

Biological Security Education, Awareness, and Outreach as Essential Elements of Strengthening the Review of Science and Technology under the BTWC

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Declaration

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Once the rockets are up, who cares where they come down? That's not my department – says Wernher von Braun.” Tom Lehrer’s satirical song is an important reminder of the social, ethical, and legal responsibilities incumbent upon those engaged in science and technology whether in government, industry, or academia. Fostering a culture of responsible innovation that promotes and supports consideration of the broader impacts of research and development can contribute to the process of ensuring that scientific and technological advances are used only for peaceful purposes and the benefit of humankind and the environment.

The revised *Recommendation on Science and Scientific Researchers* adopted by UNESCO in 2017 underlines the civic and ethical aspect of scientific research and encourages the development of appropriate mechanisms and measures that support and promote the fullest exercise, respect, and protection of the social responsibilities of researchers. It is important that science practitioners are able to “express themselves freely and openly on the ethical, human, scientific, social, or ecological value of certain projects, and in those instances where the development of science and technology undermine human welfare, dignity and human rights or is “dual-use”, they [should] have the right to withdraw from those projects if their conscience so dictates and the right and responsibility to express themselves freely on and to report these concerns.”¹

As regards the life sciences, the World Health Organisation (WHO) defines dual-use research of concern (DURC) as life sciences research that has the potential to provide knowledge, information, products or technologies that could be directly misapplied to create a significant threat with

potential consequences to public health and safety, agricultural species and other plants, animals, and the environment.² Consideration of DURC issues in life science practice is an element of effective laboratory biosecurity and relevant organisations and research facilities should establish and have in place appropriate arrangements for ensuring a regular and continued risk assessment of life science DURC throughout the entire research cycle. In developing a DURC risk assessment process, attention should be given to emerging biological risks arising from novel advances in life sciences and related fields. Biotechnology is progressing at a rapid pace and cutting-edge capabilities including genomic editing and gain-of-function experiments raise security concerns regarding the integrity of the existing international norms against the development and use of biological and toxin weapons by state or non-state actors.

Managing life science DURC research is a complex multi-layered process that requires the active engagement of multiple stakeholders along the entire innovation cycle. The World Organisation for Animal Health (OIE) has developed an indicative framework, which maps the range of stakeholders with a role in the identification, assessment, and management of dual-use risks, including researchers and their institutions, funding bodies, industry, educators, scientific publishers and other communicators of research, and regulatory authorities.³ This framework allows identifying needs and options for strengthening the management of life science DURC and enables different stakeholders to develop a better understanding of their specific responsibilities in safeguarding research and innovation against accidental or deliberate misuse.

Recently, the World Health Organisation has initiated a series of consultations to foster a

dialogue on the development of standardised approaches and tools for addressing life science DURC research. This includes outreach to science academies and councils, science editors and publishers, and funders and donors of life science research.⁴ The consultations are part of a broader effort to develop a Global Guidance Framework to Harness the Responsible Use of the Life Sciences.⁵ The envisaged Framework seeks to assist scientific communities in understanding the new ways in which their research could create both benefits and risks. To this end, it is recommended that the development of the Framework is accompanied by a process of providing stakeholders with appropriate training, resources, and tools for identifying, assessing, and communicating DURC issues in life sciences.⁶ The importance of engaging life science stakeholders with DURC issues, including through awareness-raising has also been acknowledged as part of a WHO-led horizon scanning exercise on the impact of emerging technologies on global public health.⁷

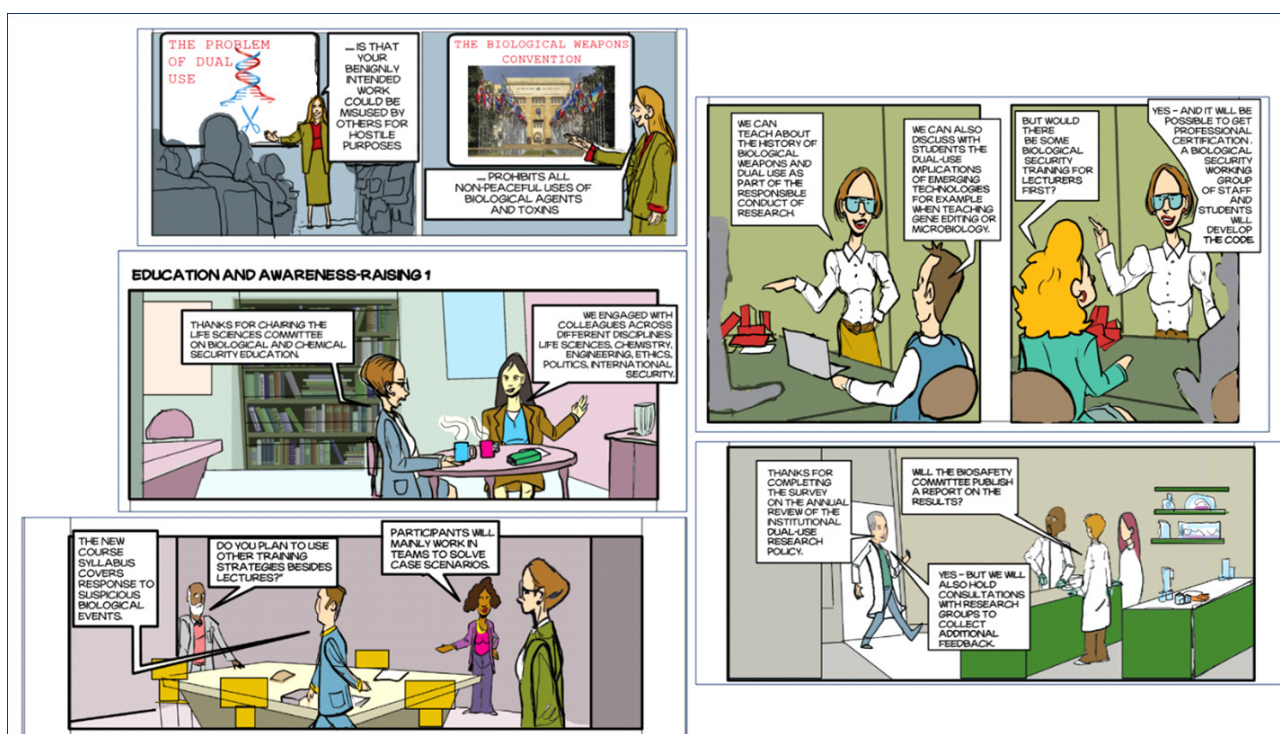
DURC issues in the life sciences often involve the possibility of deliberate misuse by third parties which is why such issues may not be immediately evident to science practitioners.⁸ Encouraging consideration of DURC risks could benefit from the use of innovative awareness-raising and training approaches that could illustrate how such risks may manifest themselves and what steps and measures could be taken to prevent and address potential consequences. Active learning strategies could be particularly useful, as they provide for a richer and immersive training experience that leverages peer-to-peer interaction and self-assessment.⁹

To help promote consideration of DURC issues among life science stakeholders, the London Metropolitan University in the UK

has recently published an awareness-raising cartoon series available in multiple languages.¹⁰ The series titled “Strengthening the Web of Prevention against Chemical and Biological Weapons” features five two-page cartoons, whereby each cartoon examines a specific concept related to biological (and chemical) security (Figure 1). Concepts covered in the series include (1) prevention of biological weapons; (2) codes of conduct; (3) education and awareness-raising; (4) biological security culture; and (5) one health security. The cartoons are designed as illustrative scenarios that can be used for

facilitating deliberation and reflection on DURC issues. The cartoon series has been translated into 12 different languages, including the six official UN languages: Arabic, Armenian, Chinese, French, German, Greek, Italian, Japanese, Russian, Spanish, Ukrainian, and Urdu. The translations have been carried out by biological security experts and education practitioners from around the world. The cartoons series is open-source and available in different languages via the London Metropolitan University Repository.¹¹

Figure 1: Cartoon Series – “Strengthening the Web of Prevention against Chemical and Biological Weapons”



Source: The cartoon series is available via the London Metropolitan University repository. For further information, see London Metropolitan University, *Heightened Risk of Disease as a Means of Terrorism, say international security experts*, Press release, 30 June 2021, <https://www.londonmet.ac.uk/news/spotlight/heightened-risk-of-disease-as-a-means-of-terrorism-say-international-security-experts/>.

The cartoon series was discussed within the framework of a webinar series on “Responsible Science” hosted by the Science and Technology Center in Ukraine (STCU) in June 2021.¹² Dr Tatyana Novosiolova, a

co-author of the series made a demo presentation highlighting possible strategies for using the cartoon scenarios for training and awareness-raising. The cartoon series has been piloted during a regular elective

seminar on chemical and biological disarmament taught as part of the International Relations degree programme at the National University of Lanus, Argentina. The feedback received from students attending the seminar has indicated that the cartoons offer an easy-to-understand approach for teaching complex security concepts.¹³ Information about the cartoon series was also shared at international conferences in Russia and China, as well as at the 39th Annual Meeting of the European Culture Collections' Organisation (ECCO).

Engaging life science stakeholders with DURC issues is a long-term endeavour that requires sustained and concerted action, as well as international cooperation and adequate resourcing. Earlier this year, the Inter-Academy Partnership, an umbrella organisation for more than 140 national, regional, and global science academies, endorsed the Tianjin Biosecurity Guidelines for Codes of Conduct for Scientists which aim to promote a culture of responsibility and guard against the hostile misuse of life sciences.¹⁴ The Tianjin Guidelines set out ten elements for strengthening biosecurity procedures and practices to reinforce the norms enshrined in the 1975 Biological and Toxin Weapons Convention (BTWC) and ensure that life sciences are used only for peaceful purposes. One of the elements of the Tianjin Guidelines specifically refers to the role of education and training in preserving the integrity of laws, regulations, international obligations, and norms with relevance to the prohibition of biological and toxin weapons.¹⁵

A Working Paper tabled at the latest BTWC Meeting of Experts recommended that the Ninth Review Conference of the Convention should endorse the Tianjin Biosecurity Guidelines and set up a mechanism for the exchange of good practices on their

implementation during the next Intersessional Process.¹⁶ Reaching agreement on this proposal among States Parties would constitute a significant move to enhance the process for review and assessment of relevant life science advances, not least because it could help facilitate scientist engagement with the Convention and encourage the development and implementation of biosecurity education and awareness-raising programmes. Moreover, any BTWC mechanisms that are pertinent to the Tianjin Biosecurity Guidelines would provide a forum for dialogue and exchange with other relevant international initiatives, including the World Health Organisation's Science and Technology Foresight for Global Health initiative.¹⁷

Endnotes:

- ¹ UNESCO, *Recommendation on Science and Scientific Researchers*, 13 November 2017 https://en.unesco.org/themes/ethics-science-and-technology/recommendation_science.
- ² World Health Organisation, *Laboratory Biosafety Manual*, 4th ed., WHO: 2020, <https://www.who.int/publications/i/item/9789240011311>.
- ³ World Organisation for Animal Health, *Guidelines for Responsible Conduct in Veterinary Research: Identifying, Assessing, and Managing Dual-Use*, May 2019, <https://www.oie.int/app/uploads/2021/03/a-guidelines-veterinary-research.pdf>.
- ⁴ World Health Organisation, *Dual Use Life Science Research (DUR/C) Dialogue with Academies and Councils*, Virtual Meeting Report, 6 July 2020, [https://www.who.int/publications/m/item/dual-use-life-science-research-\(dur-c\)-dialogue-with-academies-and-councils](https://www.who.int/publications/m/item/dual-use-life-science-research-(dur-c)-dialogue-with-academies-and-councils); World Health Organisation, *Dual Use Life Science Research (DUR/C) Dialogue with Science Editors and Publishers*, Virtual Meeting Report, 28 July 2020, [https://www.who.int/publications/m/item/dual-use-life-science-research-\(dur-c\)-dialogue-with-science-editors-and-publishers](https://www.who.int/publications/m/item/dual-use-life-science-research-(dur-c)-dialogue-with-science-editors-and-publishers); World Health Organisation, *DUR/C Dialogue: Perspective from Donors of Life Sciences Research on Dual-Use Research of Concern (DUR/C)*, Virtual

- Meeting Report, 1 December 2020, [https://www.who.int/publications/m/item/dur-c-dialogue-perspective-from-donors-of-life-sciences-research-on-dual-use-research-of-concern-\(dur-c\)](https://www.who.int/publications/m/item/dur-c-dialogue-perspective-from-donors-of-life-sciences-research-on-dual-use-research-of-concern-(dur-c)).
- 5 World Health Organisation, *Second WHO Consultative Meeting on the Development of the Global Guidance Framework to Harness the Responsible Use of Life Sciences*, Press release, 7 September 2021, <https://www.who.int/news/item/07-09-2021-second-who-consultative-meeting-on-the-development-of-the-global-guidance-framework-to-harness-the-responsible-use-of-life-sciences>.
 - 6 World Health Organisation, *WHO Consultative Meeting on a Global Guidance Framework to Harness the Responsible Use of Life Sciences*, Virtual Meeting Report, 11 March 2021 <https://www.who.int/publications/i/item/who-consultative-meeting-on-a-global-guidance-framework-to-harness-the-responsible-use-of-life-sciences>.
 - 7 World Health Organisation, *Emerging Technologies and Dual-Use Concerns: A Horizon Scan for Global Public Health*, WHO: 2021, <https://www.who.int/publications/i/item/9789240036161>.
 - 8 See Tatyana Novosiolova et al. 'Altering an Appreciative System: Lessons from Incorporating Dual-Use Concerns into the Responsible Science Education of Biotechnologists', *Futures*, vol. 108 (2019), pp. 53-60, <https://doi.org/10.1016/j.futures.2019.02.001>; Tatyana Novosiolova et al. 'Enhancing the Utility of Codes of Conduct for Chemical and Biological Security through Active Learning', *ACS Chemical Health and Safety*, vol. 28:5 (2021), pp. 311-319, <https://doi.org/10.1021/acs.chas.1c00047>.
 - 9 On the role of active learning strategies in engaging science stakeholders with security issues, see OPCW Advisory Board on Education and Outreach, *Report on the Role of Education and Outreach in Preventing the Re-Emergence of Chemical Weapons*, ABEO-5/1, 12 February 2018, https://www.opcw.org/sites/default/files/documents/2019/03/abeo-5-01_e.pdf.
 - 10 London Metropolitan University, *Heightened Risk of Disease as a Means of Terrorism, say international security experts*, Press release, 30 June 2021, <https://www.londonmet.ac.uk/news/spotlight/heightened-risk-of-disease-as-a-means-of-terrorism-say-international-security-experts/>.
 - 11 Further information about the cartoon series is available at <http://repository.londonmet.ac.uk/6435/>.
 - 12 For information about the STCU webinar series, see <http://www.stcu.int/news/index.php?id=553>.
 - 13 We would like to thank Dr Maria Espona for the information about the pilot use of the cartoon series during a university seminar. General information about the degree programme in International Relations that is taught at the National University of Lanus, Argentina is available at <http://www.unla.edu.ar/carreras/grado/licenciaturas/relaciones-internacionales>.
 - 14 Inter-Academy Partnership, *IAP Endorses the Tianjin Biosecurity Guidelines*, 8 July 2021, <https://www.interacademies.org/news/iap-endorses-tianjin-biosecurity-guidelines>.
 - 15 Inter-Academy Partnership (in cooperation with Johns Hopkins Center for Health Security and Tianjin University), *The Tianjin Biosecurity Guidelines for Codes of Conduct for Scientists*, July 2021, https://www.interacademies.org/sites/default/files/2021-07/Tianjin-Guidelines_210707.pdf.
 - 16 China and Pakistan, *The Tianjin Biosecurity Guidelines for Codes of Conduct for Scientists*, BWC/MSP/2020/MX.2/WP.6, 23 August 2021, <https://undocs.org/en/BWC/MSP/2020/MX.2/WP.6>.
 - 17 For information about the WHO S&T Foresight Initiative, see World Health Organisation, *Monitoring Emerging Technologies and Building Futures-Thinking – WHO Foresight*, 2021, <https://www.who.int/activities/monitoring-emerging-technologies-and-building-futures-thinking-who-foresight>.