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International Biosecurity Governance Evolution within the Biological Weapons Convention

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Executive Summary

1. With the extremely rapid developments in science and technology since the negotiation of the Biological and Toxin Weapons Convention (BWC), biosecurity concerns have become more and more significant for the convention. As biological risks associated with life sciences research and development of advanced technologies occur on a global level, the BWC is the pertinent international forum for dealing with biosecurity governance issues.
2. BWC states parties have been considering biosecurity governance issues including oversight, education and codes of conduct since the first Intersessional Process (ISP) began in 2003.
3. Due to different cultures and methods of implementing the provisions of the convention, no single security governance policy could be suitable for all states parties. A set of voluntary ethical elements applicable to all the BWC norms could to serve as a guideline in formulating codes of conduct for implementing biosecurity risk management programmes.
4. At the 2015 BWC Meeting of Experts, China proposed a voluntary code of conduct for scientists. These Tianjin Biosecurity Guidelines are designed to provide BWC states parties with a set of biosecurity ethical elements applicable to all members of the convention.
5. In April, 2022 China and Pakistan, with the co-sponsorship of Brazil, submitted the latest version of the Tianjin Biosecurity Guidelines to the Ninth Preparatory Meeting of the BWC. It would be a significant step forward if states parties were to adopt the Guidelines at the Ninth BWC Review Conference.

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The Biological and Toxin Weapons Convention (BWC)[1] bans biological weapons at the international level. In effect, it prohibits the development, manufacture, storage, purchase or retention of micro-biological or other biological and toxin agents as weapons. Article I of the convention sets out these prohibitions explicitly and comprehensively in the form of a general-purpose criterion, which prohibits all work on biological agents for non-peaceful purposes. Consequently, this allows work on biological agents for "prophylactic, protective or other peaceful purposes."[2] Thus, biological weapons are categorically banned while progress in science and technology in the life sciences and related fields can proceed, as long as the work is not intended for hostile purposes.

The all-encompassing formulation of the prohibitions by the general-purpose criterion is the convention's great strength. At the same time, it creates the situation of having to come to grips with the question of intent in deciding whether certain activities are allowed or prohibited under the BWC. While the great majority of life scientists surely has no intention of producing a biological weapon in the course of their work, scientists might unintentionally produce results (knowledge, products, technologies) that could potentially be misused for non-peaceful purposes. Indeed, a number of articles has been published in scientific journals in the last two-three decades in which the researchers had no malevolent intent whatsoever, but the results nonetheless have been cause for

[1] Biological Weapons Convention. Available at https://front.un-arm.org/wp-content/uploads/2020/12/BWC-text-English-1.pdf.
[2] Ibid.

considerable biosecurity concern. This characteristic of some work in the life sciences has been termed dual use research of concern (DURC).[3]

At the Eighth Review Conference of the BWC in 2016, the UK noted that while many potential benefits could arise from the developments in science and technology, the "potential of some developments for use contrary to the provisions of the Convention was also recognized" and that such developments "...may require action by States Parties."[4] As the treaty has no verification regime that could provide adequate means of examining whether the activities of a state party are in compliance with the convention, there is no agreed technical basis that would help decide the issue of intent. Article IV of the convention solely obligates the states parties to "take any necessary measures to prohibit and prevent the development, production, stockpiling, acquisition or retention of the agents, toxins, weapons, equipment and means of delivery specified in Article I of the convention."[5] In this regard Article IV is "considered the core provision relating to national implementation",[6] which is the "process by which a State Party adopts appropriate and effective national measures to carry out and enforce the obligations to which it has committed when ratifying or acceding to a Treaty."[7]

With the extremely rapid developments in science and technology since the negotiation of the BWC, biosecurity-relevant research in the life sciences and related fields has become more and more significant for the convention. As biological risks associated with life sciences research and development of advanced technologies occur on a global level, the BWC is the pertinent international forum for dealing with biosecurity governance issues.

After the collapse of negotiations in 2001 on a BWC Compliance Protocol, which would have included comprehensive verification measures that many thought would have provided critical information to ascertain whether a BWC member was in compliance with the provisions of the convention, states parties agreed to meet annually between review conferences in an Intersessional Process (ISP) "to discuss, and promote common understanding and effective action on"[8] selected topics that were considered of particular importance towards strengthening the convention in the way of compliance. The topics chosen for the first ISP were:

> "i. the adoption of necessary national measures to implement the prohibitions set forth in the Convention, including the enactment of penal legislation;
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> ii. national mechanisms to establish and maintain the security and oversight of pathogenic microorganisms and toxins;
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> iii. enhancing international capabilities for responding to, investigating and mitigating the effects of cases of alleged use of biological or toxin weapons or suspicious outbreaks of disease;
>
> iv. strengthening and broadening national and international institutional efforts and existing mechanisms for the surveillance, detection, diagnosis and combating of infectious diseases affecting humans, animals, and plants;
>
> v. the content, promulgation, and adoption of codes of conduct for scientists."[9]

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[3] DURC is life sciences research that, based on current understanding, can be reasonably anticipated to provide knowledge, information, products, or technologies that could be directly misapplied to pose a significant threat with broad potential consequences to public health and safety, agricultural crops and other plants, animals, the environment, materiel, or national security. Available at https://www.phe.gov/s3/dualuse/documents/us-policy-durc-032812.pdf.

[4] United Kingdom of Great Britain and Northern Ireland. Review of Developments in Science and Technology: Key Points From the 2012-2015 Biological and Toxin Weapons Convention Intersessional Programme. BWC/CONF.VIII/WP.17, 1 November 2016, Geneva. Available at https://meetings.unoda.org.

[5] Biological Weapons Convention. Op. cit.

[6] Germany on behalf of the European Union. Assessment of National Implementation of the Biological and Toxin Convention (BTWC). BWC/CONF.VI/WP.3, 20 October 2006, Geneva. Available at https://meetings.unoda.org.

[7] Woodward, A., Spence, S. and Escauriaza Leal, R. (2009), Factsheet: BWC Implementation, in K. McLauchlan and K. Nixdorff (eds.), *BWPP Biological Weapons Reader*, pp. 97-98. Available at http://www.bwpp.org.

[8] Fifth Review Conference to the BWC (2002) Draft Report. BWC/CONF.V/L.1, 14 November 2002, Geneva. Available at https://meetings.unoda.org.

[9] Ibid, pp. 3-4.

For each year of the ISP, a Meeting of States Parties (MSP) would be preceded by a Meeting of Experts (MX, or MXP). It was thought that the MX would prepare reports of their work for the MSP to consider and make recommendations based on the reports. The following review conference would then consider the work of the meetings and decide on any action.

Under Article IV of the BWC the states parties are not only required to adopt national measures to "prohibit" but also to "*prevent*" the misuse of biological agents for non-peaceful purposes. A statement prepared by Germany at the 2005 MX meeting of the ISP tagged topic v. on "the content, promulgation, and adoption of codes of conduct for scientists" as an effective element in *preventing* the misuse of developments in science and technology for hostile means, if applied in a certain way:

> "A Code of Conduct for the Life Sciences could represent an effective element in preventing the hostile use of biological agents, if it is designed to promote awareness of the complex dual use dilemma and at the same time proactively obligate the research scientist to engage in reflective activities such as risk assessments and consideration of alternative approaches during the research process."[10]

In effect, Germany suggested that an effective code of conduct, which helps to prevent hostile uses of the results of work in the life sciences, has to be a guideline that establishes a risk management process for biosecurity-relevant scientific work. Some countries have tried to tackle the problem on a national level by adopting regulations to manage DURC. But the majority of BWC states parties has yet to formulate and implement truly coherent, comprehensive, effective biosecurity governance policies. States parties to the convention have been grappling with the issues related to biosecurity governance ever since the first ISP. The next sections of this article deal with the evolution of this process within the BWC, from the first ISP up to the Ninth Review Conference.

Intersessional Process I (2003-2005)

The topic of *the content, promulgation, and adoption of codes of conduct for scientists* was dealt with in the 2005 meetings of the ISP. At MX 2005, states parties took an active role through the submission of a thirty five working papers addressing codes of conduct.

The Secretariat also prepared several background papers on codes of conduct to provide states parties with information to aid in the deliberations. Using the International Atomic Energy Agency (IAEA) as an example in the background paper entitled Review and Analysis of Relevant Elements of Existing Codes of Conduct in Other Fields, it noted:

> “The importance of fostering a safety and security culture…in the regulatory control or the management of radioactive sources…has prompted the IAEA to decide that a Code of Conduct should serve as guidance to States for the development and harmonisation of policies, laws and regulations on the safety and security of radioactive sources."[11]

This view of codes of conduct casts them as a means for dealing with security governance on an international level, which could be applied to the BWC. Due to different cultures, mores and methods of implementing provisions of the BWC that exist among the states parties to the convention, no single pre-formulated biosecurity governance policy would, in its entirety, be accepted and implemented by all treaty members. It is nevertheless essential to have a certain degree of harmonisation in methods of dealing with biosecurity-relevant research internationally. This might well be accomplished by following the IAEA concept. Thus, a code of conduct would provide a set of critical ethical elements acting as guidelines for formulating biosecurity risk management programmes.

[10] Germany (2005) Codes of Conduct and Their Application in the Life Sciences at Universities. BWC/MSP/2005/MX/WP.12. Available at https://meetings.unoda.org.

[11] Background Paper prepared by the Secretariat (2005) Review and Analysis of Relevant Elements of Existing Codes of Conduct in Other Fields. BWC/MSP/2005/MX/INF.3, 13 April 2005, Geneva. Available at https://meetings.unoda.org.

The states parties to the MX 2005 did agree on a final report. But this consisted mainly of a description of the proceedings.[12] The report included as an annex a so-called synthesis paper prepared by the chairman. This paper, however, had no "status". It just listed excerpts from the various presentations, statements, working papers and interventions of the meeting. This was to aid the delegations in their preparations for the 2005 MSP. Despite this attempt at encouraging action, the outcome of the MSP was disappointing. A number of "common understandings" was agreed, but with no recommendations to the Sixth Review Conference for "effective action". The only mention of codes of conduct in the final document of the review conference was:

> "...the Conference recognises the importance of codes of conduct and self-regulatory mechanisms in raising awareness, and calls upon States Parties to support and encourage their development, promulgation and adoption."[13]

Intersessional Process II (2007-2010)

States parties to the Sixth Review Conference agreed on a further ISP for the period 2007-2010. Two of the six topics of the work programme focused on governance issues:

> "iii. National, regional and international measures to improve biosafety and biosecurity, including laboratory safety and security of pathogens and toxins;" and
>
> "iv. Oversight, education, awareness raising, and adoption and/or development of codes of conduct with the aim of preventing misuse in the context of advances in bio-science and bio-technology research with the potential of use for purposes prohibited by the Convention."[14]

States parties considered these two topics in one single ISP session. This underscores the potential alliance of codes, oversight, education and awareness-raising with biosecurity measures. However, judging by the content of the various working papers submitted, states parties did not view these two as connected. Member states saw biosecurity primarily from the perspective of laboratory bio-security, that is, securing pathogens and toxins in the laboratory from falling into the hands of actors with ill intent. This aspect is indeed a part of the concept of biosecurity. But by focusing solely on securing pathogens and toxins in the laboratory, states parties did not address the biosecurity aspect of dual use research of concern, as defined in the beginning of this paper and implied in topic iv.

An exception was a 2008 working paper, in which The Netherlands presented their recently developed code of conduct.[15] The main purpose of Dutch code is "to prevent life sciences *research or its application* from directly or indirectly contributing to the development, production or stockpiling of biological weapons...or *to any other misuse* of *biological agents and toxins* [emphasis added]."[16]

The United States shared this view. In a 2008 working paper[17], they described the US National Science Advisory Board for Biosecurity (NSABB) Proposed Framework for the Oversight of Dual Use Life Sciences Research.[18] The framework focuses on oversight not only of pathogens and toxins, but also information gained from dual use research. In this framework, codes of conduct for life scientists are a part of the proposed oversight programme, serving as a set of ethical obligations "to avoid or

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[12] Meeting of Experts (2005) Report of the Meeting. BWC/MSP/2005/MX/3, 5 August, 2005, Geneva. Available at https://meetings.unoda.org.
[13] Sixth Review Conference (2006) Final Document. BWC/CONF.VI/6, 20 November - 8 December 2006, Geneva. Available at https://meetings.unoda.org.
[14] Ibid, p. 21.
[15] The Netherlands (2008) Development of a Code of Conduct for Biosecurity. BWC/MSP/2008/MX/WP.8, 30 July, 1008, Geneva. Available at https://meetings.unoda.org.
[16] Ibid, p. 6.
[17] USA (2008) Enhancing Biosecurity in the Life Sciences: Recommendations of the U.S. National Science Advisory Board for Biosecurity. BWC/MSP/2008/MX/WP.3, 30 July 2008, Geneva. Available at https://meetings.unoda.org.
[18] NSABB (2007) Proposed Framework for the Oversight of Dual Use Life Sciences Research: Strategies for Minimizing the Potential Misuse of Research Information. Available at https://osp.od.nih.gov/wp-content/uploads/Proposed-Oversight-Framework-for-Dual-Use-Research.pdf.

minimize the risks and harm that could result from malevolent use of research outcomes."[19] Japan also recognized the importance of dealing with the dual use aspect of research in oversight, in that "The contents of codes of conduct cannot be established independently of oversight mechanisms and programs for education and awareness raising."[20]

At the 2008 MSP, states parties once again reached a number of "common understandings", but with no recommendations to the Seventh Review Conference for "effective action". Thus, with the exception of a few states parties engagement in formulating governance policies, little progress was made collectively.

Intersessional Process III (2012-2015)

BWC States Parties at the Seventh Review Conference agreed on a third ISP that had, however, a different format than its predecessors. The agenda contained only three Standing Agenda Items. States parties hoped that this would make it possible to spend more time on each item. These three issues were

> "(a) Cooperation and assistance, with a particular focus on strengthening cooperation and assistance under Article X;
>
> (b) Review of developments in the field of science and technology related to the Convention;
>
> (c) Strengthening national implementation."[21]

The subjects of codes of conduct, oversight, awareness raising and education were therefore no longer separate focal points. However, particularly within the agenda item of the review of developments in science and technology, or possibly also within the agenda item of strengthening national implementation, there was potential opportunity to discuss biosecurity governance issues.

Under the review of science and technology developments in this third ISP, the states parties agreed on four topics to be dealt with in the four years until the Eighth Review Conference in 2016:

> "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)."[22]

Each year under one of the four topics, seven sub-topics were to be to be addressed, including three (c, d, e) pertaining to codes of conduct, oversight, awareness raising and education:

> "(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;

[19] Ibid, p. 51.
[20] Japan (2008) Oversight, Education, Awareness Raising, and Codes of Conduct for Preventing the Misuse of Bio-Science ad Bio-Technology. BWC/MSP/2008/MX/WP.21, 14 August 2008, Geneva. Available at https://meetings.unoda.org.
[21] Seventh Review Conference. Final Document. BWC/CONF.VII/7, 13 January 2012, Geneva. Available at https://meetings.unoda.org.
[22] Ibid, pp. 23-24.

(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. [emphasis added]".[23]

A mere total of six hours during the MXs and three hours during the MSPs were devoted to consideration of *all seven* science and technology sub-topics (!) each year. It came as no surprise that states parties made little progress. In an attempt to move the process forward, South Africa presented a Working Paper with constructive criticism on the progress being made up to that point in the ISP. South Africa illustrated this with an analysis of the science and technology review carried out during the 2012 MX:

"the technical discussions during the formal MXP in July 2012 regrettably did not provide sufficient material for an MXP report that would effectively promote common understanding and effective action on the issues raised. Some of the side-events held on the margins of the MXP generated more in-depth technical discussions; however, these were not part of the formal MXP."[24]

As in the outcomes of the previous ISPs, states parties during ISP III agreed on several common understandings but did not take concrete, effective actions. This was reflected in the reports of the meetings through the language used, which typically included such non-committal phrases as *states parties noted the value of…*, *states parties agreed on the importance of…*or *states parties recognized that…* The Eighth Review Conference in 2016 had thus received little input from the MSPs that might have induced effective action on the biosecurity. A decision about a new (fourth) intersessional programme could not be reached, but was deferred to the 2017 MSP. In his daily reports on the BWC meetings, Richard Guthrie summed up the situation on the final day of the Eighth Review Conference in that:

"…the only Final Document that could be agreed was one that did not include any substantive discussion topics for inter-sessional work but did include an annual MSP without a specific agenda apart from the first year in which it 'will seek to make progress on issues of substance and process for the period before the next Review Conference, with a view to reaching consensus on an intersessional process'."[25]

Intersessional Process IV (2017-2020)

At the 2017 MSP, states parties agreed that the ISP annual Meetings of Experts would be held for eight days each and at least three months before an annual Meetings of States Parties of four days each. The Standing Agenda Topics and time frame for the MX meetings were agreed as follows:

[23] Ibid, p. 23.
[24] South Africa (2012) The intersessional process: comments and proposals. BWC/MSP/2012/WP.7, 5 December 2012, Geneva. Available at https://meetings.unoda.org.
[25] Guthrie, R. (2017) The 2017 Meeting of States Parties: setting the scene. MSP Report 1, Daily Reports, 4 December 2017, Geneva. Available at http://www.bwpp.org/documents/Dailyreports/MSP17-01.pdf.

"MX1 (2 days): Cooperation and assistance, with a particular focus on strengthening cooperation and assistance under Article X

MX2 (2 days): Review of developments in the field of science and technology related to the Convention

MX3 (1 day): Strengthening national implementation

MX4 (2 days): Assistance, response and preparedness

MX.5 (1 day): Institutional strengthening of the Convention."[26]

Once again, there was no direct focus on international biosecurity governance in the standing agenda items. However, a significant step forward occurred during this fourth ISP. After a hiatus of ten years, characterized by a lack of concrete progress on international biosecurity governance, China, during the 2015 MSP, proposed a code of conduct for scientists. This proposal was designed to provide BWC states parties with a set of critical biosecurity ethical elements applicable to all members of the convention. China also suggested that "States parties should include the issue in the Eighth Review Conference and the following inter-sessional process."[27]

China's proposal represented a type of aspirational code of conduct[28] that many states parties to the BWC had been calling for ever since the 2005 ISP meetings. It provided a set of ethical elements to help in formulating biosecurity governance policies that would provide assurance that a country is committed to carrying out life sciences research in a responsible manner. To further develop this template or framework code, China convened a workshop in the city of Tianjin in June 2018 for in-depth discussions on its proposal. Co-hosts of that meeting were The InterAcademy Partnership (IAP) and Johns Hopkins University Center for Health Security. Participants included representatives from states parties to the BWC and individual experts as well as those representing organisations from civil society.

As a result of these and further discussions, China and Pakistan presented a revised version of the model code of conduct at the 2018 MX2.[29] States parties further discussed and revised the proposal at the following MX2 meetings. China and Pakistan with the co-sponsorship of Brazil presented the most recent version for consideration at the Ninth Preparatory Meeting of the BWC in April 2022.[30] The name has been changed to "The Tianjin Biosecurity Guidelines for Codes of Conduct for Scientists". The IAP has endorsed the guidelines.

The ten individual ethical elements contained in the guidelines include Ethical Standards, Laws and Norms, Responsible Conduct of Research, Respect for Research Participants, Research Process Management, Education and Training, Research Findings Dissemination, Public Engagement on Science and Technology, Role of Institutions, and International Cooperation.[31] The Tianjin biosecurity guidelines are entirely voluntary and have in general received wide support among states parties to the BWC. It is hoped that they will now be adopted at the upcoming Ninth Review Conference as expressed in a non-paper presented by the Chairpersons of the 2020 Meetings of the ISP:

"[M]any States Parties have noted the importance of voluntary codes of conduct. The topic has increasingly matured over time, notably with the "The Tianjin Biosecurity Guidelines for Codes of

[26] Meeting of States Parties (2017) Report of the Meeting. BWC/MSP/2017/6, 19 December 2017, Geneva. Available at https://meetings.unoda.org.
[27] Meeting of States Parties (2015) BWC/MSP/2015/WP.9, 15 December 2015, Geneva. Available at https://meetings.unoda.org.
[28] Rappert, B. (2004) Towards a Life Sciences Code: Countering the Threats from Biological Weapons. Briefing Paper No. 13, Bradford Project on Strengthening the Biological and Toxin Weapons Convention (BTWC). Available at https://bradscholars.brad.ac.uk/bitstream/handle/10454/795/BP_13_2ndseries.pdf?sequence=1&isAllowed=y.
[29] China and Pakistan (2018) Proposal for the development of a model code of conduct for biological scientists under the Biological Weapons Convention. BWC/MSP/MX.2/WP.9, 9 August 2018, Geneva. Available at https://meetings.unoda.org.
[30] China and Pakistan, Co-sponsored by Brazil (2022) The Tianjin Biosecurity Guidelines for Codes of Conduct for Scientists. BWC/CONF.IX/PC/WP.10, 7 April 2022, Geneva.
[31] Ibid, Annex pp. 3-4.

> Conduct for Scientists" presented at the 2020 MX2 and recently endorsed by the InterAcademy Partnership. Many States Parties have expressed their support for the 'Tianjin Biosecurity Guidelines' including their endorsement at the Ninth Review Conference...."[32]

The endorsement of Tianjin Biosecurity Guidelines would then be in correspondence to the endorsement of The Hague Ethical Guidelines[33] by the members of the Chemical Weapons Convention at the twentieth session of the Conference of States Parties, in which "The Conference acknowledged the establishment of 'The Hague Ethical Guidelines'....to serve as 'Guidelines for the Practice of Chemistry under the Norms of the Chemical Weapons Convention'."[34]

Taking biosecurity governance forward

In support of the Tianjin Biosecutiy Guidelines, Lijun Shang, Michael Mprah, Indrajitrakuraj Ravi (all of the London Metropolitan University) and Malcolm Dando (University of -Bradford) argued that not all elements of the Tianjin Biosecurity Guidelines are equivalent in regard to their contribution to the effectiveness of the code of conduct that would be implemented.[35] In particular, the authors point out the "key significance" of the education element, that "biosecurity awareness-raising and education are essential because if these are not in place scientists will not understand the need for biosecurity codes of conduct."[36] This view is indeed right on target, for how can scientists possibly be expected to carry out a proper risk assessment of their work or offer measures to mitigate potential risks if they do not understand the biosecurity issues associated with their work?

During the very first ISP, Australia together with a group of like-minded states[37] noted that the exchanges among the states parties had "underscored a common understanding of the pivotal role life scientists play in the effective prevention of the misuse of biotechnology and biological agents." But the group also pointed out that "Life scientists do not often consciously consider the possibility that their specific work could be of relevance to a biological weapons programme or otherwise misused to cause harm to people, animals, or plants or to render critical resources unusable."[38] Indeed, several surveys over the past two decades reveal that the majority of those involved in life science work and studies are not actively engaged in reflecting about biosecurity issues because they are simply not aware of possible dual-use aspects of their work.[39]

The World Health Organization (WHO) in its "Global Guidance Framework for the Responsible Use of Life Sciences. Mitigating Biorisks and Governing Dual-Use Research" has recently emphasized the importance of the education element. It notes the wide-spread lack of awareness of dual use biosecurity issues by the majority of those working in the life sciences and related fields: "Globally, many scientists conducting life sciences research are not trained in biosecurity, not familiar with the

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[32] United Nations (2021) Non-paper Submitted by the Chairperson of the 2020 Meeting of States Parties and the Chairpersons of the 2020 Meetings of Experts to the Biological Weapons Convention. BWC/MSP/2020/INF.2, 26 November 2021, Geneva.

[33] Available at https://www.opcw.org/hague-ethical-guidelines.

[34] OPCW (2015) Report of the Twentieth Session of The Conference of the States Parties. 30 November – 4 December 2015, C20/5, 4 November 2015, The Hague.

[35] Shang, L., Mprah, M., Indrajitrakuraj, R., Dando, M. (2022) Key Issues in the Implementation of the Tianjin Biosecurity Guidelines for Codes of Conduct for Scientists: A Survey of Biosecurity Education Projects. *Biosafety and Health*. Available at https://www.sciencedirect.com/science/article/pii/S2590053622001264.

[36] Ibid.

[37] Australia, Canada, Japan, New Zealand, Republic of Korea and Switzerland (on behalf of the 'JACKSNNZ"), and Kenya, Sweden, Ukraine, the United Kingdom of Great Britain and Northern Ireland and the United States of America. (2011). Possible Approaches to Education and Awareness-raising Among Life Scientists. BWC/CONF.VII/WP.20/Rev.1, 1 December 2011, Geneva. Available at https://meetings.unoda.org.

[38] Ibid, p. 3.

[39] Rappert, B., Chevrier, M., and Dando, M. (2006) In-Depth Implementation of the BTWC: Education and Outreach. Available at: http://www.brad.ac.uk/acad/sbtwc/briefing/RCP_18.pdf; Mancini, G.; Revill, J. (2008): Fostering the Biosecurity Norm: Biosecurity Education for the Next Generation of Life Scientists. Available at http://sro.sussex.ac.uk/id/eprint/39517/1/Fostering.pdf; National Research Council. (2010). Challenges and Opportunities for Education About Dual Use Issues in the Life Sciences. Washington, DC: National Academies Press. Available at http://www.nap.edu; Carlson, R.; Frankel, M. S. (2011): Reshaping responsible conduct of research education. Professional Ethics Report, 24 (1), 1–3. Available at https://www.aaas.org/sites/default/files/Professional-Ethics-Report-Delta.pdf.

BWC and not incentivized to devote time and resources to biorisk management." The WHO clearly states that "...any biorisk management system must include education, awareness building, and creation of a culture of individual and institutional investment in biosafety, biosecurity and oversight of dual-use research."[40]

The results of the 2022 survey of biosecurity education projects presented by Shang et al.[41] clearly document that, in spite of some improvements in awareness-raising and establishment of dual use biosecurity risk management processes since 2005, very little to date has been accomplished in wide-spread implementation of dual use biosecurity instruction for the life sciences and related fields at universities and research institutions.[42] Nevertheless, the authors argue that there are at present resources and experiences of a wide variety of groups that can be fruitfully used to take the process forward in the coming years. In particular, the authors argue that an updated teaching resource that includes core issues related to the BWC as well as those pertaining to the problem of dual use needs to be developed and made widely available.

Shang et al. offer suggestions for progress. They present and assess a wide variety of educational tools that could help institutions of learning and practice to initiate biosecurity education in ways appropriate for specific cases or areas of studies, or for different countries with different cultures. One of the main obstacles to initiating dual use biosecurity education, aside from the universal complaint about the lack of space in established curricula, is that there are no experts in biosecurity among the teaching staff that would be able to instruct the subject.[43] By applying novel means of teaching such as active learning methods[44] and using updated online biosecurity educational modules, both students and teachers together can learn the basic lessons of dual use biosecurity and BWC core issues and then gradually expand their expertise by following the relevant literature.

Another key element of the Tianjin Biosecurity Guidelines concerns the role of institutions. The Tianjin Guidelines describe a bottom-up approach to biosecurity governance. As part of such an approach, voluntary initiatives depend on the actors themselves – in this case scientists – to implement codes of conduct. Scientists are best equipped to establish and observe risk management programmes because they best understand the biosecurity issues involved. Nevertheless, the WHO Global Guidance Framework[45] also recognizes the importance of top-down support as being particularly important when it comes to institutionalising programmes. This is not to say that the administrations at institutions dictate what is to be done. However, without the dedicated *support* of the institutions at the administrative level the sustainable establishment of the process is arduous and indeterminate.

In conclusion, the Tianjin Biosecurity Guidelines present BWC states parties with ethical elements designed for incorporation into codes of conduct as a basis for developing dual-use biosecurity risk management programmes under the norms of the BWC. These Guidelines have been thoroughly discussed and revised by the states parties during the last ISP and are poised to be endorsed at the upcoming Ninth Review Conference. As pointed out by Shang et al.,[46] not all elements of the Tianjin

[40] World Health Organization (2022) Global Guidance Framework for the Responsible Use of Life Sciences. Mitigating Biorisks and Governing Dual-Use Research. Available at https://www.who.int/publications/i/item/9789240056107.
[41] Shang, L., et al., op. cit.
[42] See World Health Organization (2022) Global Guidance Framework for the Responsible Use of Life Sciences. Mitigating Biorisks and Governing Dual-Use Research, Annex 3, op. cit.
[43] Minehata, M. and Shinomiya, N. (2010). Japan: Obstacles, Lessons and Future. In B. Rappert (Ed.), *Education and Ethics in the Life Sciences* (pp. 93–114). Canberra: Australian National University E Press. Available at https://library.oapen.org/bitstream/handle/20.500.12657/33761/1/459095.pdf.
[44] Novossiolova, T., Dando, M. and Martellini, M. (2021) Enhancing the Utility of Codes of Conduct for Chemical and Biological Security through Active Learning. *ACS Chemical Health and Safety*, 28: 311-319. Available at https://pubs.acs.org/doi/pdf/10.1021/acs.chas.1c00047.
[45] World Health Organization (2022) Global Guidance Framework for the Responsible Use of Life Sciences. Mitigating Biorisks and Governing Dual-Use Research, op. cit.
[46] Shang, L., et al., op. cit.

Biosecurity Guidelines, such as that pertaining to education, can be immediately implemented in an ideal manner as the necessary enabling factors are not yet in place. The guidelines represent rather the beginning point of an essential process that can be taken the necessary steps forward in the direction of implementation in the coming years. The important thing is to get started.

An example of how the Tianjin Guidelines might be implemented can be seen in the approach of the German Research Foundation (DFG) together with the German National Academy of Sciences (Leopoldina) in implementing a **voluntary** code of conduct for dealing with security-relevant research at German universities and other research institutions.[47] This code was presented in a working paper at the MX2 in 2018.[48] Also, recommendations in the code were summarized in a presentation by Dr. Johannes Fritsch, head of office of the Leopoldina's Joint Committee on the Handling of Security-Relevant Research:

"1. Observance of ethical principles by the researchers beyond legal rules
2. Risk analysis and risk minimization
3. Documentation and communication of risks
4. Check (planned) publications for risks
5. Training, education and awareness-raising
6. Clarity on the person in charge
7. Availability of compliance bodies
8. Definition of ethical rules by the research institutions
9. Establishment of local Committees for Ethics in Security-Relevant Research ("KEF")"[49]

The first four recommendations appeal to the responsibilities of individual scientists. The other five recommendation apply to the roles and responsibilities of institutions involved in security-relevant research. Training, education and awareness-raising tops the list of recommendations for the institutions. This emphasizes the role the institutions should play in support of the establishment of biosecurity education in curricula. Comparable elements of the Tianjin Biosecurity Guidelines can be found in all these DFG/Leopoldina recommendations. To aid in the process of implementation of the recommendations, the DFG/Leopoldina Joint Committee on the Handling of Security-Relevant Research[50] is at present working actively with universities and other research institutions throughout Germany in an effort to complete the process.

By endorsing the Tianjin Biosecurity Guidelines, the BWC states parties can bring to fruition a process that began *nearly two decades ago* during the first ISP. In doing this the convention can produce a document that will serve life scientists as guidelines for conducting responsible research under the norms of the BWC, and so demonstrate that the states parties to the BWC can achieve consensus on this substantive issue and thus contribute considerably to the vital evolution of the convention.

[47] DFG/Leopoldina (2014) Scientific Freedom and Scientific Responsibility (2014). Available at https://www.leopoldina.org/en/publications/detailview/publication/scientific-freedom-and-scientific-responsibility-2014.
[48] Germany (2018) Germany's best practice in handling (bio)security-relevant research: Self-governance organized by the German National Academy of Sciences Leopoldina and the German Research Foundation (DFG). BWC/MSP/2018/MX2/WP.1, 18 July 2018, Geneva. Available at https://meetings.unoda.org.
[49] The presentation is available at https://unoda-documents-library.s3.amazonaws.com/Biological_Weapons_Convention_-_Meeting_of_Experts_(2018)/2018-08-09%2BBWC%2BMX2%2BJohannes%2BFritsch%2BGermanny%2Bfinal%2B2.pdf.
[50] DFG/Leopoldina Joint Committee on the Handling of Security-Relevant Research. Available at https://www.leopoldina.org/en/about-us/cooperations/joint-committee-on-dual-use.

The CBW network for a comprehensive reinforcement of norms against chemical and biological weapons (CBWNet)

The research project CBWNet is carried out jointly by the Berlin office of the Institute for Peace Research and Security Policy at the University of Hamburg (IFSH), the Chair for Public Law and International Law at the University of Gießen, the Peace Research Institute Frankfurt (PRIF) and the Carl Friedrich Weizsäcker-Centre for Science and Peace Research (ZNF) at the University of Hamburg. The joint project aims to identify options to comprehensively strengthen the norms against chemical and biological weapons (CBW).

These norms have increasingly been challenged in recent years, inter alia by the repeated use of chemical weapons in Syria. The project scrutinizes the forms and consequences of norm contestations within the CBW prohibition regimes from an interdisciplinary perspective. This includes a comprehensive analysis of the normative order of the regimes as well as an investigation of the possible consequences which technological developments, international security dynamics or terrorist threats might yield for the CBW prohibition regimes. Wherever research results point to challenges for or a weakening of CBW norms, the project partners will develop options and proposals to uphold or strengthen these norms and to enhance their resilience.

The joint research project is being funded by the Federal Ministry of Education and Research for four years (April 2022 until March 2026).

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