IBSEN First Quarterly Newsletter

May 2024

Executive Summary

Rapid advances in life sciences come along with lots of issues such as the development of cyberbiosecurity and the synergy of chemistry and biology. These scientific breakthroughs represent more opportunities for malign uses of research. However, there is a lack of education within the scientific community and policymaking spheres regarding dual-use research and biosecurity. The International Biological Security Education Network (IBSEN) was founded in February 2024 by the London Metropolitan University (LMU) Biological Security Research Centre (BSRC) to address these gaps. As part of this effort, this First Quarterly Newsletter will address the structure of the Network, its progress in the first months of work and LMU BSRC's future projects on strengthening global biosecurity education.

The feature column within this Newsletter analyses the development of the International Nuclear Security Education Network (INSEN), founded by the International Atomic Energy Agency (IAEA) in 2010. This *Special Topic* examines the good practices of the INSEN, the challenges it faced and draws implications for the International Biological Security Education Network.

The Quarterly Newsletter also aims to gather the latest initiatives in biosecurity education from the LMU BSRC and other regional and international actors. The section *News in Global Biosecurity Education* is designed for this purpose.

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

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1. Note from the Director of the London Metropolitan University Biological Security Research Centre (BSRC)

Image 1 Prof Lijun Shang, Director of the Biological Security Research Centre, London Metropolitan University

Biological security requires prevention of natural, accidental, and deliberate disease. A fundamental problem for future biosecurity is that the scientists creating the revolution in the life sciences have little understanding of the problem of dual-use and biosecurity. We at London Metropolitan University (LMU) Biological Security Research Centre (BSRC) have attempted to help correct this dangerous problem by providing support for efforts to endorse and implement the new Tianjin Biosecurity Guidelines under the Biological and Toxin Weapons Convention (BTWC) through inputs to the 9th Review Conference and its preparatory State Parties meetings. We also particularly focused on UK national biosecurity strategy by providing two reports to Parliament Committees and holding a cross party workshop on this issue. We have also promoted these efforts by publishing nine papers, and by being interviewed by the BBC and other media, particularly we recently edited the first biosecurity education resource book and published by Wiley in 2024. All these efforts finally came to the new initiative of "Building an international biological security education network (IBSEN)" which we hope to close the major gap in biosecurity. This ambitious project is kindly supported by a grant reward from Joseph Rowntree Charitable Trust.

We plan a systematic phased approach overseen by a small international advisory group drawn preferentially from colleagues in Africa, Latin America, and Asia along with those in European and North America and particularly firstly with UK stakeholders. The INSEN project has been substantially supported by the IAEA with organisational resources and finance, but we think that by careful use of the internet for dissemination of the intended Newsletters and

Zoom meetings we can run this project at very reasonable costs within a specific time. The core idea is to develop a network through production and wide distribution of a quarterly International Biological Security Education Network Newsletters during the two years of the project. The aim, objectives including structure framework, management and implementation strategies, and practical examples will all be discussed and presented in the newsletters. The Newsletters will be distributed only via the internet to minimise costs, but also be freely available on our centre's website at the London Metropolitan University as a central repository of information about IBSEN. We would start with a collection of contacts we already have for the mailings including those in the UK and aim to steadily build up to some 200 plus interested people globally including a good number who would take part actively in the later stages of the project where courses begin to be designed and implemented. The methodologies employed will include literature search, interview, questionnaires, systematic review and analysis, group discussion and small workshops both online and in person. The achieved objects set in this project will not only promote biological security education globally but also bring significant impact on policy and practice particularly in the UK by showing its leading role in promotion of the BTWC. The topics for the newsletters and ways to deliver will be carefully selected. Each Newsletter will summarise project works at each quarterly stage and be drafted by an invited academic along with PI and then reviewed by our oversight group set at the beginning of the project which will include experts globally. The project will closely interact with UK biosecurity strategy and BTWC meetings and conferences. It should be noted that the 9th Review Conference of the BTWC decided in December 2022 that a radical rethink of the structure and function of the Convention was required, and it set in a new system of meetings for working out what should be done over the next two to three years. This will involve expert meetings in the Spring/Summer that will report to an annual meeting of States at the end of the year in Geneva. The topics to be decided upon include the requirement for a new science and technology review mechanism and international cooperation between States Parties with different resources. Our intention would be to carefully monitor these meetings and input the material we develop in the project with the aim of engaging States Parties and the growing Convention Organisation with the building IBSEN.

We are eager to see the project fast moving forward, and welcome any information exchanges, collaborations, and jointed efforts from colleagues all over the world. Please feel free to get in touch with our team, and thanks for your interests.

2. The International Biological Security Education Network (IBSEN)

The International Biological Security Education Network (IBSEN) was founded in February 2024 thanks to a grant awarded by the Joseph Rowntree Charitable Trust (JRCT). Hosted by the London Metropolitan University Biological Security Research Centre, the IBSEN arose from the willingness to address the numerous gaps in biosecurity education across the world. Based on the principles established in the Biological and Toxin Weapons Convention (BTWC) and the Chemical Weapons Convention (CWC), this project aims to lay the foundations of a framework for widespread biosecurity education. This education is necessary and a key element to raise awareness among life scientists of the risks of scientific research with dual-use implications. Dual-Use Research of Concern (DURC) is scientific research with significant potential for generating information that could be used to harm national security, public health, or the environment. The rapid advances in life sciences represent also more capabilities for malign uses of the research. However, there is a clear lack of education on these issues in the scientific community and other stakeholders from the civil society. The IBSEN will provide tools to fill this gap.

Works at the first months of the IBSEN were dedicated to laying the Network's foundations. This included the design of the IBSEN website, the organisation of a high-profile policy workshop and the creation of a contact database of people interested in biosecurity education. The IBSEN website, launched in April 2024 has multiple purposes. It aims to not only promote the IBSEN project but also to serve as the platform gathering freely available resources in biosecurity education. Moving forward, the IBSEN aims to develop various educational resources for scientists at all levels, from high school to continuing professional

education by our own and through collaborations with colleagues across the world. All these will be shared through our Quarterly Newsletters. We will also hold workshops and webinars from time to time and disseminate our research by attending relevant conferences including BWC regular meetings, having side events, etc.

3. IBSEN Team and International Oversight Board

The IBSEN project is led by **Professor Lijun Shang**, Director of the Biological Security Research Centre (BSRC) London Metropolitan University and **Professor Malcolm Dando**, Emeritus Professor at the University of Bradford and visiting Professor to LMU BSRC. **Ms Iris Magne** is the research assistant for the IBSEN at the London Metropolitan University. **Ms Olivia Ibbotson** is another research assistant from LMU BSRC who will be involved in some of the activities.

The work of the IBSEN is supported by a volunteer International Oversight Board constituted of 8 experts representing a broad geographical coverage and interdisciplinary backgrounds:

- ***Prof Brian Balmer**, Professor of Science Policy Studies at University College London (UCL), United Kingdom*
- ***Prof Halima Benbouza**, Director for Science and Technology at the National Council of Scientific Research and Technologies, Algeria*
- ***Dr Maria J. Espona**, Director of Argentina Information Quality (ArgIQ), Argentina*
- ***Prof Kathryn Nixdorff**, Professor in the Department of Microbiology and Genetics, Darmstadt University of Technology, Germany*
- ***Dr Dana Perkins**, Senior Science Advisor, Administration for Strategic Preparedness and Response (ASPR) U.S. Department of Health and Human Services, USA*
- ***Dr Samira Senouci**, First Vice-President of the Moroccan Biosafety Association (MOBSA) and manager at LabSolutions, Morocco*
- ***Prof Zabta K. Shinwari**, Vice Chancellor of the Federal Urdu University of Arts, Science and Technology, Pakistan*
- ***Prof Xue Yang**, Professor at Law School and a Senior Fellow at the Center for Biosafety Research and Strategy (CBRS), Tianjin University, China*

The biographies of each International Oversight Board Member can be found on the IBSEN website.

4. *Special Topic*: History of the International Nuclear Security Education Network and implications for the IBSEN[1]

Advances in life sciences and other scientific breakthroughs lead to an increasing number of challenges faced by biosecurity. [1] This is exacerbated by the lack of skilled and motivated personnel trained in biosecurity. A similar defining moment took place almost fifteen years ago in the field of nuclear security. The International Nuclear Security Education Network (INSEN) aimed to address the absence of trained professionals in nuclear security and enhance global security through excellence in education. [2] *How did the INSEN challenge the absence of nuclear security education by providing an international disciplinary frame?* This article will explore the history of the INSEN and draw the implications for the newly established International Biological Security Education Network (IBSEN).

I. History and development of the INSEN

International context background for the establishment of the INSEN

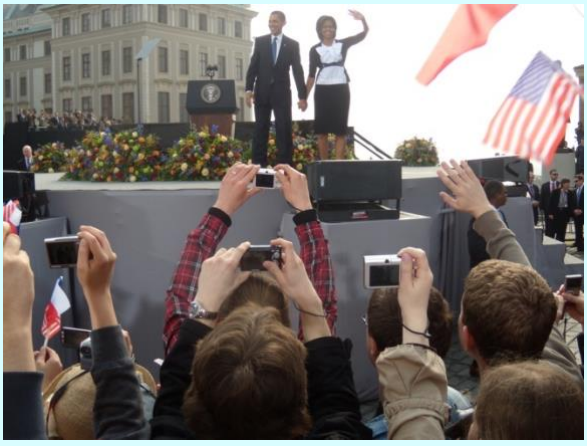


Image 2 US President Barack Obama in Prague, 5th of April 2009

The new international context after the September 11 attacks played a significant role in the creation of the INSEN. Rising threats included the interests of terrorists in obtaining weapons of mass destruction and other political developments, such as the nuclear program of Iran. This context led to the increasing awareness of the international community, manifested by the amendments of the Convention on the Physical Protection of Nuclear Materials (CPPNM) in 2005 and the

[1] We would like to acknowledge the contributors to this article, particularly Dr Matteo Gerlini, former Chair of the International Nuclear Security Education Network (INSEN) and Professor Christopher Hobbs, Professor of Science and International Security at King's College London for sharing their expertise on the INSEN.

speech of President Obama on the 5th of April 2009 in Prague, where he pledged for a nuclear-free world. [3,4] Following this call introducing a new kind of multilateralism, the first Nuclear Security Summit was organised in April 2010.[5]

The creation of the INSEN was driven by this international context. The 2009 Nuclear Security Plan agreed by the International Atomic Energy Agency (IAEA) Board of Directors emphasised the necessity to develop educational programs in nuclear security.[6] It resulted from the unprecedented initiative of the IAEA and global universities to create a Master of Science (MSc) program and a certificate program in nuclear security. [5,7,8] These programs were developed in the technical guidance of IAEA Nuclear Security Series No 12 – Educational Programme in Nuclear Security.[9] The MSc and certificate programs aimed to be complementary of academic programs already existing in some universities.[6] The workshop organised in March 2010 by the IAEA aimed to discuss this complementarity and to create the foundations of the Network by bringing together academics, International Organizations and governmental representatives.[6] Since its foundations, the INSEN was driven by the IAEA with the objective to enhance global security education.

Establishment of the Network

The mission of the INSEN defined in 2010 was diverse from the creation of educational material to its promotion. The final outline of the INSEN agreed in 2012 highlighted key areas for collaboration:[6]

- Development of **educational material**: 'peer-reviewed textbooks, computer-based teaching tools and instructional material, including exercises and materials for laboratory work.'
- **International collaboration at different levels**:

1. *Faculty*: 'mutual faculty exchanges and/or joint development and implementation of in-depth nuclear security training programmes or schools.'
2. *Academics*: 'Joint research and development activities to share scientific knowledge and infrastructure.'
3. *Students*: 'student exchange programmes to foster international cooperation and exchange information.'

- **Quality insurance**: 'consistency with IAEA defined terminology described in the IAEA Nuclear Security Glossary, the Fundamentals, and the Recommendation documents'.
- **Assessment mechanisms**:
  1. 'Theses evaluation, coordination and improvement.'
  2. 'Performance of surveys on the effectiveness of nuclear security education among students and faculty.'

To reach these objectives and promote its work, the INSEN was structured into three working groups (*Figure 1*).[9] INSEN members can participate in one or more groups and regularly meet during either the annual meeting or the working group meetings.[6]

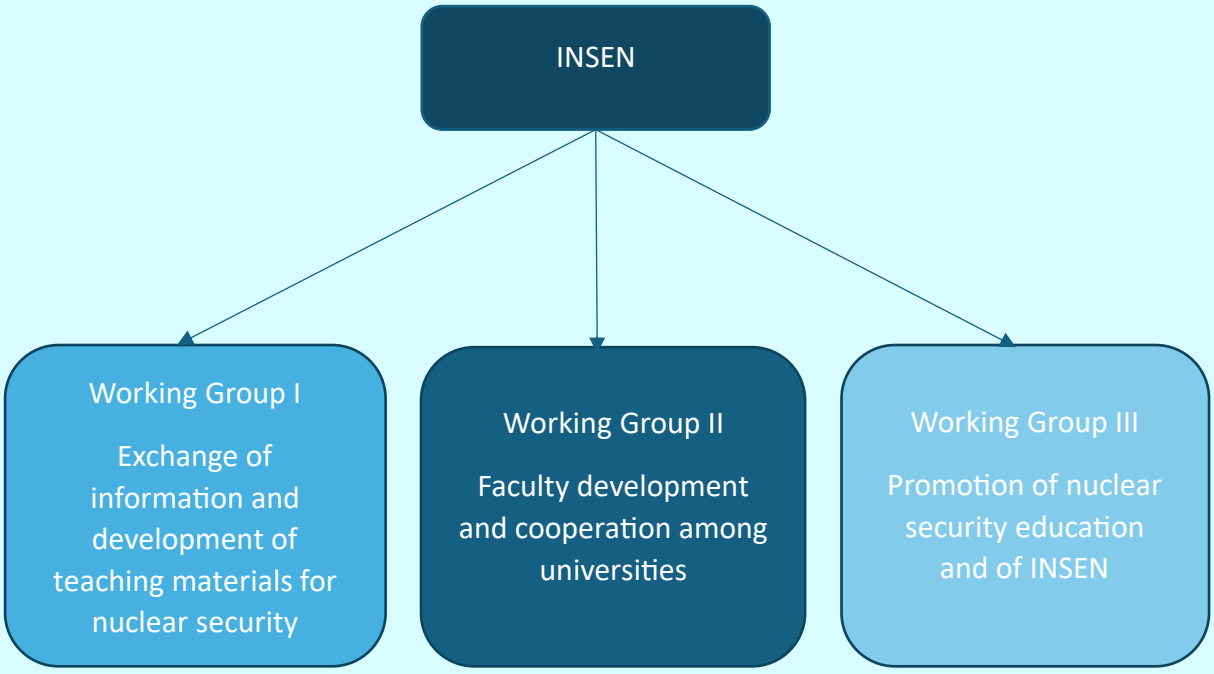


Figure 1 Working groups of the INSEN[10]

The INSEN is, as of 2023, constituted of 204 institution members from 72 IAEA member states and 13 observers.[11] These members are involved differently in the three working groups (*Figure 2*).

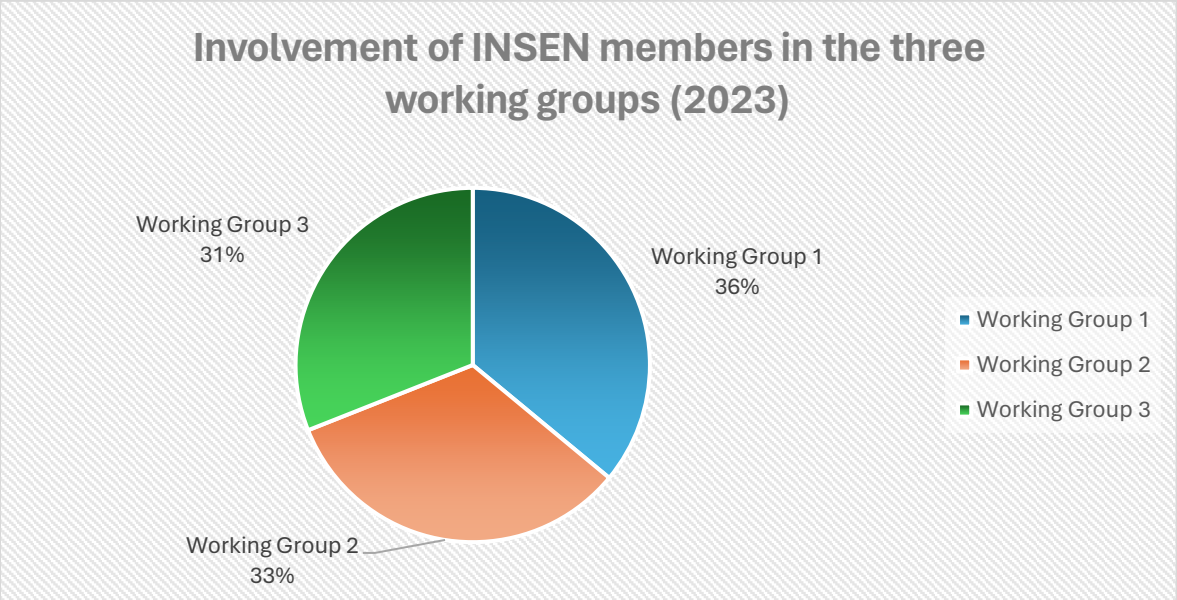


Figure 2 Involvement of INSEN members in the three WGs [11]

Overview of the Nuclear Security training developed by INSEN

Training and courses developed by the INSEN target students with different backgrounds. They include MSc programs, two-week schools, and short courses.

Image 3 First International School on Nuclear Security in Trieste, April 2013

The INSEN played a significant role in the establishment of the Joint ICTP-IAEA International School on Nuclear Security overseen by the IAEA and the International Center for Theoretical Physics. The two-weeks International School on

Nuclear Security provides an overview of contemporary nuclear security and is open to professionals with a scientific and social science backgrounds.

Training delivered by the INSEN includes Professional Development Courses (PDCs) and Faculty Development Courses (FDCs) with King's College London being a pioneer in the development of PDCs within the Network (*see section II*). [12]

Regarding MSc programs, IAEA Nuclear Security Series No 12 – Educational Programme in Nuclear Security (2010) detailed a possible curriculum for institutions to develop a MSc in Nuclear Security.[9] The guide recommends firstly to conduct a nuclear security needs assessment at the national level, followed by an analysis of the multidisciplinary aspect of nuclear security. The proposed MSc in Nuclear Security 12 required courses and 11 elective courses designed to combine theoretical and practical sessions. The required and elective courses represent around 200 hours in each semester.

Structure of the IAEA MSc in Nuclear Security	
Required courses	**Elective courses**
NS1 Introduction to Nuclear Security	**NS13** Nuclear material accountancy and inventory control of other radioactive material
NS2 International and national legal frameworks regulating nuclear security	**NS14** Vulnerability assessment of physical protection systems
NS3 Nuclear energy, nuclear fuel cycle and nuclear applications	**NS15** Risk assessment and management of State nuclear security measures
NS4 Methods and instruments for nuclear and other radioactive material measurements	**NS16(a)** Physical protection systems for nuclear and other radioactive material, sources and facilities
NS5 Effect of radiation, safety and radiation protection	**NS16(b)** Physical protection systems for radioactive material and sources
NS6 Threat assessment	**NS17** Import/export and transit control mechanism and regime
NS7 Physical protection systems design and evaluation	**NS18** Nuclear security at major public events
NS8 Physical protection technologies and equipment	**NS19** Nuclear forensics and attributions

NS9 Security of nuclear and other radioactive material in transport	**NS20** Infrastructure and procedures for detection and response to incidents involving nuclear and other radioactive material out of regulatory control
NS10 Detection of criminal or unauthorized acts involving nuclear and other radioactive material out of regulatory control	**NS22** IT/cybersecurity
NS11 Interdiction of, and response to, criminal or unauthorized acts involving nuclear and other radioactive material	
NS12 Crime scene investigation and forensic techniques	

In 2021, it was reviewed in a new technical guidance 'Model Academic Curriculum in Nuclear Security'.[13] This updated MSc curriculum model introduced new modules and divided the core modules into three categories: protection, detection and response, and cross-cutting topics (*Figure 3*). This review also recognises that each university would implement the degree structure differently, based on its resources and national job market analysis.[13]

An estimated 2500 undergraduate and postgraduate students have participated in nuclear security academic programmes offered by members of the INSEN.[14] These programs have therefore considerably contributed to the promotion of the Network and the creation of a new generation of policymakers, scholars and professionals educated in nuclear security.

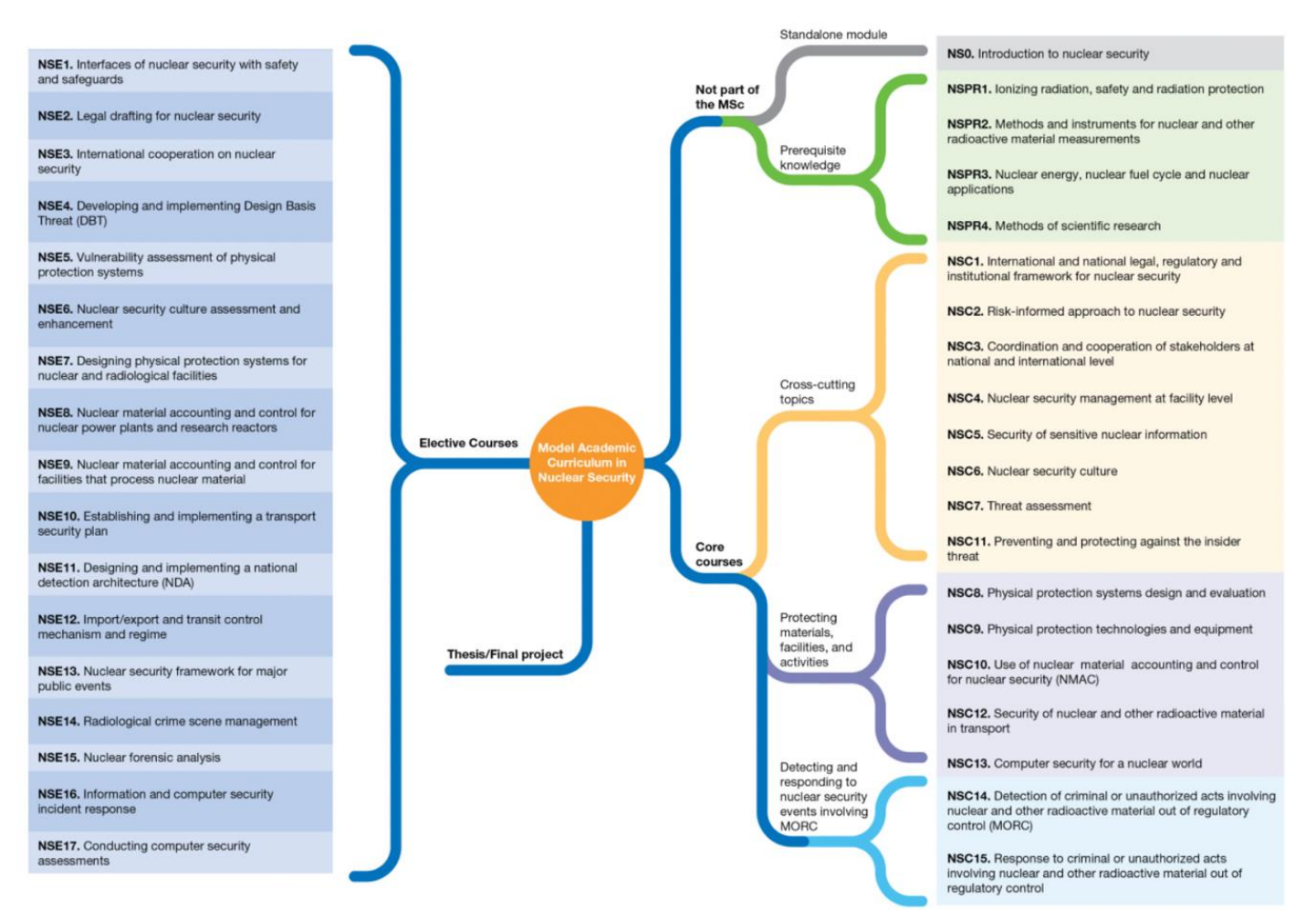


Figure 3 Review of the MSc curriculum in Nuclear Security implemented in 2021. [14]

Recent development of the INSEN

The recent developments of the INSEN are highlighted in the Annual Meeting of the International Nuclear Security Education Network (INSEN) - Chair's Report 2022 and Annual Meeting of the International Nuclear Security Education Network (INSEN) - Chair's Report 2023.[15,16] Both reports emphasise the importance of sustainability and flexibility of the Network to adapt to the constantly changing international and local contexts. This was supported by the renewed framework for nuclear security education (2022 – 2025 Nuclear Security Plan) approved during the 2022 annual meeting. Members also discussed the release of the IAEA Nuclear Security Series No. 12-T (Rev. 1) and its implementation.

Researchers have a significant role in enhancing nuclear security education within this new framework. This was illustrated by the articles of the newly published *The Oxford Handbook of Nuclear Security* written by INSEN members.

Training of early-career professionals is also key to the sustainability of the INSEN. During these meetings, INSEN members discussed different approaches to engage students and young professionals. Opportunities for engagement included the IAEA International Conference on Nuclear Security: Shaping the Future (ICONS 2024).

Finally, INSEN members also emphasised their commitments to gender parity within the Network and nuclear security. Initiatives such as the Women in Nuclear Security and the Marie Sklodowska Curie fellowship programme were mentioned.

Although the international context and the IAEA supported the establishment of the INSEN, it still faced significant challenges. One of these many challenges was the lack of clear academic definition of nuclear security in international treaties and the difficulty of creating a lasting impact in global nuclear security education. [7,11]

II. Essential Elements in the Success of the INSEN

With its rapid growth, the INSEN had a significant impact on the spread of worldwide nuclear security. Our analysis of the Network enabled us to create a non-exhaustive list of key elements contributing to its success.

Key elements contributing to the success of the INSEN	
Element	**Impact**
INSEN page on the **NUSEC** (Nuclear Security Information Portal)	The NUSEC is a collaborative platform hosted by the IAEA which enables INSEN members to share, manage and promote knowledge on nuclear security. It also serves as a coordination platform for the three working groups.
Affiliation and support from the **IAEA**	The IAEA plays a significant role in promoting the INSEN by prioritising nuclear security education. The IAEA Nuclear Security Plans give high priority to nuclear security education and assist IAEA's member states in establishing educational programmes. [12] It also provides a Secretariat function for the INSEN.
Internationality at all levels	The European MSc in Nuclear Security is administered by Delft University in the Netherlands and supported by five universities: University of Oslo, Technical University of Vienna, Brandenburg University of Applied Sciences, Dalton Nuclear Institute at the University of Manchester, the National Centre of Scientific Research 'Demokritos' in Greece. It also has a multiplier effect by bringing academics and researchers from across the world. [3]
Multiplicity of the **educational approaches** of the INSEN	The INSEN and its members combine educational approaches for various audiences (scientists, mid-career professionals, master students, etc) including PDCs and FDCs, summer schools, master programs and educational material on the NUSEC platform.

Initiatives promoting **gender parity** in nuclear security  *Image 4 Panel Gender Initiatives on Women in Nuclear Security chaired by Prof Oum Keltoum Hakam*	As the first woman to chair the INSEN, Professor Oum Keltoum Hakam aimed to increase the commitment of the INSEN regarding gender parity in nuclear security [17]. With women representing less than 20% of actors in the field in 2016, the Women in Nuclear Security Initiative (WINSI)'s goal was to strengthen opportunities for women through, for example, webinar series in partnership with universities in four continents to establish an international forum. [18] The importance of gender parity in the Network was also emphasized in the 2022 Annual report.[15]
Significant **outreach** and **promotion** of the Network	The work of the INSEN has been presented at dozens of conferences [12]. Between 2022 and 2023, INSEN members participated in 40 events and activities.[11] Furthermore, the promotion of the INSEN often took place through the Network of the member institutions, which leads to a regionally focused approach.

Local INSEN champions in nuclear security education: the example of King's College London

Contributing to this success and rapid growth, the INSEN relied on academic institutions to deliver a high-quality and cutting-edge training on nuclear security. King's College London (KCL) is an interesting case study due to its strong involvement in the Network and its duality of approaches with both a MA program and professional development courses.

In partnership with the INSEN, KCL Centre for Science & Security Studies launched in 2010 the first professional development course (PDC). During the first three years of King's PDCs, the courses were attended by more than 100 academics from 30 institutions and 15 countries.[19] The PDCs organised by KCL include 6 different workshops which last between two to six days each:

- Physical Protection of Nuclear Materials
- Science, Technicians and Engineers

- Nuclear Security Culture
- Radiological Source Security
- Insider Threat and Preventative Measures
- Senior Executives Nuclear Security Culture

These courses and workshops employ an interdisciplinary approach and use different methods to apply theoretical concepts such as case studies, site visits to an operational nuclear power plant or video walk-through of a site containing radiological sources.[19] Through these courses, KCL had to adapt to both the variety of backgrounds of its students and the interdisciplinarity of nuclear security concepts. Half of the course were focused on analysing nuclear security issues and half on the teaching methods and case study. For this first half of the course, introductory e-learning with videos explaining the key concepts of nuclear security were sent to students prior to the classes. The assessment mechanisms of these courses were also adapted to include short answer exercises and open-ended policy questions. Based on the principles of 'learning paradigm' in nuclear security education outlined by Professor Christopher Hobbs, KCL developed efficient educational tools as part of its INSEN membership.[20] Furthermore, between 2014 and 2016, KCL organised locally focused courses in Sub-Saharan and North Africa, Middle East, and Southeast Asia and focused on regional nuclear security education. The last KCL PDC was organised in 2017.

KCL also developed a Master of Arts (MA) in Science and International Security. The program focused on the policy aspects of nuclear security but also included classes on biological security. There were around 25 students per cohort coming from interdisciplinary backgrounds. However, due to a lack of funding and other internal decisions, the MA program was not continued from the 2023-2024 academic year. The modules of the MA program are now offered as optional courses to the students of the thirteen masters of the KCL Department of War Studies.

KCL established itself as a hub for nuclear security education in the INSEN thanks to the variety of programs offered and the diversity of empirical methods used and adapted to the different student backgrounds.

III. Challenges

Interdisciplinarity

Due to its interdisciplinary nature combining social sciences and nuclear science, nuclear security is still facing a lack of recognition as an educational field.[7] This is increased by the problem of recognition of social scientists compared to life scientists. There are also challenges arising from this discrepancy of backgrounds with students from the field of social sciences paired with trainers from the field of natural sciences and vice versa.[3]

Internationality

Although the Network has been constantly welcoming new members since its creation, it was also faced with the difficulty of involving some institutions from all continents. The geographical distribution of the INSEN members below highlights that only 3% of members are from Latin America. However, this region has a significant role to play in nuclear security. [21] One of the only members in Latin America is Brazil which joined the Network very recently. Although the INSEN is willing to expand the participation of Latin American states, there seem to be little answers to this call. This raises questions regarding the efficiency of the INSEN outreach strategy in the region.

Furthermore, an issue of digital divide among the various areas of the world was highlighted by the COVID-19 pandemic. [15] Some countries and regions had difficulties to access online resources and receive reliable information due to a lack of digital infrastructure. A few members faced also issues to attend remotely the INSEN annual meetings in 2021 and 2022 due to a restricted of internet access.[15] These differences must be considered by the Network to prevent an inequitable spread of nuclear security educational material depending on the digital access of countries and members.

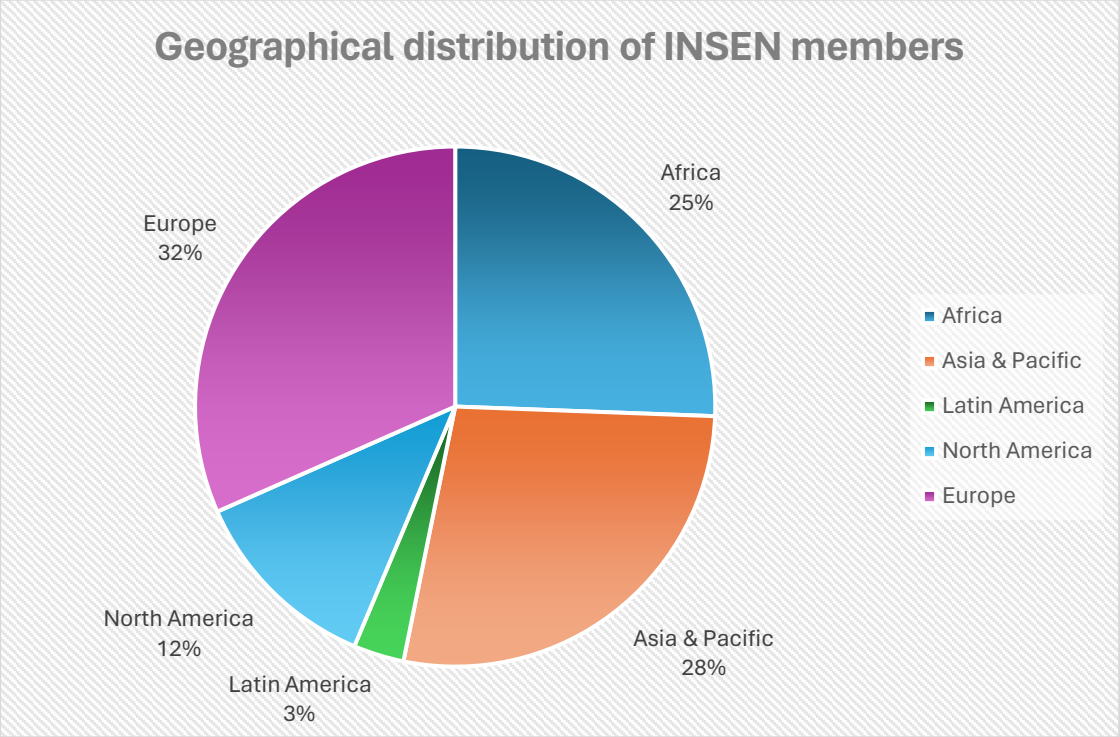


Figure 4 Geographical distribution of INSEN members, as of 2023. [22]

However, there is also a large number of registered members who are inactive. It is estimated that around only 25% of the INSEN members are regularly participating in the Network and engaging locally with the educational material. While providing numerous opportunities for transnational collaboration, the significant number of members can lead to coordination challenges within the INSEN.

Bureaucratic challenges

Bureaucratic challenges are often related to the weak link between academia and government. [3] However, challenges may be overcome when highlighting the urgency around the issues. Bureaucratic challenges also arose due to the involvement of the IAEA in the Network. The IAEA also constrained the Network by having a different vision of the educational material to be provided. The IAEA was reported as having difficulties to differentiate the training provided by the organisation and the INSEN courses. This can be illustrated by the reliance on the IAEA Nuclear Security Series No 12 for the structure of a MSc program in Nuclear Security. [9] However, this MSc structure is broad and has to take into

consideration regional challenges and resources available. The approach of implementing a unique MSc structure in Nuclear Security would not be efficient for the development of local nuclear security education.

Sustainability of the Network

The INSEN two weeks summer schools are considered more sustainable than the master programs. This is due to the difficulties to recruit interested master students on the subject. Moreover, the Network needs to ensures that the universities where the master program is developed have experts with the appropriate knowledge and infrastructures. This was a critic made to the European MSc in Nuclear Security because it was implemented in five different universities which were not necessarily specialised in nuclear security. However, the summer schools and the master programs target different audiences and answer different needs for nuclear security education. The INSEN seemed to face the difficulty of finding a balance between these different deliverables.

A lot of progress was made regarding nuclear safety; however, numerous improvements also need to be made in nuclear security. [7] Developing nuclear security education is an ongoing process. The INSEN adapted to these challenges and has proven to be an essential tool in enhancing excellent global education in the field. This capacity of the Network to adapt is illustrated by the review in 2021 of the IAEA Nuclear Security Series No 12 – Educational Programme in Nuclear Security and the development of a new technical guidance 'Model Academic Curriculum in Nuclear Security'.[13]

IV. Implications for the International Biological Security Education Network

The International Biological Security Education Network (IBSEN) was established in February 2024 by the London Metropolitan University's Biological Security Research Centre (BSRC) thanks to a grant by the Joseph Rowntree Charitable Trust (JRCT). The IBSEN is structured around a core team based at the LMU BSRC and an International Oversight Board. The

Network aims to raise awareness of risks of dual-use research in the life science and to initiative lasting changes in implementing widespread biosecurity education.

International context for biological security

Biological security is defined as 'the prevention of natural, accidental, and deliberate disease in humans, animals, and plants'.[23] Although biosecurity education has been advocated for decades, it is still overlooked in life science curriculum.[23] Stakeholders lack the necessary tools to develop an efficient biosecurity education. The newly published book *Essentials of Biological Security: A Global Perspective* (Shang, Zhang, Dando, 2024) also highlight the urgency of biosecurity education and the role of IBSEN in developing it.[23] This first volume of the book series aims to fill this gap of available tools for stakeholders and represents the first resource to implement biosecurity education.

Image 5 Ninth Conference of the State Parties, BWC 2022, Geneva

The necessity of including biosecurity education within the framework of the Biological Weapons Convention (BWC) was highlighted during the side events 'From the Tianjin Biosecurity Guidelines to an International Biosecurity Education Network' of the 2023 Meeting of State Parties. Current efforts in the field have been fragmented and geographically limited.[24] IBSEN would therefore help at implementing the mandate of the 2022 BWC 9th Review Conference to strengthen the Convention.

Previous initiatives in biosecurity education

This new resource is complementary of initiatives previously developed. These initiatives included:[8]

- Team-Based Learning (TBL), *Biological Security Education Handbook and* other resources designed by The Bradford Disarmament Research Centre, University of Broadford, UK;
- implementation of biosecurity education at National Defence Medical College in Japan;
- joint project on fostering the biosecurity norm with the Landau Network Centre Volta in Italy;
- the work of the Biological Security Research Centre, London Metropolitan University, UK.

The IBSEN will provide a platform to facilitate the exchange of biosecurity education resources such as these notable examples. It will provide the tools to strengthen such initiatives and create new resources in biosecurity education.

The IBSEN also aims to learn from the challenges faced by the INSEN

Having common goals, the IBSEN aims to learn from the experience and expertise of the INSEN. Contrary to the INSEN, the IBSEN is not directly affiliated with an international organisation. Although this can lead to significant challenges such as the difficulty of finding sustainable funding, it can on the other hand prevent bureaucratic constraints.

The involvement of members within the Network will be key to ensure a global representation and development of biosecurity education. The structure of the IBSEN and the engagement of its members will rely on a horizontal and bottom-up organizational approach to ensure a broad engagement. This approach will also enable to develop educational tools and methods adapted to national and regional needs. This will be facilitated by the creation of a database of interested stakeholders in biological security including local champions in charge of coordinating regional initiatives. IBSEN members will be involved at different levels, from high school to universities and continuing professional education and will develop appropriate tools for these levels. IBSEN also recognises the significance of gender parity for biological

security education. This commitment is reflected in the IBSEN team and the international Oversight Board.

Similarly to the NUSEC portal, the information and resources developed by the IBSEN are freely accessible on the IBSEN website. To respond to the global reach of the Network, these resources such as the Quarterly Newsletter aims to be available in four languages English, French, Spanish and Chinese. This linguistic plurality is essential to expand the Network and provide resources with a broad access.

The IBSEN will encounter challenges which are specific to the Network and biosecurity. These include the bioscience revolution and the interrelation of biological and chemical research. The Network will therefore need to have a broad view on biosecurity, integrating common issues from the Biological and Toxin Weapons Convention (BTWC) and the Chemical Weapons Convention (CWC). The interdisciplinarity of IBSEN was a factor considered since its foundation. The Network is developed to include actors from the life, physical and social sciences. This is directly related to the complexity of dual use, which is unique to biosecurity. As biological and chemical weapons are a direct consequence of dual use, IBSEN will help the scientific community in understanding prevention of dual use concerns. Biosecurity needs to have different approaches as research is conducted in commercial and academic laboratories instead of nuclear research site which is limited to governmental infrastructures.[25] These aspects add complexity to the challenges already identified from the lessons learnt through the study of INSEN.

V. Conclusion

Similarly to nuclear security education in 2010, biosecurity education is now at a defining moment. The rapid advances in life science and technologies request sustainable biosecurity education to meet the developing challenges. Learning from both the INSEN's successes and challenges, IBSEN aims to have a lasting and global impact on biosecurity education. It will adapt the characteristics of INSEN and integrate other initiatives and collaborations such as

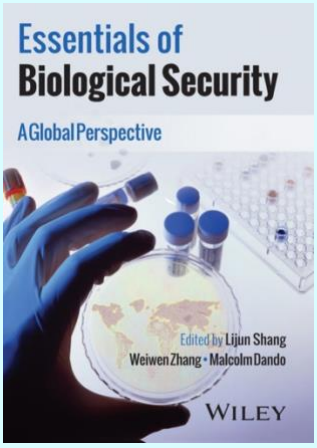
with the Advisory Board on Education and Outreach (ABEO) of the Organisation for the Prohibition of Chemical Weapons (OPCW).

IBSEN's objectives will not be to implement a 'one-size-fits-all' biosecurity education. The Network aims to work with its members to raise awareness on the issue of dual use and the necessity of biosecurity education, connect relevant actors in biosecurity education, and help them to develop educational tools adapted to their audience.

5. News in Global Biosecurity Education

I. News from the LMU BSRC

Book *Essentials of Biological Security* (Shang, Zhang and Dando, 2024).



The book Essentials of Biological Security: A Global Perspective (Shang, Zhang and Dando 2024) was published in April 2024. This book represents a new comprehensive resource for biosecurity education. It engages with experts from around the world who contributed to 20 chapters divided into five sections: Introduction and Overview, The Threat, The International Response, The Role of Scientists and The Future. This fundamental resource aims to guide scientists and policymakers and raise awareness of the risks of malign manipulation of scientific research.

Essentials of Biological Security can be ordered here.

Academics from the LMU Biological Research Centre (BSRC) present their work at the OPCW ABEO.

Professor Lijun Shang and Professor Malcolm Dando presented their book *Essentials of Biological Security* and other projects such as the IBSEN to the Advisory Board for Education and Outreach (ABEO) of the Organization for the Prohibition of Chemical Weapons (OPCW), Chemical Weapons Convention (CWC). During the 16th Session of the ABEO, Prof Shang and Prof Dando introduced the achievements of the BSRC in biosecurity education and what could be learnt from the ABEO's work in the chemical field. Their presentation was welcomed with considerable enthusiasm from the ABEO as it highlighted the convergence of chemistry and biology due to the recent revolution in sciences.

In this picture, Prof Shang and Prof Dando present their book to the ABEO 2023 Chairperson, Professor Magda Lidia Bauta Solés.

The London Metropolitan University Biological Research Centre organised a high-profile policy workshop in March 2024.

A policy workshop titled 'Toward a collaborative and integrative international CBRN security education: Coordination of International Policy Initiatives on Biosecurity Education' brought together international experts from academic institutions, civil society and international organisations including UNIDIR, CWC ABEO, BWC ISU and IAEA/INSEN. The workshop concluded on the necessity to organise regular dedicated events to strengthen global and regional biosecurity education.

The report of the policy workshop can be accessed here.

Interviews with nuclear security education experts.

LMU BSRC's research assistants Ms Olivia Ibbotson and Ms Iris Magne interviewed Dr Matteo Gerlini, former chair of the International Nuclear Security Education Network (INSEN), and Professor Christopher Hobbs, Professor of Science and International Security at King's College London. Both Dr Gerlini and Prof Hobbs gave us insightful information on the development of the INSEN, its successes and challenges, and their advice for the establishment of biosecurity education. An article based on these interviews is under preparation.

Biosecurity education in High school and Sixth-form.

Ms Olivia Ibbotson has begun the first steps of expanding the IBSEN initiatives into High school and Sixth-form education. Implementing biosecurity education to youths is vital to educate future life scientists and policy makers of the risks and consequences of dual use. Moreover, it is anticipated that the early introduction into these concepts will result in students utilizing

these skills throughout academia and into professions. The challenging factor of implementing biosecurity education in secondary education is engagement. Engagement of teachers and students is vital in forming a long-lasting education system, and subsequently maintaining this engagement. The curriculum or means of sharing knowledge must be led in a way of which is fun and intriguing to students while leaving a lasting impact. Furthermore, the curriculum must be devised in a way of which is accessible for Secondary and Sixth form teachers to implement.

A visit was made to a High School to discuss a possible collaboration with the IBSEN project. Means of piloting an IBSEN study at the school were discussed with agreement of further discussion on collaboration in the future.

II. Other news

We encourage and welcome all members from IBSEN to send us news relevant to this Quarterly Newsletter. Please note it would be your responsibility to ensure the reliability of the information sent and therefore the edited news are from open accessed sources and does not represent the LMU BSRC's views.

The WHO Technical Advisory Group on the Responsible Use of the Life Sciences and Dual-Use Research (TAG-RULS DUR) was convened for the first time in January 2024.

In September 2022, the WHO issued the 'Global guidance framework for the responsible use of the life sciences: mitigating biorisks and governing dual-use research'. As part of this framework, the TAG-RULS DUR advises Member States regarding how to implement biorisk management. During the first virtual meeting if the TAG-RULS DUR, its eighteen members discussed the activities of the group and share their expertise. This discussion on upcoming projects was further deepened during the first in person meeting of the TAG-RULS DUR in April 2024 at the WHO Head Quarters in Geneva.

Access the full report of the Inaugural Meeting here.

The International Biosecurity and Biosafety Initiative for Science (IBBIS) was launched in February 2024.

The Nuclear Threat Initiative (NTI) launched in February 2024 the independent organization the International Biosecurity and Biosafety Initiative for Science (IBBIS). According to IBBIS CEO Ernest J. Moniz, the main objective of this organization is to partner with government and international actors 'to reduce emerging biological risks associated with rapid technology advances'. Moniz emphasises the unique aspect of IBBIS as it is the first organization focusing solely on safeguarding science from deliberate abuse or misuse of bioscience and biotechnology.

Learn more about the IBBIS.

Kenya's Masinde Muliro University of Science and Technology's (MMUST) launched an inaugural Bachelor of Science in Biosafety & Biosecurity.

In January 2024, MMUST's BSc in Biosafety & Biosecurity welcomed its first cohort of 21 students. This BSc, created in collaboration with the International Federation of Biosafety Association (IFBA), is a unique program which was designed to meet the demand for qualified biosafety and biosecurity professionals. The curriculum includes courses in microbiology, virology, biotechnology and biosecurity such as the modules 'One Health, Biological Non-proliferation & Biodefense, DURC &Bioscience Risks' and 'Advances in Life Sciences, Cyberbiosecurity'. This degree represents a significant first step for the development of educational resources for regionally focused biosecurity education.

More information regarding the BSc at MMUST is accessible here.

UNIDIR and VERTIC published a new Biological Weapons Convention National Implementation Measures Database.

At the policy workshop organised in March 2024 by the London Metropolitan University Biological Security Research Centre, participants from the United Nations Institute for Disarmament Research presented the project of the Biological Weapons Convention (BWC) National Implementation Measures Database produced in collaboration with VERTIC. This database details the measures taken by each country regarding biosecurity and biosafety, their compliance with the BWC and a list of freely accessible resources. This database gives both a worldview and a country-specific focus on these measures which enables a better understand of the implementation of the BWC.

Access here the database.

A new master's biorisk management module.

The newly created international master program Infectious Diseases and One Health (IDOH) includes a new biorisk management module. IDOH is a partnership of three European universities whose research focuses on infectious diseases and 'one health' concept. During the third semester of the master program, risk assessment is approached based on the WHO Laboratory Biosafety Manual 4th Edition. Although addressed in the module, biosecurity and dual-use research of concern (DURC) their study is limited to teaching communication to students and how to justify risky experiments to the public. This approach is insufficient to face the rising challenges posed by DURC. It therefore calls for the development of other biosecurity educational tools.

Read here the full article on IDOH and the new biorisk management module.

The African Women's Network for the Global Partnership's Signature Initiative to Mitigate Biological Threats in Africa.

The International Federation of Biosafety Association (IFBA) launched a new African Women's Network to support the work of the Signature Initiative to Mitigate Biological Threats in Africa (SIMBA). This Network aims at addressing emerging and ongoing biothreats on the African

continent and to operationalize the objectives of SIMBA. This will be conducted through the promotion of multisectoral engagement and locally driven approaches. The Network will also identify women leaders in the field and create long-term leadership opportunities for women in the region.

The SIMBA Women's Network Project Overview can be found here.

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I. Nuclear security and INSEN

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Announcements: The *Special Topic* of the Second Quarterly Newsletter will focus on the work of the Advisory Board for Education and Outreach (ABEO) of the Organisation for the Prohibition of Chemical Weapons (OPCW) in fostering responsible use of chemistry and the implications for IBSEN.

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