

A photograph of the United Nations Secretariat Building in New York City. The building is a large, classical-style structure with a central entrance. Above the entrance, the words "UNITED NATIONS" and "NATIONS UNIES" are inscribed on the facade, separated by the United Nations emblem. The building is flanked by two long, parallel rows of flagpoles, each topped with a globe. The flagpoles are filled with the national flags of various countries, creating a vibrant display of colors. The sky is overcast and grey. The overall scene is formal and international.

**IBSEN Third Quarterly Newsletter**

*February 2025*



## **Executive summary**

This Third Quarterly Newsletter will address the achievements of the International Biological Security Education Network (IBSEN) during its first year and LMU BSRC's current activities on strengthening global biosecurity education.

The feature column within this Newsletter analyses the aim and structure of the *Global guidance framework for the responsible use of the life sciences: Mitigating biorisks and governing dual-use research* by the World Health Organisation (WHO). This review will focus on the biosecurity education elements of the report.

The Quarterly Newsletter also aims to share the recent activities of the International Biological Security Education Network and Biological Security Research Centre.

As part of the IBSEN, the LMU BSRC encourages any persons who are interested in biosecurity education to contact the IBSEN and discuss potential collaborations.



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## **1. Note from Professor Lijun Shang, Director of the Biological Security Research Centre at London Metropolitan University**

Time flies! It is almost 1 year since IBSEN (International Biological Security Education Network) project started in Feb 2024. With a clear two stages of working plans in mind, in the first year, apart from forming an Oversight Board inviting 8 international experts in the area from all continents around world to help us to monitor the project, we set up our project website <https://ibsen.org.uk/> to assemble all project information and related information, and we also built up a database which contains four subgroups of people who are interested in joining in this IBSEN, i.e. academic, policymaker, professional and industry, and school and general publics. After one year, the number in each group is constantly growing and now we have a total of 230 in our database. Enlarging IBSEN is not just an exercise in increasing the number of people in our database, we endeavor to fully engage people in every aspect of the project which will be detailed in the following paragraph and also presented in our published Newsletters.

The team on the project have done substantial research on the issues of biological security education in the first year. We have dedicated special case in each Newsletter to focus on comparison of main security education initiatives over the CBRNe fields, International Nuclear Security Education Network (INSEN) in first Newsletter, on the Advisory Board on Education and Outreach (ABEO) in the second Newsletter, and in this newsletter on WHO's efforts, and a few more will follow in subsequent Newsletters. We then argue that a collective and integrated approach should be the best way to move forward on biological security education after the lessons and experiences learned from previous and continuous efforts by those initiatives, and also especially with fast development of science and technologies such as artificial intelligence, synthetic biology, nanotechnology, cybertechnology and many others.

We therefore organised a special policy workshop in March 2024 (co-funded through our Research England funds) to explore this (see the news in Newsletter 1), we subsequently attended the Sixteenth Session of the Advisory Board on Education and Outreach in April 2024 to share our experience with the Board, and then in November 2024, we co-organised a side



event with ABEO) titled Progress in Chemical and Biological Security Education (<https://www.opcw.org/calendar/csp/side-events>) on the margins of the Twenty-Ninth Session of the Conference of the States Parties (CSP-29) to the Chemical Weapons Convention, The Hague, The Netherlands, 25-29 November 2024. This collaborative adventure will be further developed in the IBSEN project and also by our new funds from Marmot Trust for another year. Collaborating with Nuclear security education, we have Professor Matteo Gerlini, previous chair of the International Nuclear Security Education Network (INSEN), the International Atomic Energy Agency academic partnership for Nuclear security as a visiting fellow to London Metropolitan University (LMU) Biological Security Research Centre (BSRC) to further investigate how IBSEN will benefit from the work from INSEN. In Dec 2024, Professor Lijun Shang also presented at Interdisciplinary Nuclear Disarmament Conference at Bradford and discussed this further. Further research will focus on the new challenges from advance sciences and technology faced in CBRN fields.

The IBSEN project has also been fast developed through engagement with different stakeholders across the world both with our existing collaboration, such as China, Japan, India, etc and with developing new collaborations across the world. Particularly we have had, and are continuously having constructive talks with Synbio Africa (presenting at its annual conference), Uganda (the Uganda National Biosafety and Biosecurity coordinator), Brazil (both academics and government departmental officers), Argentina (Academic), and Mexico (ORCG), Portugal, Netherlands, Poland, etc. These ongoing engagements broaden IBSEN activities and consolidate the planned objectives. The IBSEN team also promotes this project through attending conferences nationally and internationally. Through presentation and discussion with people around the world, the IBSEN project not only has been recognised but also expanded in both the scale and the content. For example, a IBSEN team member joined side event in the Geneva BWC summer conference, presented and been given the award of the Robert I. Gross Memorial Award at the annual Biosafety and Biosecurity Conference organised by the Association for Biosafety and Biosecurity in the United States. Professor Lijun Shang has been awarded a British Academy grant to explore the biosecurity in agribusiness and invited to an Advanced Research Workshop of the NATO Science for Peace and Security



Programme in Rome. Professor Shang has been invited to give a talk on 18th Vaccine Congress (September 2024, Lisbon) and workshop of Building a Regulatory Framework for Biosecurity in Brazil (September 2024, Brazil).

## 2. IBSEN after 1 year

During the first year, IBSEN project not only produced Newsletters (3), attended conference (10), organised workshops (2), but also published papers (3), wrote reports (2) and actively applied for funds (5). We have also continuously expanded our contact database (230). As mentioned in our previous Newsletter 2, the translation project of our first book (Essential of Biological security: A Global Perspective, Wiley, April 2024) has been progressed very smoothly. We hope to report to you some translations of the book later this year. We are in the preparation on 2<sup>nd</sup> book on potential biosecurity issues on advanced science and technology.

From the intensive research and activities in the first year, we feel that IBSEN should continuously works on further development of network globally with some focus on specific areas and broad interests and contents, and further development of education resources and methodologies including translation of them. We should also work on its evaluation which appeared crucial important in the beginning design of the implementation. We should without doubt explore how to make IBSEN sustainability, such as continuously seek funds and new bloods.

I am also very happy to welcome and introduce our new team member Ms Kathryn Millett who will be joining in us from Feb 2025.

### 3. *Special Topic*: Biosecurity Education in the WHO Global Framework

#### I. Introduction

Perhaps the most important steps taken in attempting to deal with the problem of dual-use is the *Global guidance framework for the responsible use of the life sciences: Mitigating biorisks and governing dual-use research* by the World Health Organisation (WHO) in 2022. This report will analyse the aims and structure of the global framework, discussing the framework's implementation methodology and what lessons/implications we may draw for the IBSEN. The IBSEN's key areas of interest include the overall development of the network, methodologies, evaluation, translation, educational resources and sustainability.

The sections of the WHO report are set out below in Figure 1.

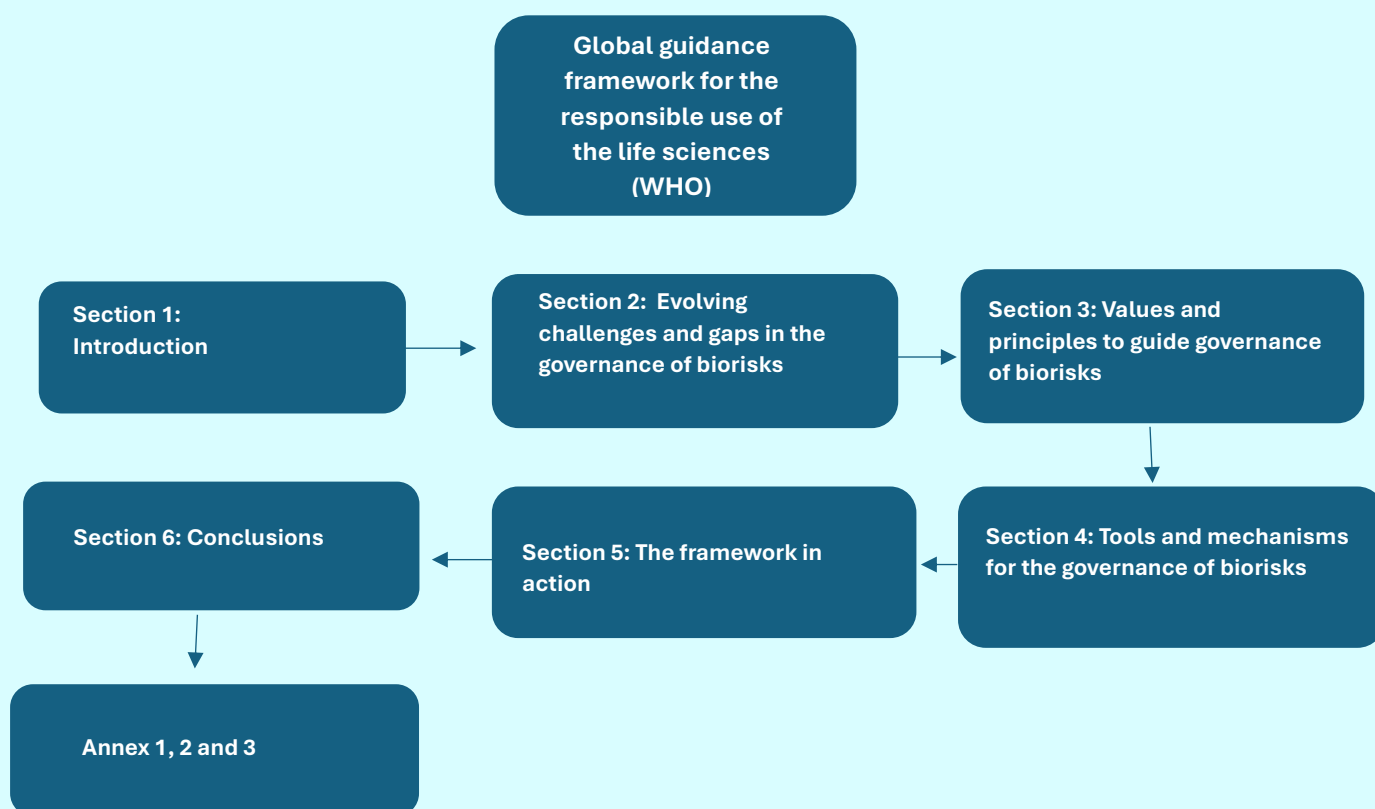


Figure 1 Sections of the WHO global framework

In this report we centre our review on what the WHO perspective is on the state of biosecurity education and what may be done about it. Biosecurity education is discussed in sections 4, 4.4 and Appendix 3 and are set out in Figure 2.

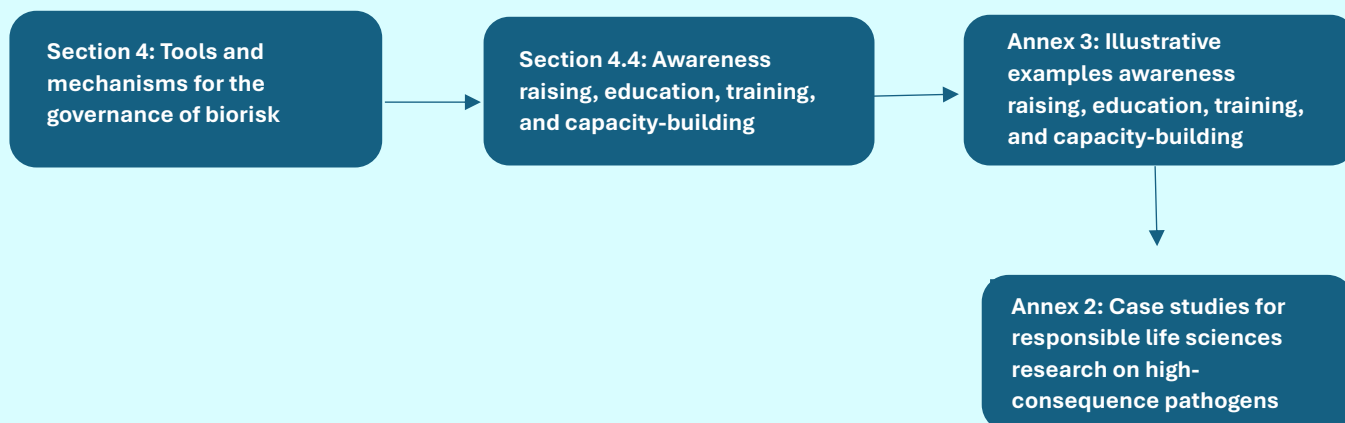


Figure 2 Sections of the WHO global framework of which directly relate to biosecurity education

**Section 2** of the report highlights the ever-evolving challenges and major gaps in the governance of biorisks.

**Section 3** draws attention towards the importance of values and principles, and their associated commitments. This section discusses how these values and principles should guide the development and implementation of biorisk management policies by Member States of the WHO. Section 3 also provides key elements of good governance of biorisks.

**Section 4** identifies the practical tools and mechanisms for the governance of biorisks. This section discusses the need for different tools and mechanisms for different groups of stakeholders. Section 4 covers formal and informal governance measures at individual, institutional, national, regional and international levels. This section also discusses the target audiences such as scientists and technicians, research institutions, funders, publishers and those communities working with disciplines that intersect with the life sciences.

**Section 5** provides a 6 step approach with checklists applicable to different stakeholders, so they may apply these steps to their own contexts. This section encapsulates various elements





of the framework and outlines the steps in terms of stakeholders, tools and mechanisms, principles and values, and key questions for the governance of biorisks. This section may be referred to as the ‘framework in action’.

## II. Context according to the WHO Global Framework

Rapid advances in life sciences research contribute to the development of new diagnostics, vaccines, innovative treatments etc, and as a result contribute to the implementation of preventive public health measures and thus promote food safety and security. Advances within life science research also leads to questions about significant ethical, legal, societal, safety and security risks. Research which can benefit society may also be accidentally or deliberately misused to potentially cause harm to humans, animals, plants, agriculture and the environment. The WHO global framework provides 4 examples of how risks may occur and can be seen in Table 1.

*Table 1 Four examples of how risks may occur*

1.	Risks can arise from unintentional actions
2.	Risks can stem from unanticipated findings that could potentially cause harm
3.	Risks can also stem from inadvertent applications of research with outcomes which are applied in harmful or potentially unethical ways unanticipated by the researcher
4.	Risks can arise from the deliberate misuse of life sciences research, knowledge, materials and skills to cause harm

The WHO global framework focuses on the safety and security risks of health-related research caused by accidents, and inadvertent or deliberate misuse with the intention to cause harm. The report deliberates on how to develop and implement governance tools and mechanisms that mitigate the risks posed by life sciences research, without hampering the development and use of such research for global health and society. The report advocates for the responsible use of research within the life-sciences.

Of particular interest for the present review, is the view of the state of biosecurity awareness. The framework states that there is a lack of widespread awareness amongst scientists that



work in this area could be conducted or misused in ways that result in health and security risks to the public. This provides incentives to identify and mitigate risks. The framework presents this as a chronic and fundamental challenge.

The WHO report provides clear rationale behind the global guidance framework as set out in Table 2.

*Table 2 The rationale behind the global guidance framework*

1.	Rapid development and diffusion of biotechnology capabilities makes challenges for governance.
2.	Countries and scientific institutions lack structures for biorisk governance.
3.	Life sciences are increasingly converging with other fields such as chemistry, AI and nanotechnology. Risks may emerge at these interfaces and not necessarily covered under existing biorisk frameworks.
4.	Paucity of international standards of norms for preventing and mitigating these emerging health security risks.

### III. The Framework

Due to the aforementioned factors, a global guidance framework is needed for mitigating biorisks and governing dual-use research. The WHO biorisk global framework recognizes that there is no standard or unique approach that may be used for this purpose. The framework serves as the first global technical and normative framework that aims to set foundations to inform the development of national frameworks and approaches, taking into account the different national contexts, resources and priorities. Diverse audiences will be targeted via specific and practical toolkits.

WHO has been active in this area of research since the late 60s, with resolution WHA22.58 from 1969, and the publication of the report *Public health response to biological and chemical weapons: WHO Guidance* in 1970 and its second edition in 2004. WHO has recently published guidance on responsible life sciences research and convened consultations on dual use research.

The framework aims to provide guidance, values and principles, tools, and mechanisms to

mitigate and govern existing and future potential biorisks and dual-use research. Biorisk management is defined under this report as ‘an integrative, and overarching approach to address the risks associated with the life sciences research enterprise, from accidents and inadvertent actions to deliberate misuse’ and relies on three core pillars, seen in Figure 3.

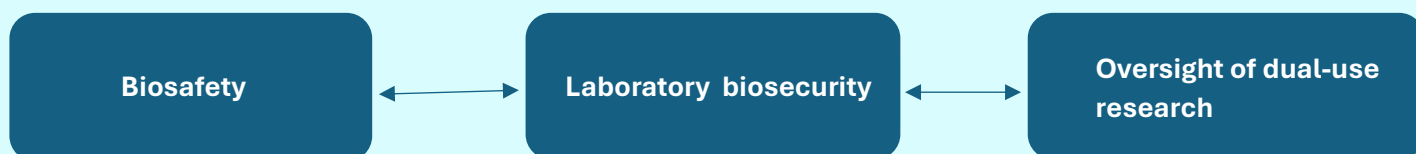


Figure 3 Three core pillars of biorisk management

The WHO report identified the following stakeholders; scientists and their institutions, funding bodies, publishers, editors, governments, civil society, security communities, DIY laboratory communities and the private sector. The report’s target audiences are policy-makers and regulators, scientists, research institutions, educators, trainers, project management staff, funding bodies, publishers, editors, the private sectors (all relevant stakeholders that are part of the research life-cycle) and citizen groups including civil society and organizations.

It is important to note, that this framework does not address the management of responses to disease outbreaks affecting humans, animals and plants. However, this report does recognize the importance of preventing and mitigating these risks in collaboration with the relevant actors and sectors.

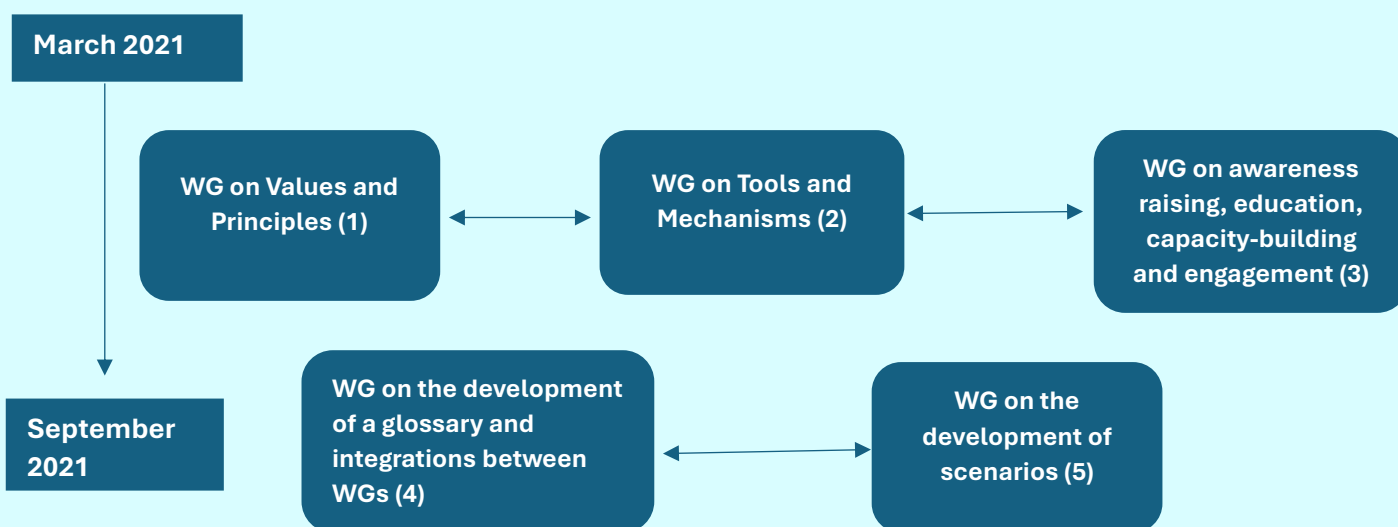
Section 5 of the framework acknowledges that there is no ‘one-size-fits-all’ approach and as such provides checklists of steps that should be considered for developing a biorisk management framework. The checklists are designed for many different stakeholders involved in the governance of biorisks and lists existing resources and tools to support the stakeholders. The framework can therefore be operationalized through the implementation of a six-step approach and the checklists as set out in Table 3.

*Table 3 The six-step approach for implementing the framework and developing biorisk management activities*

Step 1	Identify and assess risks and benefits
Step 2	Describe values, principles and goals
Step 3	Undertake stakeholder analysis
Step 4	Identify tools and mechanisms
Step 5	Implement
Step 6	Review and modify

#### IV. The Five Working Groups

Five working groups (WG) were established to assist in the development of the framework and provided significant technical contributions, as seen in Figure 4.



*Figure 4 Timeline of the Five Working Groups*

An initial consultative meeting was convened in March 2021 to discuss the scope, terminology and critical elements of the framework. Three WGs were established after the meeting; WG on Values and Principles (1), WG on Tools and Mechanisms (2), and WG on awareness-raising, education, capacity-building and engagement activities (3). The three working groups produced three drafts papers of which were shared with participants prior to the 2<sup>nd</sup> meeting in September 2021.



WG 1 was formed to establish a list of principles that would group policies and actions of the multiple stakeholders and sectors in this area. **Principles identified** (see Table 4) **by WG 1 underpin the framework and are viewed as ‘touchstones’ for considered moral judgements about the safe, secure and responsible use of life sciences.** The WG also underscored the need for the development of a glossary, case studies and scenarios.

*Table 4 Principles identified by WG on Values and Principles*

1.	Health, safety and security
2.	Responsible stewardship of science
3.	Integrity
4.	Fairness
5.	Openness, transparency, honesty and accountability
6.	Inclusiveness and collaboration
7.	Social justice
8.	Integration justice
9.	<b>Public education, engagement and empowerment</b>

WG 2 focused on identifying existing tools and mechanisms for governance, identifying the most important challenges, gaps and priorities and developing a set of recommendations for the next steps of the framework. The challenges relate to risks beyond the scope of pathogens, covering information technologies, neuroscience and synthetic biology. Moreover, risks go beyond life sciences to convergent fields of artificial intelligence, chemistry and nanotechnology. Risks may also extend past traditional laboratory environments, such as small start-up companies, non-profits, DIY spaces etc. WG 2 identified three major gaps, shown in Table 5. The gaps identified were the ‘chronic and fundamental challenge’ of biorisk management, demonstrating a lack of awareness, insufficient institutional, national and international policies/governance and a shortage of forums to facilitate information and tool sharing. WG 2 stated that WHO could fill gap 3 by creating a central repository for learning, guidance and resources. Scientists, institutions and Member States could consult the repository and adapt resources to their circumstances.

*Table 5 Three gaps identified by WG on Tools and Mechanisms*

1.	Lack of awareness amongst scientists worldwide
2.	Insufficient institutional, national, and international policies and governance mechanisms
3.	Lack of forums to facilitate the sharing of effective tools and mechanisms (such as central repositories of resources)

WG 2 acknowledged that there is no one-size-fits-all approach and governance of biorisks should be ever-evolving, targeting multiple stakeholders with different governance strategies that should reinforce different goals. Recommendations made by WG 2 can be seen in Table 6.

*Table 6 Recommendations made by WG on Tools and Mechanisms*

1.	WHO should communicate to all Member States and Stakeholders that biorisk management should be of a high priority.
2.	Ongoing education on the biorisk management framework guidance should be created, disseminated and provided.
3.	Ongoing educational outreach activities and forums should be established to facilitate the sharing of effective tools and mechanisms.
4.	WHO should play a leadership role across United Nations agencies and lead/coordinate initiatives to mitigate biosecurity, biosafety and dual use risks.

WG 2 suggested the following possibilities for governance; third-party certification for certain laboratories, inspecting specific laboratories and setting up collaborating centres for biorisk management in all six WHO regions.

WG 3, relating to awareness raising and education, was tasked with reporting the gaps and challenges related to biological security in basic and applied life sciences (and converging sciences and technologies). The key gap identified by WG 3 was that few life scientists had an adequate understanding of the dangers of dual use or of biological security in general. The key challenge was how to fill this gap. WG 3 also was responsible for identifying 13 lessons from past educational activities, found below in Figure 4 and Table 7 and discussed further in section V.

*Table 7 13 key lessons identified from past educational activities by WG on awareness-raising, education, capacity-building and engagement activities.*

1.	The different purposes of the initiatives around education, training, capacity-building and engagement and the fact that it was not always clear what was expected from those “engaged” or “educated”.
2.	The issue of priorities as dual-use and other biosecurity-related issues are not necessarily immediate priorities for many of those associated with the life sciences.
3.	The lack of shared terminology complicates the sharing of best practices
4.	Educational efforts need to be widely promoted and discussed as no single approach can fit the needs and conditions of all.
5.	The importance of being inclusive, as concerns about the hostile use of the life sciences extend beyond those working with pathogens. Research organizations, funders, laboratory technicians, professional societies, data managers and curators, publishers, ethics committees, institutional and repository managers, and civil society networks and regulators have roles to play.
6.	The design and creation of awareness-raising and education materials should integrate best practices, such as active learning and Team-Based learning.
7.	<b>Some participants considered the most appropriate approach would be to integrate material on biosafety and biosecurity into existing training courses on laboratory practice and bioethics while others indicated that there was a need for focused materials in order to develop a biological equivalent of the International Nuclear Security Education Network.</b>
8.	Both bottom up (e.g. informal and self-governance measures) and top down support (e.g. formalized and institutionalized measures) are required.
9.	The importance of having specialised materials appropriate to local circumstances, particularly for low- and middle-income countries; it was suggested that there are currently insufficient locally appropriate case studies.
10.	In order to promote and promulgate materials, the working group emphasized the value of having “champions”, including industry and academic leaders.
11.	Resources both in terms of financial and technical support will be required to undertake activities and sustain cooperative networks and the curation of educational materials.
12.	Enabling measures, such as mechanisms to respond to concerns through providing channels for whistleblowing, need to be developed in tandem with awareness-raising measures.
13.	Measures to support the sustainability of education, training and capacity-building need to be built into initiatives from the beginning.



WG 3 made the following seven recommendations, as seen below in table 8.

*Table 8 Seven recommendations made by the WG on awareness-raising, education, capacity-building and engagement activities.*

1.	An urgent strategic and comprehensive assessment should be carried out of what actions are needed in relation to education and training to prevent the hostile use of basic and applied life sciences, and the situation should be mapped out in order to get a better grasp of the wider context of such actions.
2.	Organizations and Member States should share information about the activities that they have undertaken and the lessons learned from these experiences.
3.	Further efforts are required to establish national and regional networks in relation to education and training underpinned by high-level leadership.
4.	Adequate and long-term resourcing mechanisms for these activities are needed.
5.	The framing of the problem around biological weapons or even dual use may be less productive than looking at the multiple uses of basic and applied life sciences or the broader issues of the unwanted side effects of research through discussion of the responsible conduct of research. This could enable greater engagement and buy-in from life scientists and those associated with basic and applied life sciences.
6.	Metrics for evaluation need to be developed and integrated into any initiative to capture indicators of success or failure in order to build a better evidence-base for what works (and what does not).
7.	There is a need to define a diversity of scenarios and case studies that can be used to identify key issues of relevance to preventing accidental, inadvertent and deliberate diseases. Before choosing such scenarios, it will be important to sketch out the landscape of different scenarios of relevance to all aspects of the research process and regarding diverse areas of the life and associated sciences. Scenarios should be chosen to reflect the whole landscape and should not be dominated by any one part of the research process or any one area of life sciences.

Two additional WGs were formed in September 2021; WG on the development of a glossary and integrations between WGs (4) and WG on the development of scenarios (5).





## V. Education, awareness raising and courses

Section 4, 4.4, Annex 2 and Annex 3 directly relate to biosecurity education, as seen above in Figure 2. The report refers to biosecurity education and awareness raising as a tool and mechanism of biorisk governance. Tools and mechanisms provide practical grounding for the application of values and principles, of which form/provide the ethical foundations for responsible use of the life sciences. This element of combining ethics with tools and mechanisms for responsible use of the life sciences is an important aspect of the WHO approach. In order to ensure uptake of these ethical foundation elements, the report advocates the development and implementation of awareness raising, education, codes of conduct, ethical reviews, training and capacity-building. Evaluation is another important element, and some evaluation has taken place in previous exercises, however, the extent may be unacknowledged or underacknowledged.

Annex 3 provides an overview and illustrative examples of awareness raising and education in 18 countries plus the United Nations Interregional Crime and Justice Research Institute. The education and awareness raising exercises will be attached to the end of this report and titled Annex 3. Key examples listed in Annex 3 include but are not limited to *The Tianjin Biosecurity Guidelines for Codes of Conduct for Scientists* and *The Biosecurity Emergency Response Training Australia (BERTA)*.

Annex 2 uses case study examples to demonstrate how combining tools and mechanisms with values and principles may be used to evaluate the risks/benefits of the research and how integrating ethics into analysis is vital. The WHO report uses case study 1 (The Chemical synthesis of poliovirus cDNA, see Box 1), to illustrate a risk-benefit analysis and to deliberate on whether the potential benefits outweigh the risk of misuse and visa versa.

### Box 1: Overview of case study 1 – The Chemical synthesis of poliovirus cDNA

- 2001, USA researcher announced their laboratory had synthetically created a full-length poliovirus complementary DNA (cDNA) construct, without the use of living cells, template DNA or RNA.
- Results published in journal Science In 2001 – First publication for chemically synthesizing a virus de novo.
- Laboratory views viruses as chemicals with life cycles vs living entities, and this experiment was formed to support this argument.
- Used publicly available sequence to create their synthetic virus
- Found similar pathology between the chemically derived virus and wildtype virus.
- Received criticism that the publication of the work may give bioterrorists tools to create a bioweapon.  
For example, may allow someone with malicious intent to synthetically create Ebola virus etc.
- Lead researcher stated this work highlighted the risks of having virus sequences publicly available.
  - Work was not contributing to additional risk because there had already previously published that it was theoretically possible.
- Concerns if the US government would implement new research restrictions, especially in-light of the 2001 Anthrax attacks.
- This case highlights the controversy on information hazards and highlights the importance of internal and external ethical reviews before publication.

The report has identified 13 key lessons from past educational activities, as seen above in Table 7 and below in Figure 5. The identified lessons provide key aspects of which must be addressed when developing a biorisk management framework/initiatives.

Firstly, it should be acknowledged that the **purpose** of the exercises will vary from enabling self-governance to underpinning formal oversight, to promoting discussion and other objectivise. Awareness raising and education should address accidental (biosafety) and the prevention of deliberate outbreaks of disease (biosecurity), and should established what is expected of those undertaking the education. The biosafety aspect may be addressed through the implementation of institutional safety procedures, however, the prevention of hostile use (biosecurity) requires the sustainable and systematic implementation of education to students, trainees, scientists and the entire research life-cycle.

The **priorities** of what should be addressed needs to be established. For those associated with basic and applied life sciences, biosecurity and dual-use research may not be an



immediate priority. Furthermore, for countries facing severe health and environmental challenges, it is a demanding and difficult task to balance security threats associated with the life sciences. The report also notes that the lack of shared **definitions** and terminology, including key terms such as biosafety, biosecurity and dual-use complicates the sharing of practices. **Discussions** are key due to the uncertainty regarding how education and training should be performed, what it should entail, why it is necessary and who should be involved. The report recognises that no single approach can meet the needs and conditions of all, therefore, the strengths, opportunities and challenges of the initiatives should be evaluated. Evaluation allows for the assessment of the tools and mechanisms, and how capacity building may be improved.

Drawing upon the need of discussions to attempt to factor in the needs and conditions of all, it is important to promote **inclusion** within frameworks/initiatives. Past initiatives involved a wide-range of stakeholders, as concerns regarding biorisks are not limited to those working with pathogens. Concerns extend to research organizations, funders, laboratory technicians, professional societies, data managers and curators, publishers, editors, ethics committees, institutional or repository managers, civil society networks and regulators have all roles to play – both as teachers and learners.

The **innovation** of the initiatives should tailor awareness-raising and education materials to integrate best practices. Active learning and team-based learning approaches have proved to be and have enduring value and as such could be adapted for future training. The **integration** of educational materials may be implemented into pre-existing training courses on laboratory practice and bioethics. They may also be integrated into wider discussions on responsible conduct of research. The report states that both a **bottom-up** and a **top-down** support is required, with top-down support particularly important in institutionalizing initiatives.

Organizations and countries require educational material which is appropriate to their circumstances, and as such **localized materials** are ideal. As previously stated throughout the WHO report, there is no one-size-fits-all approach and scenarios must be tailored to each local context and must be accessible and promulgated. Materials must consider the local risks

and challenges.

The WHO report also recognizes the importance and value of **champions** to promote and promulgate the materials. The formation of informal and formal networks is important in creating, identifying and fostering individual champions or groups of champions. Networks are important to capitalize on attention towards responsible conduct of research and open science education.

There have been several past educational initiatives that have faced difficulties with sustainability due to lack of **resources** and funding. In order to sustain cooperative networks and curate educational materials, both financial and technical support is required. It is vital to form routes to **enable measures**, such as providing channels for whistle-blowers in addition to developing tools and mechanisms that target/respond to concerns. This is important in regards to reporting and responding to suspicions of which maybe raised by trainees, students, scientists, or other relevant stakeholders.

As discussed throughout, **sustainability** is vital to forming initiatives. Measures to sustain initiatives must be integrated into exercises from the beginning. Consideration of incentives for engagement is recommended, such as relevant career metrics.



Figure 5 13 key lessons identified by WHO from past educational activities



### **Biorisk Implementation and Evaluation Framework (BRIEF) Tool**

The draft online implementation and evaluation tool (BRIEF) was formed to support Member States and other stake holders to operationalize the framework. The online tool also serves to develop biological risk management processes relevant to their contexts and priorities. The online tool has been developed via a contract to The Johns Hopkins University Center for Health Security. Johns Hopkins provides three main purposes of the tool, as seen in Table 9.

*Table 9 Three purposes for the Biorisk Implementation and Evaluation Framework (BRIEF) Tool*

1.	Socialize and provide further awareness of the Global Guidance Framework and the need to strengthen biorisk management.
2.	Identify the greatest priority risks at the individual country or institutional level
3.	Serve as a management tool to address these risks and implement mitigating activities.

As of June 2024, the development of the tool was progressing, with the skeletal categorization framework, specific risk questions and answers, and the first draft of the tool (Draft 0) completed.

### **Training Course on Dual-Use Research and the Responsible Use of the Life Sciences**

The WHO online training course for dual-use research and responsible use of the life sciences is aimed at all relevant stakeholders, from lab bench to oversight policy and mechanisms including internationally, within national governments, funding bodies, publishers, educational institutions, the private sector and other stakeholders. The online training course will be freely available on the WHO Academy platform. The next steps will be dedicated to finalizing the training course and uploading it to the WHO Academy platform.



## VI. Conclusion

The WHO Global framework is the most thorough study of biosecurity education so far and holds major implications for IBSEN and all other biosecurity education projects. The framework highlights a lack of awareness amongst scientists globally and stresses that risks go beyond life sciences to convergent fields of Artificial Intelligence, Chemistry and Nanotechnology. The emphasis of lack of awareness and convergent approach is in line with the reasons for the IBSEN project. A key aspect of the framework is acknowledgment that there is a wide range of targeted stakeholders and it is important to adopt a 'no one-size-fits all' approach. The framework supports stakeholders via the identified values and principles to assist in decision making. An important element of the framework is the articulation between ethics and education. The framework advocates for ethics to be embedded within the formation of education resources. It is clear throughout the framework that ethics have been of a major priority, with ethics encoded into each section. Application of ethics can be evidenced via risk assessments, values and principles, the six-step implementation approach and 13 lessons from previous education activities.

Moreover, the WHO's efforts to implement this framework, the methodologies it uses and its evaluation system will hold key insight for all current and future biosecurity education projects including the IBSEN. Given IBSEN's areas of interest the following questions apply:

1. How will the WHO report the educational activities undertaken through implementation of the framework, so that a much wider audience of stakeholders can understand the lessons learned?
2. What different methods of evaluation will the WHO use to assess the impact of the courses undertaken and how will these evaluation methods be assessed?
3. What evaluation will be made of the chosen main method of implementation via an online course as against other possible education implementation methods?
4. Will other groups that use the online course material produced by the framework project be requested to report their experiences and how will such project reports be made available to the wider biosecurity education community worldwide?



5. To what extent will the online course and other material be made available in languages other than English, so as to enable relevant implementation across the world?
6. How can people attempting to implement biosecurity education link the ethical values stated to decisions made about research activities. For life scientists is there a crucial link to be made to the Tianjin Guidelines?
7. How will the WHO sustain the implementation and development of the framework's biosecurity education aspect?

Clearly, as the IBSEN project moves progressively towards its implementation phase, these questions will be of greater relevance for the design of future IBSEN's activities.

#### **4. News from the Biological Security Research Centre, London Metropolitan University**

##### Biological Security Research Centre co-host a side event on the margins of the OPCW Conference of State Parties 2024

The Biological Security Research Centre (BSRC) at London Metropolitan University (LMU) co-hosted with the Advisory Board on Education and Outreach (ABEO) of the Organisation for the Prohibition of Chemical Weapons (OPCW) a side event titled as Progress in Chemical and Biological Security Education (<https://www.opcw.org/calendar/csp/side-events>) on the margins of the Twenty-Ninth Session of the Conference of the States Parties (CSP-29) to the Chemical Weapons Convention, The Hague, The Netherlands, 25-29 November 2024.

Chemical and Biological Security Education face great challenges. One common challenge is how to implement global and regional education sustainably and to design relevant resources.

Initiatives developed by international organisations such as the ABEO of the OPCW and by the civil society, including the work of the London Metropolitan University (LMU) Biological Security Research Centre (BSRC), have created the opportunity to share examples of good practices. This also allows each initiative to learn from previous and ongoing challenges that each face.



This side event was therefore designed to provide a platform to introduce recent progress on chemical and biological security education and showcase updated research and activities, particularly to share the projects conducted by the ABEO and the LMU BSRC. These projects that target the same audience students and young professionals highlighted the importance of collaboration between academia and international organisations in chemical and biological security education. A collaborative approach to chemical and biological security education was therefore essential to implement the BTWC and CWC efficiently; and it was also necessary to develop new methodologies and implementation tools to address the rapid advancements in science and technology.

The programme included the presentation from ABEO Chairperson, Professor Magda Bauta Solés and BSRC Director, Professor Lijun Shang. It also included a short presentation from Ms Maeva Khachfe, Director of Research, KE and Enterprise Operations at London Metropolitan University to introduce university's support and involvement. In the end, there was a session for questions and discussion. The side event was attended by over 100 people from UN officials, Delegations from States Parties to the CWC from all over the world and civil society. The presentations were highly appraised, and the approaches taken by OPCW/ABEO and LMU BSRC were recognised and highly recommended.

All attendants agreed that this kind of dedicated side event should be encouraged to help civil society expertise to contribute to the future development of the chemical and biological security education to ensure a responsible use of knowledge in science.

Professor Lijun Shang, Director of LMU BSRC commented, "co-hosting a high-profile side event on the margins of the OPWC Conference of the States Parties to present biosecurity education works from London Met not only showcased the important works from my centre, but also promoted the Centre, the School and the University to outside world. I am looking forward to further collaboration across the world."

The side event was funded by the OPWC, and a grant awarded to Professor Lijun Shang by JRCT. Any enquiry please contact Professor Lijun Shang on [l.shang@londonmet.ac.uk](mailto:l.shang@londonmet.ac.uk)





*Progress in Chemical and Biological Security Education - Co-hosted side event between the Biological Security Research Centre and Advisory Board on Education and Outreach (ABEO) of the Organisation for the Prohibition of Chemical Weapons (OPCW)*

Maeva Khachfe's speech at the Biological Security Research Centre x Advisory Board on Education and Outreach (ABEO) of the Organisation for the Prohibition of Chemical Weapons (OPCW)

As everyone knows improving biological security education is very important in the process of maintaining and strengthening the BTWC. Civil society plays an important role in this endeavour.

London Metropolitan University set up the Biological Security Research Centre (BSRC) in 2020 with Professor Lijun Shang, the co-organiser of this Side Event, as its founding Director.

BSRC is a home for scholars from diverse subject areas who can address the issue of biological security, foster the next generation of researchers, and enable London Metropolitan University to become a centre of excellence in biological security research and education. The Centre focuses in particular on strengthening the international norm against biological and chemical warfare which is embodied in the 1925 Geneva Protocol, the 1970s Biological and



Toxin Weapons Convention (BTWC) and the 1990s Chemical Weapons Convention (CWC).

The COVID-19 pandemic dramatically demonstrated how vulnerable modern society is to disease and has brought increased attention to the problem of biological security. While national and international efforts have been made in recent decades to strengthen the BTWC and the CWC, many gaps and challenges remain, and these will obviously increase as beneficial work in the life and associated sciences inevitably opens up new possibilities for dual use – the fact that: “knowledge and technologies used for beneficial purposes can also be misused for harmful purposes.”

Building on the strong tradition of UK applied academic and policy support for strengthening the norm against biological and chemical warfare, the LMU Biological Security Research Centre (BSRC) is concerned specifically with the development and implementation of new methods of biological security awareness-raising and education for scientists, social scientists, policy makers and the general public. The University has supported this initiative from the very beginning. Apart from the centre’s own funding route, LMU provides every year small funds to help BSRC to flourish.

BSRC has been awarded 8 grants in the last 4 years and published over 30 high impact journal articles, written several reports and organised several workshops and seminars like this one nationally and internationally. BSRC has dedicated webpage to store its publications, and all publications can be accessed freely. Several papers have clearly identified the gap existing on biological security education, especially how this gap can be narrowed, and how NGOs can work cooperatively with international organisations such as the BTWC, OPCW/ABEO and WHO.

Now, the Centre has an opportunity to help develop an International Biological Security Education Network (IBSEN) to foster University level biosecurity education similar in scope to the International Nuclear Security Education Network (INSEN) organised through the International Atomic Energy Agency (IAEA). This work will complement the work of the Advisory Board on Education and Outreach (ABEO) of the Chemical Weapons Convention and that of the World Health Organisation’s efforts to implement its new Global Biosecurity

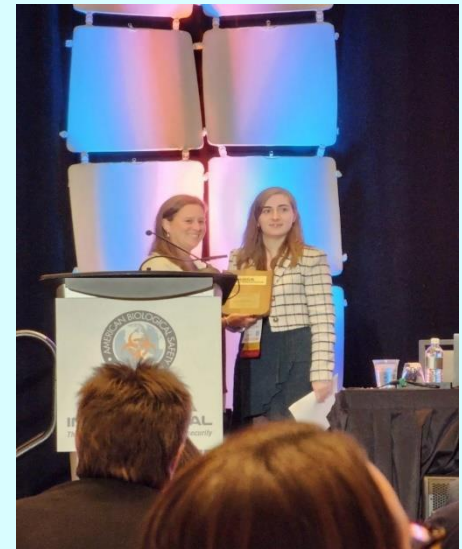


Framework. This is what the recent grant awarded to Prof Shang from the Joseph Rowntree Charitable Trust should enable the BSRC to do. In the next 2 years, we hope this project will see the foundation of the international network. LMU will give full support on this project.

We welcome everyone who would like to collaborate with LMU BSRC in this task and LMU will continuously support the work at BSRC including support to host workshops. Therefore, I hope to see you sometime in London.

### IBSEN Project Work Awarded Prestigious Robert I. Gross Memorial Award

On 12 December 2024 the news centre of Kings College London reported on the award of the Robert I. Gross Memorial Award at the annual Biosafety and Biosecurity Conference organised by the Association for Biosafety and Biosecurity in the United States to Iris Magne, one of Kings' PhD candidates. Iris explained that "I was working part-time for London Metropolitan University, where I helped to develop the International Biological Security Education Network (IBSEN). I submitted a project to the ABSA International Conference, the largest conference on biosecurity and biosafety in the world. They had one panel on biosecurity, and I was invited to speak." Iris noted that "I spoke about IBSEN, the Biological Security Education Network, and what we can learn from nuclear and chemical security education to develop biological security education. It was a comparative approach, looking at different types of security education."



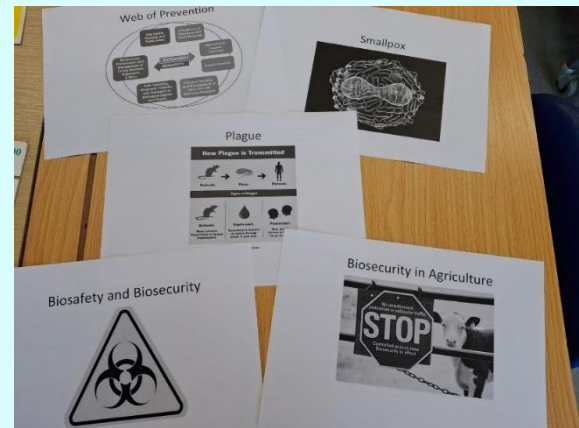
*Iris Magne accepts Robert I. Gross Memorial Award on behalf of the International Biological Security Education Network.*

It is a pleasure to congratulate Iris on the award and the significant acknowledgment of the importance of the IBSEN project on biosecurity education.



### Update on IBSEN Biosecurity education in High School project

Olivia Ibbotson has confirmed collaboration with a local high school to initiate a Biosecurity education project. The project aims to develop educational materials and implementation methodologies to introduce students to biosecurity, drawing upon topics already embedded into the curriculum such as gene editing and vaccines. Olivia will lead the project for the International Biological Security Education Network and work collaboratively with lead Science Technician Gill Moore. Olivia has developed a detailed timeline, and devised content and evaluation methodologies with Gill. Gill has also developed some exciting resources to introduce the topic to students. We hope to host a launching event shortly.



*Biosecurity resources created by Gill Moore*

We thank Gill Moore for her passion and dedication to the project!

### Presentation of biosecurity education in agribusiness at the North East Postgraduate Conference

Olivia Ibbotson presented the work of the International Biological Security Education Network at the North East Postgraduate Conference in Newcastle. Olivia illustrated a survey study on current biosecurity education in the agribusiness sector. The survey revealed, quite worryingly, that only 4% of courses surveyed contained clear biosecurity elements. This research builds upon the two British Academy funded Biosecurity risks in Agribusiness workshops held in London and Amsterdam by our centre.



*Olivia Ibbotson presented the work of the IBSEN at the North East Postgraduate conference*



Horizon Europe bid – ‘Prevention, detection, response and mitigation of chemical, biological and radiological threats to agricultural production, feed and food processing, distribution and consumption’

The Biological Security Research Centre previously hosted two British Academy funded workshops in London and Amsterdam to discuss Biosecurity risks affecting Agribusiness in preparation for a Horizon Europe bid. The workshop saw the creation and collaboration of a multidisciplinary team of experts, who formed several working packages for the bid. The team submitted their Horizon Europe proposal in November 2024.

Legal analysis of White Phosphorus research paper to be published in the CBW magazine

Olivia Ibbotson has authored a research paper analysing the legality and ethics of military use of White Phosphorus. Olivia’s paper discussed the legal, ethical and health risks associated with White Phosphorus.

Olivia’s paper is set to be published in the Summer edition of the Chemical and Biological magazine, Manohar Parrikar Institute for Defense Studies and Analyses.

Visiting Fellow to London Metropolitan University Biological Security Research Centre

Our centre is pleased to announce Professor Matteo Gerlini will be joining us as a visiting fellow.

Matteo Gerlini, PhD in history of international relations, is associate professor in the University of Siena. He chaired the International Nuclear Security Education Network, the academic partnership promoted by the IAEA. He has ran research and gave lectures in the University of Rome La Sapienza, the University Pompeu Fabra, Barcelona, and Keio University, Tokyo. He was delegate of the University of Florence in the EU Non Proliferation and Disarmament Consortium. In 2020 he was Taiwan Fellow at National Chengchi University, Taipei. He is currently member of the ISEG panel in the NATO Science for Peace and Security Program, and member of the NATO Defence College Foundation board of





directors. Scientific coordinator of the Training in Radiological and International Nuclear Security (TRAINS), granted by OECD-NEA NEST program. He is visiting fellow at Alcide De Gasperi Center, European University Institute, on the history of Joint Research Centre – European Commission. Member of the scientific committee of the Specializing Master program in Nuclear safeguards, organized by the Polytechnic of Milan and the European Nuclear Education Network. Lecturer on EURATOM history in the European Safeguards Research and Development Association (ESARDA) courses.

Other news:

- Professor Dando and Shang had been interviewed by to Gwyn Winfield of CBRNe world about setting up their International Biosecurity Education Network (IBSEN).
- Professor Shang made a presentation at the 18th Vaccine Congress on 8-11 September 2024, Lisbon, titled as “Close the biological security education gap: Toward a collaborative, collective and integrative international biological security education”.
- Professor Shang has been invited to give a talk at a workshop on “Developing a Biosecurity Regulator Framework in Brazil” on 9-10 September 2024, Brasilia titled as “Close the biological security education gap: Introduction of biosecurity and global importance”.
- Professor Matteo Gerlini, the previous chair of an International Biosecurity Education Network (IBSEN), came to LMU BSRC as a visiting fellowship from September 2024 to February 2025 to conduct a joint research project with Professor Shang on “Comparing international security paradigm: biological and nuclear”.
- Professor Shang was invited to an Advanced Research Workshop of the NATO Science for Peace and Security Programme in Rome on 19-21 November 2024 titled as “Potential Biosecurity Issues on Agribusiness”.
- Professor Shang gave a presentation at an Interdisciplinary Nuclear Disarmament Symposium on 6th December 2024 at Bradford University titled as “Lessons learned from INSEN and beyond”.



## Bibliography

World Health Organisation (2022) *Global guidance framework for the responsible use of the life sciences: Mitigating biorisks and governing dual-use research* WHO, Geneva. [GLOBAL FRAME WORK.pdf](#)

World Health Organization (undated) *WHO global guidance framework for the responsible use of the life sciences: from guidance to action*. WHO, Geneva. [https://cdn.who.int/media/docs/default-source/research-for-health/final\\_a0\\_24039\\_poster\\_who-global-guidance-framework-for-the-responsible-use-of-the-life-sciences.pdf?sfvrsn=6ceac6f7\\_3](https://cdn.who.int/media/docs/default-source/research-for-health/final_a0_24039_poster_who-global-guidance-framework-for-the-responsible-use-of-the-life-sciences.pdf?sfvrsn=6ceac6f7_3)

World Health Organization (2021) *WHO Consultative Meeting on a Global Guidance Framework to Harness the Responsible use of Life Sciences: Meeting Report*. WHO, Geneva, 11 March. [9789240027879-eng.pdf](#)

World Health Organization (2021) *Second WHO consultative meeting on a global guidance framework to harness the responsible use of life sciences Meeting Report*. WHO, Geneva. 7 September. [9789240039544-eng.pdf](#)

World Health Organization (2024) *WHO Technical Advisory Group on the responsible use of the life sciences and dual-use research Report of the meeting*. WHO, Geneva, 25 June. [9789240102569-eng.pdf](#)



### Annex 3. Illustrative examples of awareness raising, education, training, and capacity-building in the life sciences and related fields

Argentina	<p>The Argentine National Authority for the Chemical Weapons Convention developed a national project on education and outreach.</p> <p>The chemistry department at the University of Rosario, where chemical safety, security and responsible conduct of science are part of the chemical curricula, with various curricular activities, elective subjects (e.g. bioethics, green chemistry and educating for a sustainable future) and complementary activities (e.g. workshops and seminars).</p>
Australia	<p>The Biosecurity Emergency Response Training Australia (BERTA)</p>
Canada	<p>Centre for Biosecurity of the Public Health Agency of Canada and the Office of Biohazard Containment and Safety of the Canadian Food Inspection Agency have both created biosafety and biosecurity training materials and online training portal.</p> <p><i>Tri-agency framework: Responsible conduct of research.</i></p>
China	<p><i>The Tianjin Biosecurity Guidelines for Codes of Conduct for Scientists</i></p>
France	<p>The Agence Nationale de Sécurité du Médicament et des produits de santé (ANSM) [National Agency for the Safety of Drugs and Health Products]</p> <p>The National Consultative Council for Biosecurity (CNCB)</p>
Germany	<p>The German Research Foundation (DFG) and the Leopoldina (German Academy of Sciences) established the Joint Committee on the Handling of Security-Relevant Research.</p> <p>The Federal Foreign Office established the German Biosecurity Programme.</p> <p>The Central Committee on Biological Safety</p> <p>German Society for Virology (GfV) are also guiding activities for awareness raising.</p>





India	The Indian Council of Medical Research issued the revision of its <i>National ethical guidelines for biomedical and health research involving human participants</i>
Japan	<p>The Science Council of Japan revised its code of conduct for scientists in 2013 and included a clause on DURC.</p> <p>The Subcommittee on Pathogens Research made recommendations on dual-use issues related to infectious disease research, noting the importance of awareness-raising and educational activities in academia.</p> <p>The Biosecurity Study Group</p> <p>The Association for the Promotion of Research Integrity, founded in 2016, has been providing online educational modules in both Japanese and English, part of which includes education on biosecurity.</p>
Kenya	The Kenya Chemical Society has conducted chemical security training and outreach campaigns in academia and industry.
Lebanon	<p>Biosafety and biosecurity association</p> <p>Provided education on basic biosafety principles and biosecurity measures through seminars, symposia, poster sessions, workshops, online courses and forums, as well as train-the-trainer events.</p>
Malaysia	The responsible conduct of research (RCR) education agenda by Educational Institute on Responsible Science.
Mexico	The Mexican Biosafety Association
Morocco	The Moroccan Biosafety Association
The Netherlands	<p>Biosecurity office</p> <p>At the request of the Dutch Ministry of Education, Culture and Science, the Royal Netherlands Academy of Arts and Science (KNAW) developed a Code of Conduct for Biosecurity.</p>
Pakistan	In collaboration with other countries, Pakistan has been carrying out awareness-raising activities and producing educational materials



	on bioethics, biosafety, biosecurity and dual-use research since 2010.
Ukraine	In 2018, the Organization for Security and Co-operation in Europe conducted a thorough review of biological safety and security in Ukraine and identified major gaps, one of which was appropriate training in biosafety and biosecurity.
United Nations Interregional Crime and Justice Research Institute	<p>The United Nations Interregional Crime and Justice Research Institute (UNICRI), in collaboration with the US Federal Bureau of Investigation (FBI), administers the International Network on Biotechnology (INB).</p> <p>The INB also supports the development and sharing (via an online portal accessible to network partners) of modular educational resources (e.g. awareness-raising videos, scenarios and active learning exercises) covering the themes of biosafety, biosecurity and bioethics.</p>
United Kingdom of Great Britain and Northern Ireland	<p>The International Biological Security Programme (IBSP).</p> <p>The University of Bath and the company Biosecure developed an online training course “Next generation biosecurity: responding to 21st century biorisks”.</p> <p>The University of Bradford has produced an education module resource, <i>Preventing biological threats: what you can do</i> and <i>Biological security education handbook: the power of team-based learning</i>.</p> <p>London Metropolitan University has produced an innovative set of biological security education cartoons, of which have been translated into several languages.</p>
United States of America	The US Department of State Bureau of International Security and Non proliferation Office of Cooperative Threat Reduction initiated the Biosecurity Engagement Program (BEP).

Annex 3. Illustrative examples of awareness raising, education, training and capacity-building in the life sciences and related fields - Global guidance framework for the responsible use of the life sciences: Mitigating biorisks and governing dual-use

A photograph of the United Nations Secretariat Building in New York City. The building is a large, light-colored stone structure with a central entrance. Above the entrance, the words "UNITED NATIONS" and "NATIONS UNIES" are inscribed on either side of the UN emblem. The building is flanked by two long, parallel rows of flagpoles, each topped with a globe. The flagpoles are filled with the national flags of various countries, creating a vibrant display of colors. The sky is overcast and grey.

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