

# BIOSECURITY EDUCATION FOR THE LIFE SCIENCES: NUCLEAR SECURITY EDUCATION EXPERIENCE AS A MODEL

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## Introduction

1. Working Paper No.20 submitted by Australia, Canada, Japan, New Zealand, Republic of Korea and Switzerland (on behalf of the “JACKSNNZ” ), Kenya, Sweden, Ukraine, the United Kingdom and the United States of America in November 2011 to the Seventh Review Conference of the Biological and Toxin Weapons Convention (BTWC), emphasised the growing body of evidence demonstrating that there is ‘*generally limited level of awareness [of bioethics and biosecurity risks] among life scientists in numerous institutions in numerous countries*’.<sup>1</sup> The same Working Paper, also noted that:

*analysis of the reasons for this lack of awareness include, inter alia, the lack of university courses covering aspects related to the BWC and related (bio-)security issues, either because the curriculum developers do not consider the topic to be important or have difficulty fitting teaching material on biosecurity into what they claim is an already overcrowded curriculum, or because of a lack of expertise and access to relevant teaching material.*<sup>2</sup>

2. The Working Paper, referring to the outcomes of the Sixth Review Conference of the BTWC and the Meetings of States and the Meetings of Experts that took place during the Second Intersessional Process from 2007 to 2010, presented a collection of national experiences on biosecurity education, highlighting ‘*key-findings and preliminary conclusions on possible approaches to education and awareness raising*’.<sup>3</sup> In so doing, its primary goal was to provide a basis for discussion and consideration of the issue of education and

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<sup>1</sup> Australia, Canada, Japan, New Zealand, Republic of Korea and Switzerland (on behalf of the “JACKSNNZ”2), Kenya, Pakistan, Sweden, Ukraine, the United Kingdom of Great Britain and Northern Ireland and the United States of America, The Seventh Review Conference of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction, Geneva, 5-22 December 2011, *Possible Approaches to Education and Awareness-Raising among Life Scientists*, BWC/CONF.VII/WP.20, 1 November 2011. Available at <http://daccess-dds-ny.un.org/doc/UNDOC/GEN/G11/643/57/PDF/G1164357.pdf?OpenElement>.

<sup>2</sup> Australia, Canada, Japan, New Zealand, Republic of Korea and Switzerland (on behalf of the “JACKSNNZ”2), Kenya, Pakistan, Sweden, Ukraine, the United Kingdom of Great Britain and Northern Ireland and the United States of America, The Seventh Review Conference of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction, Geneva, 5-22 December 2011, *Possible Approaches to Education and Awareness-Raising among Life Scientists*, BWC/CONF.VII/WP.20, 1 November 2011. Available at <http://daccess-dds-ny.un.org/doc/UNDOC/GEN/G11/643/57/PDF/G1164357.pdf?OpenElement>.

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awareness raising at the Seventh Review Conference in December 2011. The Working Paper thus sought to draw attention to and encourage all States Parties to consider the following issues:

*that the frequent lack of awareness of aspects related to biosecurity and the obligations of the Convention among life scientists has to be addressed more urgently, strategically, and comprehensively;*

and

*that such activities could, inter alia, lead to sustainable introduction of specific educational modules and activities related to the Convention.*<sup>4</sup>

3. At the Seventh Review Conference, the States Parties agreed in regard to Article IV of the Convention that

*11. The Conference reaffirms the commitment of States Parties to take the necessary national measures under this Article. The Conference also reaffirms that the enactment and implementation of necessary national measures under this Article, in accordance with their constitutional processes, would strengthen the effectiveness of the Convention. In this context, the Conference calls upon States Parties to adopt, in accordance with their constitutional processes, legislative, administrative, judicial and other measures, including penal legislation, designed to:*

*(a) enhance domestic implementation of the Convention and ensure the prohibition and prevention of the development, production, stockpiling, acquisition or retention of the agents, toxins, weapons, equipment and means of delivery as specified in Article I of the Convention;*

*(b) apply within their territory, under their jurisdiction or under their control anywhere and apply, if constitutionally possible and in conformity with international law, to actions taken anywhere by natural or legal persons possessing their nationality;*

*(c) ensure the safety and security of microbial or other biological agents or toxins in laboratories, facilities, and during transportation, to prevent unauthorized access to and removal of such agents or toxins. [Emphasis added]*<sup>5</sup>

In addition, the States Parties agreed:

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<sup>4</sup> Australia, Canada, Japan, New Zealand, Republic of Korea and Switzerland (on behalf of the “JACKSNNZ”<sup>2</sup>), Kenya, Pakistan, Sweden, Ukraine, the United Kingdom of Great Britain and Northern Ireland and the United States of America, The Seventh Review Conference of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction, Geneva, 5-22 December 2011, *Possible Approaches to Education and Awareness-Raising among Life Scientists*, BWC/CONF.VII/WP.20, 1 November 2011. Available at: <http://daccess-dds-ny.un.org/doc/UNDOC/GEN/G11/643/57/PDF/G1164357.pdf?OpenElement>.

<sup>5</sup> United Nations, The Seventh Review Conference of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction, Geneva, 5-22 December 2011, *Final Declaration in Final Document*, BWC/CONF.VII/7, 13 January 2012. Available at: [www.unog.ch](http://www.unog.ch).

13. The Conference notes the value of national implementation measures, as appropriate, in accordance with the constitutional process of each State Party, to:

- (a) implement voluntary management standards on biosafety and biosecurity;
- (b) encourage the consideration of development of appropriate arrangements to **promote awareness** among relevant professionals in the private and public sectors and throughout relevant scientific and administrative activities and;
- (c) **promote** amongst those working in the biological sciences **awareness** of the obligations of States Parties under the Convention, as well as relevant national legislation and guidelines;<sup>6</sup> Emphasis added]

4. Moreover, the States Parties agreed Standing Agenda Items for the Intersessional Programme between 2012 and 2015, to be addressed at meetings of both the Meeting of Experts and Meeting of States Parties each year. The Standing Agenda Item on ‘*Review of Developments in the Field of Science and Technology related to the Convention*’ includes the topic:

- (e) education and awareness-raising about risks and benefits of life sciences and biotechnology.<sup>7</sup>

In addition, the Standing Agenda Item on *Strengthening National Implementation* includes the topic:

- (d) national, regional and international measures to improve laboratory biosafety and security of pathogens and toxins;

5. The importance of education and awareness-raising programmes for those engaged in the life sciences has been emphasised by recent developments regarding the creation of mammalian-transmissible H5N1 Avian Influenza virus. Two points merit attention in this regard. First, it has been stressed that ‘*a comprehensive strategy on awareness-raising and education will have to be developed by each State Party and its implementation carefully monitored if significant progress is to be ensured.*’<sup>8</sup> Secondly,

- ... responsibility cannot be discharged solely at the level of individual scientist’s projects and publications. It is necessary that a wider framework of understanding is

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<sup>6</sup> United Nations, The Seventh Review Conference of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction, Geneva, 5-22 December 2011, *Final Declaration* in *Final Document*, BWC/CONF.VII/7, 13 January 2012. Available at [www.unog.ch](http://www.unog.ch).

<sup>7</sup> United Nations, The Seventh Review Conference of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction, Geneva, 5-22 December 2011, *Final Declaration* in *Final Document*, BWC/CONF.VII/7, 13 January 2012. Available at [www.unog.ch](http://www.unog.ch)

<sup>8</sup> Tatyana Novossiolova, Masamichi Minehata and Malcolm Dando, *The Creation of Contagious H5N1 Influenza Virus: Implications for the Education of Life Scientists*, *Journal of Terrorism Research*, vol.3:1, June 2012, pp.39-51. Available at: <http://ojs.st-andrews.ac.uk/index.php/jtr/article/view/417/377>.

*developed so that dual use and bioterrorism are seen as only part of a much wider problem of protecting the life sciences from large-scale militarisation.*<sup>9</sup>

Fostering a culture of responsibility among those engaged in the life sciences thus requires active commitment and participation of a wide range of stakeholders, including but not limited to international organisations, government authorities, industry, academia, professional associations and civil society.

6. Given the crucial role of education and awareness-raising on the biosecurity risks associated with work in the life sciences, it is important to develop a comprehensive framework for the implementation of policies and measures that not only correct the existing deficiency in biosecurity competence but also provide mechanisms for ensuring broad training outreach, effectiveness and sustainability. In developing such a framework in the field of biosecurity, it can be helpful to review and draw upon the security education experience in other areas of science. One area in which substantial efforts have been made in introducing and embedding security education is nuclear science. This Briefing Paper examines the significant progress made in nuclear security education and identifies what could be valuable in developing a comprehensive strategy on biosecurity education and awareness-raising programmes.

### **Nuclear Security Education: Overview**

7. In order to consolidate international efforts to reduce the risk of potential misuse of nuclear and/or radioactive material and to enhance nuclear security, the International Atomic Energy Agency (IAEA) has developed and launched three successive *Nuclear Security Plans* for the periods 2002-2005, 2006-2009 and 2010-2013. The *Nuclear Security Plan* for 2006-2009 covered three main areas, namely Information Management and Coordination, Prevention, and Detection and Response to nuclear security events.<sup>10</sup> The overall objective of the *Plan* was to:

*to contribute to global efforts toward achieving worldwide, effective security wherever nuclear or other radioactive material is in use, storage and/or transport, and of associated facilities, by supporting States, upon request, in their efforts to implement activities in this regard. Such assistance includes capacity building, guidance, human resource development, sustainability and risk reduction. The objective is also to assist adherence to and implementation of nuclear security related international legal instruments and to strengthen the international cooperation and coordination of assistance given through bilateral programmes and other international initiatives in a manner that contributes to enabling a broader use of nuclear energy and of such applications with radioactive substances.*<sup>11</sup>

8. In implementing the *Nuclear Security Plan 2006-2009*, the Agency sought to promote ‘best practices for dealing effectively with nuclear and radiological threats’ with a special

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<sup>9</sup> Tatyana Novossiolova, Masamichi Minehata and Malcolm Dando, *The Creation of Contagious H5N1 Influenza Virus: Implications for the Education of Life Scientists*, *Journal of Terrorism Research*, vol.3:1, June 2012, pp.39-51. Available at: <http://ojs.st-andrews.ac.uk/index.php/jtr/article/view/417/377>.

<sup>10</sup> IAEA Office of Nuclear Security, *Implementation of the IAEA Nuclear Security Plan 2006-2009*, September 2011, Vienna. Available at <http://www.iaea.org/Publications/Booklets/NuclearSecurity/nsplan0911.pdf>.

<sup>11</sup> IAEA Office of Nuclear Security, *Implementation of the IAEA Nuclear Security Plan 2006-2009*, September 2011, Vienna. Available at <http://www.iaea.org/Publications/Booklets/NuclearSecurity/nsplan0911.pdf>.

attention on sustainability.<sup>12</sup> To this end, the Agency ‘conducted international conferences, training courses, seminars and workshops and has issued nuclear security guidance and other publications.’<sup>13</sup>

9. It is to be noted that in 2008 the IAEA published an Implementing Guide entitled *Nuclear Security Culture* which appeared in No.7 of the *IAEA Nuclear Security Series*. This Guide specifically emphasised that ‘a systematic approach to training and qualification is required for an effective nuclear security culture.’<sup>14</sup>

10. In regard to education and training, the Agency has developed, together with academics and experts from Member States, a Guide entitled *Educational Programme in Nuclear Security*, which first appeared in 2010 in No.12 of the *IAEA Nuclear Security Series*. The Guide began by a mention of the ‘increase in demand in nuclear energy’ and the rising ‘potential malicious acts involving nuclear material’, highlighting the ‘demonstrated increased need for well qualified experts and specialists in nuclear security’.<sup>15</sup> Its chief objective is:

*to facilitate the development of comprehensive nuclear security human resource development programme with the purpose of building up and maintaining relevant knowledge and skills, and sustaining qualified personnel dealing with future nuclear security challenges.*<sup>16</sup>

The guide further identified a list of issues that need to be taken in consideration when implementing nuclear security education at university level. Above all, it was recognised that:

*many universities are not yet equipped to meet the increased requirements for nuclear security experts with comprehensive in-depth knowledge and competencies.*<sup>17</sup>

11. Among the issues to be considered, the need for the development of adequate teaching materials was also acknowledged.<sup>18</sup> In addressing those challenges, the guide emphasised that:

*the IAEA stands ready to assist, upon request, in increasing lecturers’ knowledge pertaining to nuclear security and in developing adequate textbooks and other teaching material in cooperation with its Member States.*<sup>19</sup>

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<sup>12</sup> IAEA Office of Nuclear Security, *Implementation of the IAEA Nuclear Security Plan 2006-2009*, September 2011, Vienna. Available at <http://www.iaea.org/Publications/Booklets/NuclearSecurity/nsplan0911.pdf>.

<sup>13</sup> IAEA Office of Nuclear Security, *Implementation of the IAEA Nuclear Security Plan 2006-2009*, September 2011, Vienna. Available at <http://www.iaea.org/Publications/Booklets/NuclearSecurity/nsplan0911.pdf>.

<sup>14</sup> IAEA, ‘Nuclear Security Culture: Implementing Guide’, *IAEA Nuclear Security Series*, No.7, 2008, Vienna. Available at [http://www-pub.iaea.org/MTCD/publications/PDF/Pub1347\\_web.pdf](http://www-pub.iaea.org/MTCD/publications/PDF/Pub1347_web.pdf).

<sup>15</sup> International Atomic Energy Agency, ‘Educational Programme in Nuclear Security’, *IAEA Nuclear Security Series*, No.12, 2010, Vienna. Available at: [http://www-pub.iaea.org/MTCD/publications/PDF/Pub1439\\_web.pdf](http://www-pub.iaea.org/MTCD/publications/PDF/Pub1439_web.pdf).

<sup>16</sup> International Atomic Energy Agency, ‘Educational Programme in Nuclear Security’, *IAEA Nuclear Security Series*, No.12, 2010, Vienna. Available at: [http://www-pub.iaea.org/MTCD/publications/PDF/Pub1439\\_web.pdf](http://www-pub.iaea.org/MTCD/publications/PDF/Pub1439_web.pdf).

<sup>17</sup> International Atomic Energy Agency, ‘Educational Programme in Nuclear Security’, *IAEA Nuclear Security Series*, No.12, 2010, Vienna. Available at: [http://www-pub.iaea.org/MTCD/publications/PDF/Pub1439\\_web.pdf](http://www-pub.iaea.org/MTCD/publications/PDF/Pub1439_web.pdf).

<sup>18</sup> International Atomic Energy Agency, ‘Educational Programme in Nuclear Security’, *IAEA Nuclear Security Series*, No.12, 2010, Vienna. Available at: [http://www-pub.iaea.org/MTCD/publications/PDF/Pub1439\\_web.pdf](http://www-pub.iaea.org/MTCD/publications/PDF/Pub1439_web.pdf).

<sup>19</sup> International Atomic Energy Agency, ‘Educational Programme in Nuclear Security’, *IAEA Nuclear Security Series*, No.12, 2010, Vienna. Available at: [http://www-pub.iaea.org/MTCD/publications/PDF/Pub1439\\_web.pdf](http://www-pub.iaea.org/MTCD/publications/PDF/Pub1439_web.pdf).



## *Master of Science in Nuclear Security*

12. The guide outlined a model of a Master of Science (M.Sc.) and a Certificate Programme in Nuclear Security in order to provide Member States with a comprehensive strategy for the implementation of nuclear security education and also to encourage universities and other educational institutions to develop relevant academic programmes. The Master Programme features formal teaching training, practical pre-thesis work, and thesis writing. As part of the formal training, those willing to enrol in the M.Sc. Programme are required to take a set of compulsory courses, as well as choose several elective courses. Along with the wide range of technical skills and knowledge pertinent to the proper and safe operation of nuclear facilities and related equipment, the M.Sc. Programme seeks to develop an in-depth understanding of a broad scope of security issues including but not limited to international and national legal frameworks, threat assessment, detection, investigation and prevention of criminal and unauthorised mishandling of nuclear materials, import and export controls, nuclear material accountancy and inventory, multi-stakeholders co-operation at international level, cyber-security and nuclear security at public events. It is recommended that the pre-thesis practice should take place in a security office of a nuclear facility, at an emergency response organisation, with law enforcement agencies (e.g. customs), or at university under the supervision of an expert in the respective field.<sup>20</sup>

13. The proposed prototype Certificate Programme is a variation of the M.Sc. Programme discussed above. It is shorter in terms of duration as it is designed to be completed within one university semester. It also combines formal teaching training with practical work and aims at raising awareness of the broader issues related to ensuring the safety and security of nuclear material, facilities and equipment.

14. Prior to the publication of the Guide, the Agency has already made some progress in establishing nuclear security education and training. Its first achievements took place back in 2005 with the launching of a module on nuclear security at the Sevastopol National University of Nuclear Energy and Industry in Ukraine.<sup>21</sup> The module was taught both at undergraduate (Bachelor's) level and postgraduate (Master) level.

15. In May 2009 several new nuclear security training facilities were inaugurated at the Interdepartmental Special Training Centre (ISTC) in Obninsk, Russia, as a result of the cooperation between the Agency and the Russian Federation. Since then, the Agency has delivered five training courses. Besides participants from Central and Eastern Europe and the Commonwealth of Independent States, two of the courses have also included Western European participants.<sup>22</sup> In addition, the Agency and the ISTC have jointly developed a pilot course as a practical introduction for pre-diploma students in university education.<sup>23</sup>

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<sup>20</sup> International Atomic Energy Agency, 'Educational Programme in Nuclear Security', *IAEA Nuclear Security Series*, No.12, 2010, Vienna. Available at: [http://www-pub.iaea.org/MTCD/publications/PDF/Pub1439\\_web.pdf](http://www-pub.iaea.org/MTCD/publications/PDF/Pub1439_web.pdf).

<sup>21</sup> IAEA Office of Nuclear Security, *Implementation of the IAEA Nuclear Security Plan 2006-2009*, September 2011, Vienna. Available at <http://www.iaea.org/Publications/Booklets/NuclearSecurity/nsplan0911.pdf>.

<sup>22</sup> IAEA Board of Governors, *Nuclear Security Report 2010: Measures to Protect Against Nuclear Terrorism*, GOV/2010/42-GC(54)/9, 12 August 2010, Vienna. Available at [http://www.iaea.org/About/Policy/GC/GC54/GC54Documents/English/gc54-9\\_en.pdf](http://www.iaea.org/About/Policy/GC/GC54/GC54Documents/English/gc54-9_en.pdf).

<sup>23</sup> IAEA Board of Governors, *Nuclear Security Report 2010: Measures to Protect Against Nuclear Terrorism*, GOV/2010/42-GC(54)/9, 12 August 2010, Vienna. Available at [http://www.iaea.org/About/Policy/GC/GC54/GC54Documents/English/gc54-9\\_en.pdf](http://www.iaea.org/About/Policy/GC/GC54/GC54Documents/English/gc54-9_en.pdf)

16. In autumn 2009 the Tomsk Polytechnic University (TPU) in the Russian Federation launched an academic programme entitled Nuclear Control and Regulation in Nuclear Security. The programme is based on the Agency guidance document and is accredited by the Russian Federation's national Competent Authority.<sup>24</sup> In 2010, the collaboration between the Agency and TPU entered its second phase, as part of which a Master of Science programme in nuclear security will be established.<sup>25</sup>

17. For several years, the Agency has been cooperating with the Naif Arab University for Security Sciences (NAUSS) in Saudi Arabia on the development and implementation of a certified nuclear security education programme. As a result, the first modules of the introductory course in nuclear security were delivered in autumn 2009.<sup>26</sup> The Agency is preparing to provide additional support to NAUSS, *'including nuclear security training for professors and instructors and assistance in establishing laboratories for practical nuclear security exercises.'*<sup>27</sup>

#### *International Nuclear Security Education Network (INSEN)*

18. In September 2009, the IAEA Board of Governors agreed upon the *Nuclear Security Plan* covering 2010-2013. This current *Plan* builds upon the objectives set by the two preceding *Plans* and, as such, it seeks to foster international cooperation and promote activities which *'would contribute to enabling the safe, secure and peaceful use of nuclear energy and of such applications with radioactive substances.'*<sup>28</sup> The *Nuclear Security Plan 2010-2013* comprises four key elements, namely Needs Assessment, Information Collation and Analysis; Contributing to the Enhancement of a Global Nuclear Security Framework; Providing Nuclear Security Services; and Risk Reduction and Security Improvement. The section on Providing Nuclear Security Services lays a strong emphasis on the value of supporting States in developing educational programmes in nuclear security in order to foster a sustainable nuclear security culture:

*37. Sustainable improvements in nuclear security will be underpinned by institutional capacity building, human resource development and education programmes. These programmes recognise that human resource development is critical for States to be able to implement nuclear security and cover a wide range of topics for different staff categories at different levels. Attention should be given to designing the programme in such a way that existing capacities at international, regional and national levels are considered. A comprehensive overall human resource development strategy, developed in close consultation with Member States, that runs from short term*

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<sup>24</sup> IAEA Office of Nuclear Security, *Implementation of the IAEA Nuclear Security Plan 2006-2009*, September 2011, Vienna. Available at <http://www.iaea.org/Publications/Booklets/NuclearSecurity/nsplan0911.pdf>.

<sup>25</sup> IAEA Board of Governors, *Nuclear Security Report 2010: Measures to Protect Against Nuclear Terrorism*, GOV/2010/42-GC(54)/9, 12 August 2010, Vienna. Available at [http://www.iaea.org/About/Policy/GC/GC54/GC54Documents/English/gc54-9\\_en.pdf](http://www.iaea.org/About/Policy/GC/GC54/GC54Documents/English/gc54-9_en.pdf)

<sup>26</sup> IAEA Board of Governors, *Nuclear Security Report 2010: Measures to Protect Against Nuclear Terrorism*, GOV/2010/42-GC(54)/9, 12 August 2010, Vienna. Available at [http://www.iaea.org/About/Policy/GC/GC54/GC54Documents/English/gc54-9\\_en.pdf](http://www.iaea.org/About/Policy/GC/GC54/GC54Documents/English/gc54-9_en.pdf)

<sup>27</sup> IAEA Board of Governors, *Nuclear Security Report 2010: Measures to Protect Against Nuclear Terrorism*, GOV/2010/42-GC(54)/9, 12 August 2010, Vienna, Austria. Available at: [http://www.iaea.org/About/Policy/GC/GC54/GC54Documents/English/gc54-9\\_en.pdf](http://www.iaea.org/About/Policy/GC/GC54/GC54Documents/English/gc54-9_en.pdf)

<sup>28</sup> IAEA Board of Governors, *Nuclear Security Plan 2010-2013*, GOV/2009/54-GC(53)/18, 17 August 2009, Vienna, Austria. Available at: <http://www-ns.iaea.org/downloads/security/nuclear-security-plan2010-2013.pdf>.

*training to an education programme culminating in a Master of Science in nuclear security, should be made available during the period of the Plan. These activities will be complemented with activities aimed at supporting the availability of sufficient infrastructure capacities at the regional level as well as in an individual country.*<sup>29</sup>

19. To achieve this, the *Nuclear Security Plan 2010-2013* envisages a range of activities being undertaken by the IAEA as well as by States including

- *Provision of support to national education and training programmes, including human resource development needs assessment and related methodologies; and*
- *Development and employment of innovative human resource delivery mechanisms for self-sustained training including through e-learning.*<sup>30</sup>

20. The adequacy and effectiveness of the measures adopted to develop sustainable capacity in nuclear security will be assessed based on several performance indicators, *inter alia*,

- *Number of States having a comprehensive human resource development programme;*
- *Availability, at the regional level, of academic educational programmes in nuclear security; and*
- *Number of training courses and number of individuals trained with Agency support.*<sup>31</sup>

21. In March 2010 the IAEA organised a workshop inviting experts from academia, international organisations, and professional nuclear material management associations to discuss current and future nuclear security curricula and establish collaboration network among universities which provide or intend to start a programme in nuclear security, Consensus was reached at the workshop to create a collaboration network for higher education in nuclear security, as this was recognized to be an important and suitable mechanism to support and promote the sustainable establishment of nuclear security education. Immediate action was taken to set up the International Nuclear Security Education Network (INSEN) under the auspices of the IAEA.

22. The INSEN is a partnership between the IAEA and educational and research institutions, and competent authorities. Its mission is '*to enhance global nuclear security by developing, sharing and promoting excellence in nuclear security education*'.<sup>32</sup> In order to achieve its main objective, namely to foster and support the implementation of nuclear security education, the Network has identified a set of key areas and activities for collaboration. These include:

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<sup>29</sup> IAEA Board of Governors, *Nuclear Security Plan 2010-2013*, GOV/2009/54-GC(53)/18, 17 August 2009, Vienna, Austria. Available at: <http://www-ns.iaea.org/downloads/security/nuclear-security-plan2010-2013.pdf>.

<sup>30</sup> IAEA Board of Governors, *Nuclear Security Plan 2010-2013*, GOV/2009/54-GC(53)/18, 17 August 2009, Vienna, Austria. Available at: <http://www-ns.iaea.org/downloads/security/nuclear-security-plan2010-2013.pdf>.

<sup>31</sup> IAEA Board of Governors, *Nuclear Security Plan 2010-2013*, GOV/2009/54-GC(53)/18, 17 August 2009, Vienna, Austria. Available at: <http://www-ns.iaea.org/downloads/security/nuclear-security-plan2010-2013.pdf>

<sup>32</sup> International Atomic Energy Agency, *International Nuclear Security Education Network (INSEN)*, March 2010. Available at: <http://www-ns.iaea.org/security/workshops/insen-wshop.asp>.



- *Development of peer-reviewed textbooks, computer based teaching tools and instructional material, including exercises and materials for laboratory work;*
- *Faculty assignment and development in the different areas of nuclear security through mutual faculty exchanges and/or joint development and implementation of in-depth nuclear security training programmes or schools;*
- *Joint research and development activities to share scientific knowledge and infrastructure;*
- *Student exchange programmes to foster international cooperation and exchange information;*
- *Quality assurance: consistency with IAEA defined terminology described in the IAEA Nuclear Security Glossary, the Fundamentals and the Recommendations documents;*
- *Theses evaluation, coordination and improvement;*
- *Performance of surveys on the effectiveness of nuclear security education among students and faculty.*<sup>33</sup>

23. Membership of the INSEN is open to any educational and research institution that has already introduced a course in nuclear security, or is willing to develop such a programme. Decision-making and action-planning is negotiated among all members. Network members meet annually on a regular basis. IAEA is responsible for convening the INSEN annual meeting, as well as preparing the agenda for that meeting in consultation with the INSEN members, and reporting on the overall status of implementation activities.

24. Currently the INSEN comprises three working groups, each covering one of the following areas:

- *Exchange of information and development of materials for nuclear security education (Working Group 1);*
- *Faculty development and cooperation among educational institutions (Working Group 2);*
- *Promotion of nuclear security education (Working Group 3).*<sup>34</sup>

Working Group 1 is tasked with establishing a mechanism to coordinate and assist the development of peer-reviewed educational resources and instructional materials for nuclear security academic programmes. Working Group 2 seeks to enhance faculty development and capacity building through, *inter alia*, organising in-depth training courses for teaching staff provided by leading experts; assisting in the development of tailored curricula for nuclear security modules and courses; developing a nuclear security teaching staff roster; and establishing a mechanism to facilitate the exchange of students teaching staff and researchers. Working Group 3 looks into ways of engaging with all nuclear competent authorities, as well as identifying requirements for nuclear security specialists and facilitating the development of nuclear security job descriptions.<sup>35</sup>

25. Ever since its establishment, the INSEN has officially been granted access to the *IAEA Nuclear Security Portal (NUSEC)*, ‘*a collaborative, centralised and non-public, password-*

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<sup>33</sup> International Atomic Energy Agency, *International Nuclear Security Education Network (INSEN)*, March 2010. Available at: <http://www-ns.iaea.org/security/workshops/insen-wshop.asp>.

<sup>34</sup> International Atomic Energy Agency, *International Nuclear Security Education Network (INSEN)*, March 2010. Available at: <http://www-ns.iaea.org/security/workshops/insen-wshop.asp>.

<sup>35</sup> International Atomic Energy Agency, *International Nuclear Security Education Network (INSEN)*, March 2010. Available at: <http://www-ns.iaea.org/security/workshops/insen-wshop.asp>.

protected online platform through which Member States and other Agency partners can demonstrate their nuclear security activities'.<sup>36</sup> The portal provides INSEN with the infrastructure for promoting, managing, disseminating and preserving nuclear security; for communication and exchange of information; and for storing information and establishing databases with relevant materials.

26. On 2 May 2012, the IAEA noted that 26 universities and 2 international organizations are collaborating in the INSEN partnership aiming to promote excellence in nuclear security education.<sup>37</sup> INSEN membership is open to any educational and research institution already involved or that plans to be involved in nuclear security education in the future. Its current membership includes institutions in 26 Member States as well as other institutions:

Member State	Number of institutions
Austria	1
Canada	1
France	2
Germany	1
Ghana	1
Greece	1
India	1
Italy	1
Japan	2
Malaysia	2
Montenegro	1
Morocco	2
Netherlands	1
Nigeria	1
Pakistan	2
Poland	1
South Korea	1
Russian Federation	9
South Africa	1
Sweden	1
Switzerland	1
Tanzania	1
Thailand	1
Ukraine	1
United Kingdom	2
United States	11
Other bodies <sup>†</sup>	10

<sup>36</sup>International Atomic Energy Agency, *Nuclear Security Information Portal (NUSEC)*, available at <http://www-ns.iaea.org/security/nusec.asp?s=4&l=31>.

<sup>37</sup>International Atomic Energy Agency, *Trends and Achievements in Nuclear Safety and Security*, available at <http://www.iaea.org/newscenter/news/2012/ns.html>.

<sup>†</sup> These include two UN bodies: UNICRI and UNODC

27. More recently, the *Nuclear Security Report* issued on 31 July 2012 for consideration at the General Council meeting held on 22 to 27 September 2012 reported that:

58. *The Agency is continuing to provide support to develop global nuclear security education primarily through the working groups of the International Nuclear Security Education Network (INSEN), which held its second annual meeting from 8 to 9 August 2011. The meeting attracted 50 participants from 21 Member States, together with representatives from international organizations.*

59. *In order to address the need for adequate educational materials in the area of nuclear security, INSEN has concentrated its efforts on developing the first academic textbook dedicated to nuclear security. This textbook is based on the module NS1 Introduction to Nuclear Security set out in IAEA Nuclear Security Series No. 12, Educational Programme in Nuclear Security and provides a broad overview of nuclear security. The textbook is currently at the final stage of review.*

60. *INSEN members have also developed two academic textbooks in Russian language of relevance to nuclear security, on nuclear energy, nuclear fuel cycle and nuclear applications; and on methods and instruments for nuclear and other radioactive material measurements.*

61. *In addition, peer reviewed teaching material comprising an indicative agenda, PowerPoint presentations and related session plans, practical and laboratory exercises as well as evaluation exercises have been developed for the six academic courses set out in IAEA Nuclear Security Series No. 12. A group of universities in Austria, Germany, the Netherlands, Norway and the United Kingdom will launch the first comprehensive master's degree programme in nuclear security in the first quarter of 2013, using the material produced by INSEN.<sup>38</sup>*

## **Nuclear Security Education: An Overall Appreciation**

28. In considering the activities and the achievements made by the IAEA in the area of nuclear security education, there are several important points to be noted.

29. First, the approaches adopted towards the implementation of nuclear security education are **state-led** and **all-inclusive** underpinned by a shared recognition for the value of leadership, state commitment and international co-operation. In the report evaluating the progress achieved throughout the duration of the *Nuclear Security Plan 2006-2009*, the IAEA underscored that '*all states have responsibilities to establish appropriate systems to prevent, detect and respond to malicious acts involving nuclear or other radioactive material. Not doing so may create a weak link in global nuclear security*'.<sup>39</sup> [Emphasis added]. Among the lessons learned that apply at the **national** level, the report further outlined the following:

- *An effective nuclear security infrastructure requires a multidisciplinary approach with: (i) legal and regulatory infrastructures with clearly defined responsibilities*

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<sup>38</sup> IAEA Board of Governors, *Nuclear Security Report 2012*, GOV/2012/41/GC(56)/15, 31 July 2012, Vienna, Austria. Available at <http://www.iaea.org/About/Policy/GC/GC56/Documents/index.html>.

<sup>39</sup> IAEA Office of Nuclear Security, *Implementation of the IAEA Nuclear Security Plan 2006-2009*, September 2011, Vienna. Available at <http://www.iaea.org/Publications/Booklets/NuclearSecurity/nsplan0911.pdf>.

among different organisations and operators; (ii) **human resource development**; (iii) the establishment of procedures and coordination functions; and (iv) technical support for national infrastructures, recognising that nuclear security arrangements within nuclear facilities/locations are different from those applied outside such facilities/locations to protect civil society from nuclear security events involving radioactive substances;

- Account should be taken of the synergies between safety, security and national accounting and control systems, integrating where appropriate, relevant features of the national legal and regulatory systems;
- **A sustainable nuclear security culture is needed in the management of activities involving nuclear or other radioactive material.** As a result, nuclear security would be an enabling factor in the broader use of nuclear energy.<sup>40</sup>

30. With regard to the lessons learned that apply at the **regional** and **international** level, the report emphasised that ‘*regional cooperation and coordination agreements facilitate regional approaches to nuclear security*’ and stressed the importance of ‘*appropriate sharing of knowledge, experience and coordination among States and international organisations based on a comprehensive set of established standards and guidance to provide common references.*’<sup>41</sup>

31. The second characteristic relates to the significant role that the IAEA plays in promoting nuclear security education and facilitating and supporting awareness raising and training initiatives. A summary of the Agency’s wide-ranging activities in this respect were presented in the previous section of this Briefing Paper. As part of the specified Programme Implementation of the *Nuclear Security Plan 2010-2013*, the Agency will provide assistance and guidance in the following areas:

- *Nuclear Security Guidance*;
- *Legislative Assistance and Facilitation of Adherence to and Implementation of International Instruments*;
- *Nuclear Security Peer Reviews and Advisory Services*;
- **Sustainability Support**;
- *Research and Development*;
- *Integrated Nuclear Security Support Plans*;
- *Information Management and Collection*;
- *Cooperation and Networking*; and
- *Risk Reduction.*<sup>42</sup>

32. Furthermore, the active engagement of the IAEA in fostering and sustaining nuclear security culture has been recognized as one of the chief directions towards the effective provision of nuclear security services for the duration of the *Nuclear Security Plan 2010-2013*:

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<sup>40</sup> IAEA Office of Nuclear Security, *Implementation of the IAEA Nuclear Security Plan 2006-2009*, September 2011, Vienna. Available at <http://www.iaea.org/Publications/Booklets/NuclearSecurity/nsplan0911.pdf>.

<sup>41</sup> IAEA Office of Nuclear Security, *Implementation of the IAEA Nuclear Security Plan 2006-2009*, September 2011, Vienna. Available at <http://www.iaea.org/Publications/Booklets/NuclearSecurity/nsplan0911.pdf>.

<sup>42</sup> IAEA Board of Governors, *Nuclear Security Plan 2010-2013*, GOV/2009/54-GC(53)/18, 17 August 2009, Vienna, Austria. Available at: <http://www-ns.iaea.org/downloads/security/nuclear-security-plan2010-2013.pdf>

36. *The Agency's nuclear security services have been useful in assisting those States requesting the services in evaluating and improving their existing systems. These Agency services should be further developed, within the period of the Plan, to be useful for all States. States increasingly express the need for and value of having Agency services available to assist them in evaluating the measures taken to prevent, detect and respond to malicious acts involving nuclear and other radioactive material. During the period of the plan, a flexible model for nuclear security services will be finalised. The service will involve recognised experts within Member States and be designed to meet the needs, as requested, by and individual State. Internationally accepted Agency guidance and binding and non-binding international legal instruments of relevance to nuclear security provide the basis for the evaluation. The expert services should be complemented by self-assessment methodologies. The service should be designed so that communication of findings and the dissemination of best practices will be possible. It should be so designed that all States share a common understanding of the value provided by the service and that the standards met provide for confidence building among States.*<sup>43</sup> [emphasis in original]

33. At the heart of the support provided by the IAEA toward achieving sustainability is the promulgation and establishment of nuclear security education both at the academic level and in the professional sphere:

*Human resource development covering both training and academic educational programmes will be provided to address the range of national responsibilities. The Agency will also provide support to States who wish to develop nuclear security support centres. These are national centres designed to facilitate human resource development and provide technical support services such as equipment calibration and maintenance at the national and regional levels.*<sup>44</sup>

34. Another characteristic of nuclear security education is the financial support that is provided. As already noted, the strategy adopted by the IAEA for awareness raising, training and education is comprehensive and systematic, covering different levels and types of instruction. Moreover, the development of mechanisms for building sustainable capacity in the area of nuclear security is among the main objectives for the effective implementation of the *Nuclear Security Plans* for both the period 2006-2009 and 2010-2013. To this end, the IAEA initiatives related to education are primarily financed by the Nuclear Security Fund (NSF). The Nuclear Security Fund is a voluntary funding mechanism that was created in March 2002 by the IAEA Board of Governors.<sup>45</sup> The NSF was established to support, *inter alia*, 'the implementation of nuclear security activities to prevent, detect and respond to nuclear terrorism.'<sup>46</sup> Except for a very small Regular Budget component, the chief source of funding for the implementation of the *Nuclear Security Plans* comes from the NSF. The implementation of the *Nuclear Security Plan 2006-2009* was thus almost wholly dependent on the donation of extra budgetary funds by Member States and others to the NSF and on in-

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<sup>43</sup> IAEA Board of Governors, *Nuclear Security Plan 2010-2013*, GOV/2009/54-GC(53)/18, 17 August 2009, Vienna, Austria. Available at: <http://www-ns.iaea.org/downloads/security/nuclear-security-plan2010-2013.pdf>

<sup>44</sup> IAEA Board of Governors, *Nuclear Security Plan 2010-2013*, GOV/2009/54-GC(53)/18, 17 August 2009, Vienna, Austria. Available at: <http://www-ns.iaea.org/downloads/security/nuclear-security-plan2010-2013.pdf>

<sup>45</sup> IAEA, *Nuclear Security Fund*, August 2012, Vienna, Austria. Available at: <http://www-ns.iaea.org/security/nsf.asp>.

<sup>46</sup> IAEA, *Nuclear Security Fund*, August 2012, Vienna, Austria. Available at: <http://www-ns.iaea.org/security/nsf.asp>.



kind contributions.<sup>47</sup> The total amount of contributions to the NSF for the period 2006-2009 amounted to over \$70 million.<sup>48</sup>

35. Last but not least, these efforts to establish nuclear security education are underpinned by a shared understanding that this is a **long-term** objective that will require **unequivocal continuous commitment**:

*It appears that activities carried out under the Nuclear Security Plan have contributed significantly to national efforts to improve nuclear security. However, there is no room for complacency. The work needed to achieve and maintain a high level of nuclear security should be considered as work in progress which requires continual review.*<sup>49</sup>

36. This conviction is also reflected in the final report on the *Implementation of the IAEA Nuclear Security Plan 2006-2009* which concluded with a list of lessons learned that apply to the Agency's work. The list is replicated in the report outlining the *Nuclear Security Plan 2010-2013*. These lessons are as follows:

- *Nuclear security is a **long term effort** and the Plan should adopt a **long term perspective**, identifying core activities while, at the same time, being kept under constant review to reflect changes in circumstances; [Emphasis added]*
- *Priority should be given to the production of nuclear security guidance to assist States and to human resource development support;*
- ***Effective implementation** of the Plan **has to be based on** systematic approaches using programmes designed to ensure sustainability of security improvements and to obtain strengthened capacities, **building on regional and national infrastructures and capabilities**; [Emphasis added]*
- *Strengthened coordination with other international organisations, initiatives and bilateral programmes is needed to avoid duplication of efforts or gaps.*<sup>50</sup>

### **Implications for Biosecurity Education of Life Scientists**

37. While the need for and the value of biosecurity education for life scientists have largely been acknowledged over the past several years, unfortunately, to date, efforts to raise awareness of the legal, ethical and social responsibilities of those engaged in the life sciences remain sporadic, largely limited to the context of a specific country or region, and severely constrained in terms of time and resources. Analysis of the available information shows that very few academic institutions have taken steps to develop curricula in biosecurity.

38. A notable exception in this respect is the University of Bradford, UK, which has gained significant credibility as a pioneer in the field of biosecurity education and awareness-raising. The Bradford Disarmament Research Centre (BDRC), together with colleagues from the

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<sup>47</sup> IAEA, *Nuclear Security Fund*, August 2012, Vienna, Austria. Available at: <http://www-ns.iaea.org/security/nsf.asp>.

<sup>48</sup> IAEA Office of Nuclear Security, *Implementation of the IAEA Nuclear Security Plan 2006-2009*, September 2011, Vienna. Available at <http://www.iaea.org/Publications/Booklets/NuclearSecurity/nsplan0911.pdf>.

<sup>49</sup> IAEA Office of Nuclear Security, *Implementation of the IAEA Nuclear Security Plan 2006-2009*, September 2011, Vienna. Available at <http://www.iaea.org/Publications/Booklets/NuclearSecurity/nsplan0911.pdf>.

<sup>50</sup> IAEA Office of Nuclear Security, *Implementation of the IAEA Nuclear Security Plan 2006-2009*, September 2011, Vienna. Available at <http://www.iaea.org/Publications/Booklets/NuclearSecurity/nsplan0911.pdf>.

National Defence Medical College, Japan and the Landau Network Centro Volta, Italy, successfully developed a Biosecurity Education Module Resource (EMR) comprising of 21 lectures accompanied by lecture notes, self-study materials and essay questions. This Resource is freely available online currently in ten languages, including English, Japanese, Russian, French, Spanish, Urdu, Polish, Romanian/Moldovan and Georgian. Based on the EMR, in 2010 Bradford launched a 20 Master-level credits online distance-learning train-the-trainer programme in Applied Dual-Use Biosecurity. The Programme was upgraded to 30 Master-credits in 2011.

39. In 2011 Bradford launched its National Series which is a set of country-specific lecture material focussing on issues of biosecurity and dual use. In addition, in August 2012 Bradford collaborated with the Public Health Agency of Canada and Carleton University on the delivery of a continuing professional development joint training course in biosecurity, biosafety and bioethics leading to an *Advanced Certificate in International Biological Sciences Security Management*.

40. **Overall**, however, **progress** on education and awareness-raising among those engaged in the life sciences so far **has been slow** demonstrating the need for consolidated efforts and long-term commitment to building sustainable capacity in biosecurity. Given the rapid advancement of science and technology and the growing potential threat of hostile misuse of the life sciences, there is an urgent need to strengthen the norm of biological disarmament and non-proliferation embedded in the Biological and Toxin Weapons Convention. Fostering the culture of biosecurity in the area of life sciences is thus of paramount importance. To this end, biosecurity education and awareness-raising should be among the main focal points of discussion and action, not least because they constitute essential elements in the overall web of preventive policies and initiatives. The nuclear security education experience can serve as a valuable model in at least several important respects in devising a comprehensive strategy for the implementation of biosecurity education.

41. First and foremost, there is a need for **state-led** initiatives, commitment and cooperation at international and regional level in the field of biosecurity education. Decisions need to be made at the **international level** regarding the measures and mechanisms that can be utilised and/or need to be developed in order to facilitate the implementation of biosecurity education. Short-term and mid-term goals and milestones need to be determined, and systematic action plans need to be developed. Once consensus is achieved among States Parties on the steps needed to be taken, key stakeholders and potential partners need to be identified. These can be international organisations, regional bodies and/or representatives of the civil society, including but not limited to academia, industry, think-tanks. The format of the new Intersessional Process 2012-2015 provides the States Parties to the BTWC both with a forum and an opportunity to discuss possible approaches to biosecurity and awareness-raising under Standing Agenda Item '*Review of Developments in the Field of Science and Technology related to the Convention*'.

42. Secondly, there is a need for a synchronised and coordinated approach that builds upon the existing expertise in the field of biosecurity education while, at the same time, allows for a broader participation of multiple stakeholders, thus maximising the potential benefits and achieving inclusiveness. Coordination at international level is crucial in order to ensure that the agreements reached at formal sessions are acted upon systematically and effectively; that States Parties in different regions and at different stages in their development are provided with the support they require for the implementation of the agreed plans; and that expertise

and resources are adequately distributed. Coordination at international level is also vital for evaluating the needs and capacities of individual States Parties; assessing the progress made in implementing the agreements as well as addressing any potential challenges that may be encountered; developing a long-term strategy for monitoring and reviewing the process of human resource development and awareness-raising in the area of biosecurity. Such coordination will also play a key role in preventing duplication of efforts or gaps.

43. Given the importance of coordination at international level, there are a number of issues that merit consideration. For instance, what form should the process of coordination assume? Drawing upon the nuclear security education experience, it appears that the IAEA plays an indispensable role in the implementation of the *Nuclear Security Plans* at international, regional, and national level by providing individual States Parties with the support which they specifically require. Based on this model, centralised coordination through an intergovernmental organisation clearly generates considerable benefits, not least because it allows for an efficient distribution of resources, effective time management, assistance provision, and progress assessment.

44. Yet if this model is to be applied for the purpose of implementing biosecurity education programme at international level, which international organisation should be tasked with the coordination of the process? The most obvious candidate for the role is the Implementation Support Unit (ISU) since it is the agency that has been monitoring the activities related to the implementation of the BTWC and has been working closely with States Parties at various levels. Nevertheless, the ISU, as it currently stands, is hardly equipped for fulfilling the duties of an international coordination agency. The Unit possesses neither the capacity nor the resources required for coordinating the implementation of a comprehensive biosecurity education plan. At present, the ISU is both understaffed and underfunded in comparison to its nuclear counterpart – the IAEA – which, in turn, creates serious challenges to mirroring the success achieved in the realm of nuclear security education. If the ISU were to be given the mandate to act as a coordinating agency to help implement the biosecurity education plan once it is agreed, then the ISU would need to be restructured so that it could perform its new functions and meet the defined objectives. Its mandate would need to be extended; its scope of activity would need to be expanded; and its budget would need to be increased.

45. Thirdly, the implementation of a comprehensive biosecurity education plan will require adequate financial support. It is essential that funds be specifically allocated for the purposes of human resource development, education and awareness-raising in order to ensure continuity and sustainability. Based on the model of the nuclear security education experience, a fund for voluntary contributions could be set up. The amount and range of contributions would depend on the mandate of the fund and on the time-frame set for achieving the defined objectives. The coordinating agency would be tasked with the administration of the fund, the preparation of regular reports on how resources have been utilised and the assessment of the needs of individual States Parties.

46. Fourthly, it is important that the biosecurity education plan should include short-term, mid-term and long-term goals and that corresponding milestones be defined. Periodic reviews of the progress made at every stage of implementation need to be conducted. In this regard, the coordinating agency will again play a key role by providing appropriate mechanisms for data collection and analysis and assessment of the measures taken by individual States Parties at international, regional and national level. Matrices and performance indicators need to be developed in order to evaluate the effectiveness of the biosecurity education plan. Those may

take the form of quantifiable indices, such as, the number of countries which have implemented biosecurity education and training at university level, or number of institutions within a region that offer accredited biosecurity education and training. This in turn will facilitate the progress monitoring and allow for adjustments and changes where necessary. The development of matrices will also be instrumental for identifying potential challenges and how they can be best addressed. Finally, it will allow for identifying models of best practice and knowledge sharing among individual States Parties.

47. Last but not least, the establishment of biosecurity education needs to be regarded as the basis for fostering a culture of responsibility and awareness among those engaged in the life sciences. As such, the biosecurity education plan, however conceived, has to be considered a long-term objective. A normative change in the culture of the life sciences cannot be expected to occur overnight. Rather, the development of a culture of biosecurity in the life sciences needs to be a continual process which requires high-level commitment, adequate support and constant evaluation review. It also requires wide cooperation and engagement of multiple stakeholders, including relevant International and Regional Organisations, National Authorities, and representatives of civil society (e.g. academia, industry, non-governmental organisations).

48. The rapid advancement of science and technology and the multifaceted security concerns that such advances raise pose an unprecedented challenge to the integrity of the international prohibition of biological weapons enshrined in the BTWC. Addressing this challenge requires that a robust culture of biosecurity be fostered in the life sciences. Only in this way will it be possible to ensure that attempts at hostile misuse of life science knowledge and materials are effectively discouraged and prevented and that the life sciences continue to generate benefits for peaceful, prophylactic and preventive purposes. To this end, the implementation of a comprehensive biosecurity education plan at international level based on the model of the nuclear security education experience is an indispensable step. These are the issues that need to be at the forefront of the discussion on the Standing Agenda Item '*Review of Developments in the Field of Science and Technology related to the Convention*' and also the Standing Agenda Item '*Strengthening National Implementation*' with regard to education and awareness-raising. During the Intersessional Process which has just begun there is time to focus on the issue in the form of constructive dialogue and deliberation, to make important decisions, and above all, to move toward substantive and cumulative progress.