global Control of Epizootic Diseases, www.isah-soc.org/documents/2011/PRO-2011/files/volume_I/004_.pdf. Accessed 04.02.14.

Larigauderie, A. & Mooney, H.A. 2010. "The Intergovernmental science-policy Platform on Biodiversity and Ecosystem Services: Moving a step closer to and IPCC-like mechanism for biodiversity", *Current Opinion in Environmental Sustainability*, Vol.2: 9-14.

Nixdorff, K. November 2013. "The 2013 Meeting of Experts to the BWC, with a Focus on the Standing Agenda Item Review of Science and Technology Developments". *Biochemical Security 2030 Project – Policy Paper 2.* Available through http://biochemsec2030.org/policy-outputs/. Accessed 09.05.14.

OIE. January 2012. *Biological Threat Reduction Strategy: Strengthening Global Biological Security*. http://www.oie.int/fileadmin/Home/eng/Our_scientific_expertise/docs/pdf/A_Biological_Threat_Reduction_Strategy_jan2012.pdf. Accessed 07.02.14

OIE. 2011. *Procedures Used by the OIE to Set Standards and Recommendations for International Trade, with a Focus on the Terrestrial and Aquatic Animal Health Codes.* www.oie.int/fileadmin/Home/eng/International_Standard_Setting/docs/pdf/A_OIE_procedures_stand___recom_2011.pdf. Accessed 04.02.14.

OIE. No date [1]. *Scientific Commission on Animal Diseases (or Scientific Commission).* http://www.oie.int/international-standard-setting/specialists-commissions-groups/scientific-commission-reports/, accessed 14.02.14.

OIE. No date [2]. Specialist Commissions, http://www.oie.int/international-standard-setting/overview/introduction-to-specialist-commissions/, accessed 14.02.14.

South Africa. 5 December 2012. *The Intersessional Process: Comments and Proposals.* BWC/MSP/2012/WP.7. Available through http://www.unog.ch/bwc. Accessed 15.05.14.

UNEP. 1992. *Convention on Biological Diversity*. http://www.cbd.int/convention/text/. Accessed 14.02.14.

UNEP. 1998. *System-Wide Earthwatch Report on International Scientific Advisory Processes on the Environment and Sustainable Development*, UNEP/DEIA/TR.98-1, www.un.org/earthwatch/about/docs/sciadv.htm, accessed 29.01.14.

United Nations. 13 January 2012. *The Seventh Review Conference of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction – Final Document*, BWC/CONF.VII/7. Available through http://www.unog.ch/bwc. Accessed 15.05.14.

Vohland, K., Mlambo, M.C., Domeignoz Horta, L., Jonsson, B., Paulsch, A., and Martinez, S.I. 2011. "How to ensure a credible and efficient IPBES?" *Environmental Science and Policy*, Vol.14: 1188-1194.