OPCW

Advisory Board on Education and Outreach

Fifth Session
27 February – 1 March 2018

ABEO-5/1
12 February 2018
Original: ENGLISH

REPORT ON THE ROLE OF EDUCATION AND OUTREACH IN PREVENTING THE RE-EMERGENCE OF CHEMICAL WEAPONS

1. EXECUTIVE SUMMARY

1.1 This report by the Advisory Board on Education and Outreach (ABEO) identifies education and outreach (E&O) approaches to help the Organisation for the Prohibition of Chemical Weapons (OPCW) achieve its goal of preventing the re-emergence of chemical weapons.

1.2 In paragraph 35 of the "Medium-Term Plan of the Organisation for the Prohibition of Chemical Weapons, 2017 – 2021" (EC-83/S/1 C-21/S/1, dated 8 April 2016), it is noted that:

> Successful implementation of the Convention cannot be achieved simply through a regulatory approach by national governments. It also requires instilling a sense of ownership into relevant stakeholders in the chemical industry, research, academia, NGOs, and civil society in order to garner their support and active collaboration.[1]

1.3 This report addresses how to develop this "sense of ownership" by responding to three requests made by the Director-General of the OPCW Technical Secretariat (hereinafter "the Secretariat) to the ABEO at its Third Session (see Annex 2 to ABEO-3/1, dated 16 March 2017):

(a) to identify best practices and the latest advances in E&O theory and practice relevant to the OPCW's E&O activities;

(b) to relate the relevant E&O theory and practice to the OPCW's mandate and main areas of work, as the Organisation moves its focus to preventing the re-emergence of chemical weapons; and

(c) to develop on this basis a portfolio of specific E&O activities and projects that the Organisation, States Parties, and the ABEO and its individual members should pursue as a matter of priority from 2018 onward.[2]

1.4 A significant evidence base now confirms that the best educational approach to teach or inform an audience is "active learning", as opposed to traditional, lecture-based instruction in which students are passive recipients of information. The approach puts

[1] Available at: https://www.opcw.org/fileadmin/OPCW/EC/83/en/ec83s01_c21s01_e_.pdf

[2] The full text of the Director-General's request is reproduced in Annex 1 to this report.

the learner, rather than the instructor, at the centre of all activities. This learner-focused strategy can be applied in the classroom, laboratory, or field.

1.5 A growing body of knowledge and experience offers insights into how the OPCW can support E&O that is relevant to different national and regional experiences in chemical weapons disarmament. This report identifies a number of teaching strategies that support active learning, which are highly relevant to the OPCW's extensive capacity-building programmes for all its stakeholders.

1.6 Research on effective teaching also suggests that knowledge *per se* plays a relatively limited role in shaping people's attitudes. Simply providing information, even in the most neutral manner possible, is unlikely to be the most effective path to engagement. The research underscores the importance of understanding how particular audiences are likely to regard and potentially respond to an issue. It is therefore essential to allow sufficient time for audiences to discuss ideas and concepts so that they can relate what they have heard to their own circumstances.

1.7 As part of its expanded activities in E&O, **the OPCW should reach out to new stakeholder communities to raise awareness about their possible contributions to the "prevention of the re-emergence of chemical weapons" and promote professional, scientific, and business cultures that aim to reduce the risks of inadvertently undermining the norm against chemical weapons**. This report identifies a range of stakeholders—industry, scientists, academia, civil society, policymakers, and the media—and formulates recommendations on:

(a) the general approach to take;

(b) the projects that should be pursued;

(c) the concrete actions that should be undertaken; and

(d) who should undertake the projects/activities.

1.8 The recommendations provide the basis for a strategic and sustainable portfolio of E&O activities for the medium term.[3]

1.9 Many units in the Secretariat already have significant E&O components as part of their work, including training staff to carry out particular tasks. The insights from the science of learning and theories of outreach are directly relevant to and may further enhance the design and implementation of these activities.

1.10 The Secretariat **should systematically develop more interactive approaches across the full range of its E&O activities. The design of activities should include greater emphasis on assessing the effectiveness of teaching or training. Courses and other activities therefore need to be designed with clear goals and measurable objectives**.

1.11 Most of the E&O activities of States Parties are carried out through their National Authorities (NAs). All NAs have certain basic responsibilities in national implementation, though the scope and focus of these may vary substantially. The

[3] The full portfolio of recommended activities can be found in Annex 2 to this report.

range of E&O activities also varies. For some NAs, outreach to their national chemical industry is a routine part of their work. In contrast, many smaller countries in Africa and Latin America have no meaningful chemical industry, but may be engaged with traders and shipping agencies, or with the "informal" sector, which has become the subject of increased attention. In the professional assessment of the ABEO, E&O activities that contribute to the prevention of the re-emergence of chemical weapons would be welcomed by target audiences and States Parties where there is a significantly sized chemical industry.

1.12 Many NAs wish to broaden their E&O and have asked for assistance and training to equip them for this work. In recognition of these requests, this report recommends that **the OPCW take advantage of its existing processes to support NAs to help them build the capacity to carry out E&O. In addition, existing E&O materials need to be adapted so that they can be used more effectively**.

1.13 **To ensure a sense of common purpose among all E&O activities directed at different types of audiences in different parts of the world, the adoption of an overarching theme is recommended. The phrase "preventing the re-emergence of chemical weapons" reflects a primary goal of the OPCW and is sufficiently malleable that it can be adapted to many different E&O settings**. Since "prevention of the re-emergence of chemical weapons" encompasses the complete set of actions, supplementary themes such as chemical safety and security, the chemical industry's Responsible Care® initiative, and responsible science can frame actions in support of or with reference to the overall goal.

2. BACKGROUND

Education and outreach at the OPCW

2.1 The OPCW began to undertake E&O activities early in its history. A historical summary of these activities can be found in Annex 3 to this report.[4] The Third Special Session of the Conference of the States Parties to Review the Operation of the Chemical Weapons Convention (hereinafter "the Third Review Conference") formally recognised the contribution of E&O to the full and continuing implementation of the Chemical Weapons Convention (hereinafter "the Convention") and its norm against chemical weapons. Annex 4 summarises recent OPCW reports on the current roles envisioned for E&O.

2.2 The decision by the Executive Council (hereinafter "the Council") at its Eightieth Session establishing the ABEO (EC-80/DEC.5, dated 8 October 2015[5]) refers to E&O in support of "continued and sustainable implementation of all aspects of the Convention" to be undertaken by the States Parties and the Secretariat. In this regard, it notes the importance of "engagement with a range of *audiences*, including scientists, industry, students, educators, civil society, and policymakers" (emphasis added). In addition, the Secretariat and the NAs can be at the same time partners in

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[4] A more complete account can be found in the report of the Scientific Advisory Board's Temporary Working Group on Education and Outreach entitled "Education and Engagement: Promoting a Culture of Responsible Chemistry" (SAB/REP/2/14, dated 25 November 2014). Available at: https://www.opcw.org/fileadmin/OPCW/SAB/en/Education_and_Engagement-v2.pdf

[5] Available at: https://www.opcw.org/fileadmin/OPCW/EC/80/en/ec80dec05_e_.pdf

delivering E&O and audiences for capacity-building to enable them to better execute their E&O responsibilities.

2.3 The Director-General requested the ABEO at its Third Session (14 to 16 March 2017) to prepare a substantial report on the role of E&O in the future implementation of the Convention.[6] In line with its mandate, the ABEO should ensure that the OPCW's E&O activities, and those of States Parties, are effective, sustainable, and cost-effective and benefit from the latest advances in education and outreach theory and practice. This report should:

(a) identify best practices and the latest advances in E&O theory and practice relevant to the OPCW's E&O activities;

(b) relate the relevant E&O theory and practice to the OPCW's mandate and its main areas of work, as the Organisation moves its focus to preventing the re-emergence of chemical weapons; and

(c) develop on this basis a portfolio of specific E&O activities and projects that the Organisation, States Parties, and the ABEO and its individual members should pursue as a matter of priority from 2018 onward.

Preventing the re-emergence of chemical weapons

2.4 At its Third Session, the ABEO recommended that the OPCW adopt the phrase "prevention of the re-emergence of chemical weapons" as the overarching theme in its interactions with stakeholders, to communicate a sense of common purpose for all OPCW activities currently in progress and envisaged for the future. The ABEO furthermore strongly encouraged that "OPCW staff members systematically dedicate one or more paragraphs to this concept in every public discourse (speech, introduction, seminar, training activity, outreach event, public diplomacy, online educational modules, or publications, etc.) and provide an outline of the theme in relation to the audience, illustrating how the various aspects or objectives of a specific activity contribute to the overarching goal suggested by the phrase".[7]

2.5 The OPCW aims broadly with its various E&O activities. Furthermore, it wishes to engage with many different types of stakeholders simultaneously and has parallel short- and longer-term ambitions. Adoption of a central organising theme helps to establish and preserve unity of purpose, a general sense of strategic direction, as well as methodological cohesion across different initiatives.

Entering the post-destruction phase

2.6 The Convention is gradually moving into the next stage of its existence. Nearing universality and edging closer to the verified destruction of all declared chemical weapons stockpiles, the attention of States Parties naturally is shifting to the maintenance of the prohibition in a changing scientific, technological, economic, political, and security environment. This transition requires States Parties to identify and set future priorities.

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6 The full text of the Director-General's request is reproduced in Annex 1 to this report.

7 Subparagraph 8.33(b) of ABEO-3/1. Available at: https://www.opcw.org/fileadmin/OPCW/ABEO/abeo-3-01_e_.pdf

2.7 Preambular paragraph 6 of the Convention mandates this forward-looking responsibility:

> Determined for the sake of all mankind, to exclude completely the possibility of the use of chemical weapons, through the implementation of the provisions of this Convention, thereby complementing the obligations assumed under the Geneva Protocol of 1925.[8]

2.8 The Convention sets a timeless aspiration for the sake of all mankind, and instructs that it be achieved through the implementation of the treaty provisions.

2.9 The phrase "prevention of the re-emergence of chemical weapons" appeals to the future of the norm. It affects how one views the concrete implementation of different treaty provisions, be it Convention Article VI: "Activities not Prohibited Under this Convention", the future of the verification regime, or interactions with the chemical industry, scientific community, and other stakeholders. From an E&O perspective, the phrase therefore progresses naturally from the aspiration in preambular paragraph 6 towards an organising theme for concrete, forward-looking action and activities. Furthermore, it is sufficiently malleable to function as an umbrella for a plethora of activities in different settings.

2.10 The phrase has currency within the OPCW. It features in the final report of the Third Review Conference (RC-3/3[*], dated 19 April 2013),[9] and has appeared in several official statements by the Director-General, Deputy Director-General, and other senior officials.[10] The phrase is also used extensively in the forward-looking Note by the Secretariat entitled "The OPCW In 2025: Ensuring A World Free of Chemical Weapons" (S/1252/2015, dated 6 March 2015).[11] Notwithstanding the above, "preventing the re-emergence of chemical weapons" has by and large remained semantically void, as is evidenced by its occasional interchangeability with "non-proliferation" in official discourse or its seeming lack of substantive impact on activities undertaken by the OPCW and its Secretariat.

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8 Full text of the Convention available at: https://www.opcw.org/fileadmin/OPCW/CWC/CWC_en.pdf

9 Available at: https://www.opcw.org/fileadmin/OPCW/CSP/RC-3/en/rc303__e_.pdf

10 See for instance the keynote speech by Deputy Director-General H.A. Rao, "Preventing the Re-Emergence of Chemical Weapons: Lessons for Non-Proliferation", Summer Programme, Asser Institute, (The Hague, 2016). Available at: https://www.opcw.org/fileadmin/OPCW/DDG/DDG_Keynote_Speech_Asser_2016-09-05.pdf
Dr Alexander Kelle, then at Bath University and presently a Senior Policy Officer with the Secretariat, had already elaborated on the notion in 2012 even though referring to its growing use in disarmament circles. (A. Kelle, "Non-proliferation and preventing the re-emergence of chemical weapons", *Disarmament Forum*, no. 1 (2012), pp. 55–64. Available at: http://unidir.org/files/publications/pdfs/agent-of-change-the-cw-regime-en-312.pdf)
In an interview before the Third Review Conference, the Director-General had already used the notion several times. D. Horner, "No Chemical Weapons Use by Anyone: An Interview with OPCW Director-General Ahmet Üzümcü", *Arms Control Today* (January/February 2013). Available at: https://www.armscontrol.org/print/5642

11 Available at: https://www.opcw.org/fileadmin/OPCW/S_series/2015/en/s-1252-2015_e_.pdf

Adoption of a central organising theme

2.11 Concepts such as "disarmament" or "non-proliferation" suggest overall policy goals; they do not invite individual stakeholders to specific action. "Prevention of the re-emergence of chemical weapons", in contrast, appeals more readily to the responsibility of stakeholder communities and individuals to uphold the norm embedded in the Convention. It can be defined as the collective of actions undertaken by the OPCW, its Secretariat, and the National Authorities to implement the provisions of the Convention, on the one hand, and by professional, scientific, and academic communities, as well as civil society constituencies and individuals, to advance consciousness, responsibility, and specific behaviours that support purposes not prohibited by the Convention, on the other hand.

2.12 While each action may be undertaken independently, ultimately they all contribute to the overarching goal. Moreover, each action deepens the consciousness of the norm and draws in fresh communities and individuals. The overarching theme simultaneously advertises commonality of purpose, makes goals tangible on every level and for every type of action, and offers recognisability across types of audiences.

2.13 In this context, it therefore follows that the roles of E&O, including public diplomacy, are to not only devise strategies, methodologies, and tools in the pursuit of the overarching goal, but also to help audiences discover and identify their respective stakes and possible roles in the prevention of the re-emergence of chemical weapons.

2.14 "Preventing the re-emergence of chemical weapons" is a primary goal of the OPCW. However, the phrase can also be used to frame chemical disarmament. Since "prevention of the re-emergence of chemical weapons" encompasses the complete set of actions, supplementary themes such as chemical safety and security, the chemical industry's responsible care® initiative, and responsible science can frame actions in support of or with reference to the overall goal.[12]

2.15 Maintaining unity of purpose across target audiences does not invalidate the need for differentiation, bearing in mind different target audiences or regional and cultural contexts.

3. EDUCATION AND OUTREACH: CURRENT THEORY AND PRACTICE

3.1 This section summarises the findings of various bodies of research that inform our current understanding of the best approaches to E&O. This report deals with E&O separately, with public diplomacy treated as a special category of outreach.

3.2 Although most of the publications about modern E&O research have emanated from North America and Western Europe, the insights and approaches are being applied globally. There is extensive practical experience from around the world to show that the methods can be used successfully in a range of different cultural settings and social contexts. This growing body of knowledge and experience provides lessons for how the OPCW can deliver E&O in ways appropriate to different national and

[12] The report of the SAB Temporary Working Group on Education and Outreach (SAB/REP/2/14) explores several themes that could be used to support awareness raising and engagement with particular audiences.

regional experiences in chemical weapons and disarmament to support the prevention of the re-emergence of chemical weapons.

Education and the science of learning

3.3 Decades of research in education provide a fundamental understanding of how people, from infancy to adulthood, learn. More recent advances in cognitive psychology, neuroscience, and related fields, which reveal how the brain works, reinforce these findings. Taken together, this research provides strong evidence about the most effective approaches to education and training.

3.4 One of the most important implications of this research is that "active learning" methods, as opposed to traditional, lecture-based instruction in which students are passive recipients, produce better and longer lasting results. The results hold for factual information and for more fundamental concepts. The methods can be applied in many settings, including the classroom, the laboratory, or the field.[13]

3.5 Active learning approaches are not new. In Western culture, the Socratic method could be considered an early example. India too provides examples of ancient and modern applications.[14] Characteristics of active learning processes include:

(a) having students engage in some activity that forces them to reflect upon ideas and how they are using those ideas;

(b) requiring students to regularly assess their own degree of understanding and skill at handling concepts or problems in a particular discipline;

(c) attaining knowledge by participating or contributing; and

(d) keeping students mentally, and often physically, engaged through activities that involve them in gathering information, thinking, and problem solving.[15]

3.6 There are many teaching strategies that support active learning, such as in-class problem solving, peer-to-peer instruction, case studies, role playing and other simulations, exercises, and learning from original investigations (as, for instance, in the laboratory). The theory and practice are thus as potentially relevant to the OPCW's extensive capacity-building programmes as to the materials and methods for its engagement with the academic community.

3.7 An important finding from the research on learning is that factual knowledge must be placed in a cultural framework to be well understood. This emphasises the integration of learning about process and content with effective instruction. Ensuring time for reflection is another essential component of effective learning: reflection has been

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13 National Research Council (NRC), *How People Learn: Brain, Mind, Experience, and School (Expanded Edition)* (Washington, DC: National Academies Press, 2000) and NRC. *Reaching Students: What Research Says About Effective Instruction in Undergraduate Science and Engineering* (Washington, DC: National Academies Press, 2015).

14 *J. Frazier, ed., The Continuum Companion to Hindu Studies (London: Continuum, 2011).*

15 NRC, *How People Learn* and J. Michael, "Where's the evidence that active learning works?" *Advances in Physiology Education* 30 (2006): 159-167.

shown to permit deeper learning.[16] Again, many strategies exist to provide opportunity for such reflection.

3.8 These insights are important for the OPCW because students, and adults in particular, do not arrive to the classroom as empty vessels into which instructors simply pour new knowledge and insights. They come with a range of experiences and cultural frameworks, on which new understandings are to be constructed.[17] Sometimes a student's prior understandings will support further learning. In other instances, he or she may arrive with pre-conceived ideas or misconceptions that inhibit the capacity to absorb additional information or ideas. Addressing and perhaps changing a student's prior understandings requires time and explicit engagement from the instructor.

3.9 Culture can also influence prior understandings, which has implications for the development of curriculum materials for the types of international audiences that the OPCW addresses.

3.10 In addition, a student presented with too many ideas too quickly will find it difficult to absorb them, especially if this requires him or her to change a previously held conception. Without assistance, humans struggle to make connections between disparate fields or types of knowledge.[18] The OPCW's preparatory work may, for instance, involve assessments that draw on observations of a specific situation as well as technical knowledge. Given its inherent complexities, training should be designed to include different types of reflection time, from deliberate breaks in lectures that provide such opportunities to exercises that structure and guide reflection.

3.11 Learning is also enhanced when the learner perceives the relevance of the material. The need for relevance underscores the importance of making materials and activities adaptable to local settings and individual circumstances, for example, by providing instructors with a range of suggestions for adapting a common curriculum to their own settings, and supporting the translation of materials into local languages.

3.12 Less is known about ethical development than learning in technical fields. There is also less consensus on appropriate ethical models for different cultural settings.[19] There can be additional challenges in culturally diverse settings, such as some of the OPCW's training courses, where prior understandings will affect how an individual interacts with course materials and activities. There is substantial agreement, however, that active learning approaches are appropriate and effective for engaging students on ethical issues in many contexts.

3.13 In the last decade there has been a substantial effort to develop common principles to guide the conduct of the increasingly globalised research community.[20] There are also

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16 NRC, *America's Lab Report: Investigations in High School Science* (Washington, DC: National Academies Press, 2005) and NRC, *Ready, Set, Science*! (Washington, DC: National Academies Press, 2008).

17 NRC, *How People Learn*.

18 *Ibid.*

19 S. Bonde *et al*., "Making Choices: Ethical Decisions in a Global Context", *Sci Eng Ethics*, No.22 (2016): *343*-366. DOI 10.1007/s11948-015-9641-5.

20 InterAcademy Council and IAP (The Global Network of Science Academies), *Responsible Conduct in the Global Research Enterprise: A Policy Report* (Amsterdam: IAC, 2012); *Lancet*, "Promoting research integrity: a new global effort", Editorial, Vol. 380 (October 27, 2012):1445; and N.H Steneck, "Global Research Integrity Training", *Science*, Vol. 340 (May 3, 2013): 552-553.

several examples of successful approaches to education regarding the responsible conduct of research and other ethical issues in science that have been developed, tested, and implemented in varied settings by international teams.[21] These experiences offer models for developing educational activities and resources that form an integral part of the overall set of actions covered by the "prevention of the re-emergence of chemical weapons."

3.14 The research shows that active learning methods are most effective when the course or activity in which they are used clearly identifies the goals and objectives of each component, as well as those of the overall effort. After the goals and objectives are established, the assessments are designed and checked to ensure that there is alignment between the objectives and the content matter. This process is called "backward" or "reverse" design.[22] It ensures that by explicitly articulating the learning objectives, they will inform and be integrated into the design of both the instructional and assessment strategies from the beginning. In addition, making the objectives clear to students enables them to understand the purpose of the class or activity, which further enhances their understanding.

3.15 Research on learning strongly indicates that assessment should be an integral part of teaching and learning.[23] It is generally agreed in the field of education research that a programme that does not integrate assessment into the learning process will likely prove ineffective in achieving its training or educational goals. A variety of tools are also available to support assessments, but to be effective, they must be geared to the desired learning outcomes. In addition, both standard education assessment and the concept of backward design are compatible with the results-based management (RBM) system currently guiding the OPCW's programme development and evaluation.

Examples of active learning approaches

3.16 With active learning, lectures do not disappear as a teaching method, but are redesigned to include systematic opportunities to engage students. For example, the instructor might give a 10- to 12-minute talk, followed by some sort of short exercise or organised discussion that provides both the instructor and the students with an opportunity to assess whether the material is being understood.[24] The approaches can be applied in many settings, from small classes to large lecture halls with hundreds of students.

3.17 Two common examples of active learning are problem-based learning and case studies. Connecting to real-world problems is an important feature of both problem-based and case strategies.

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21 Bonde *et al*., "Making Choices".

22 G. Wiggins and J. McTighe, *Understanding by Design*, Expanded 2nd ed. (Upper Saddle River, NJ: Pearson Publishing, 2005).

23 NRC, *Reaching Students*, and Dirks *et al.*, *Assessment in the College Classroom* (New York: Freeman, 2014).

24 A number of examples may be found in NRC, *Reaching Students*, 96-103.

3.18 A problem-based learning approach has been applied to biosecurity education. The University of Bradford, for example, prepared an edited volume containing articles on various topics relating to biological disarmament and non-proliferation.[25] It includes discussions of active learning and contains an accompanying handbook with exercises on "team-based learning," with additional materials for teachers available from the project website.[26]

3.19 Cases studies are often used by faculty employing a problem-based method of instruction. Cases that involve multiple participants lend themselves to role playing, which is one of the oldest forms of active learning. Simulations provide a way to encourage students to "step into the shoes" of decision makers to come to appreciate the complexity of negotiations or the pressures of an international crisis. Role playing can range from the simple to the elaborate, from an exercise that takes a portion of a class session to a simulation of an arms control negotiation that would fill an entire course.[27] In January 2017, the OPCW hosted a table-top exercise, a familiar form of active learning among security professionals, for representatives from international and regional organisations. The OPCW regularly hosts groups of students participating in Model United Nations programmes to carry out their simulations in a "real-world" disarmament setting.

3.20 One advantage of role playing, particularly in discussions of ethical issues, is that individuals can adopt and argue for a position without being obliged to make their own views known from the start. As discussed in the next section, advances in online education are enabling role playing and simulations that can engage participants beyond the classroom and even national boundaries.

Technology-enabled learning

3.21 Online technologies make it possible to develop high-quality curriculum materials to be shared with a broad audience. This approach is particularly promising in international applications, as long as attention is paid to necessary adaptations. Given the proven effectiveness of active learning, technology-enabled modules will need to be interactive in their design. Simply reading about an issue on a web page and clicking through a quiz is unlikely to support cognitive, behavioural, and performance change.

3.22 Practical technical issues are also an essential component for designing effective online education. The availability of technology and bandwidth needs to be carefully considered, since the OPCW also conducts major assistance programmes in areas that suffer from frequent power cuts or slow connection speeds. In some settings, mobile

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[25] S. Whitby *et al.*, *Preventing Biological Threats: What You Can Do,* (Bradford, UK: Bradford Disarmament Research Centre, 2016). Available at: http://www.brad.ac.uk/social-sciences/peace-studies/research/publications-and-projects/guide-to-biological-security-issues/

[26] T. Novossiolova, *The Biological Security Education Handbook: The Power of Team-Based Learning*, (Bradford, UK: Bradford Disarmament Research Centre, 2016), http://www.brad.ac.uk/social-sciences/peace-studies/research/publications-and-projects/guide-to-biological-security-issues/

[27] A. Kelle, "Experiential learning in an arms control simulation", *PS: Political Science & Politics*, No.2 (2008): 379-85.

phone access is available even if Internet connectivity is limited or unreliable, and there is increasing attention on developing these options.[28]

3.23 Students' familiarity with technology can also be harnessed to engage them in disarmament-relevant activities. ABEO member Benjamin Ruiz Loyola has been working with a group of students from several schools within his university to build a web page (blog) called "*Ciencia para la paz*"[29] (science for peace), on which information about chemical weapons and other weapons of mass destruction (WMD) will be posted. Professor Ruiz has also engaged students to use a traditional form of science communication—posters—to produce materials related to science for peace and chemical weapons issues.

3.24 In March 2017, the European Union (EU) Non-Proliferation Consortium, an EU-wide academic and research network led by four European think tanks supporting the EU in its non-proliferation and disarmament policies, launched an e-learning course, *EU Non-proliferation and Disarmament*.[30] The course aims to provide a comprehensive knowledge resource for practitioners and scholars interested in arms control, non-proliferation, and disarmament, and EU policies in these fields. The Peace Research Institute Frankfurt took the lead in developing the course and consulted with experts in active learning from German universities to take advantage of the latest practices in online education. ABEO Chairperson Jean Pascal Zanders prepared and presented the unit on chemical weapons.[31]

Teaching the teachers and promoting professional development

3.25 Developing educational materials and activities is unlikely to be effective without parallel professional development for faculty. Research shows that simply providing evidence about the effectiveness of active learning methods is not enough to persuade faculty to change how they teach.[32] Carefully designed and targeted efforts are necessary.

3.26 Professional societies in many disciplines offer workshops for new faculty, as well as educational symposia, special interest sections for members, and other activities to raise awareness about effective teaching practices and to recognise individuals who engage in this work. The programmes are a subset of the more general category of "train-the-trainer" programmes, in which more experienced educators seek to impart knowledge or skills in a way that can be sustained after the initial encounter. The newest programmes draw on the science of learning to inform the design of faculty development programmes, infusing the workshops/meetings/institutes with active practices and principles.[33]

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28 D. Sagarmay, "Distance Learning in Developing Countries through Multimedia Technology Using Mobile Devices," *International Journal of Education and Learning,* Vol. 1, No. 1 (March 2012): 41-48.

29 See: www.cienciaparalapaz.wixsite.com/cienciaparalapaz

30 See: https://nonproliferation-elearning.eu/

31 See: https://nonproliferation-elearning.eu/learningunits/chemical-weapons/

32 C. Henderson, N. Finkelstein, and A. Beach, "Beyond dissemination in college science teaching: An introduction to four core change strategies", *Journal of College Science Teaching,* Vol. 39, No.5 (2010): 18-25.

33 R.C. Hilborn, ed., *The Role of Scientific Societies in STEM Faculty Workshops* (College Park, MD: American Association of Physics Teachers, 2013). See: http://*www.aapt.org/Conferences/newfaculty/upload/STEM_REPORT-2.pdf*

3.27 Some professional societies and their counterparts in the international disciplinary unions, including for chemistry, have also promoted active learning approaches internationally. The International Union of Pure and Applied Chemistry (IUPAC) has a Committee on Chemistry Education (CCE), of which the OPCW Science Policy Adviser is a liaison member. CCE holds an international conference every two years, along with numerous regional conferences on chemistry education. The faculty institutes on responsible science carried out by the United States National Academy of Sciences in the Middle East, North Africa, and South and Southeast Asia are another example, and also include discussions of security issues.[34] Together, these and other programmes offer several models for promoting faculty development.

3.28 The work of these professional organisations also provides lessons for the efforts to promote the inclusion of topics like chemical weapons and the Convention in courses in schools at the secondary level and beyond. The role of "champions" who advocate the inclusion of these topics is particularly important. It is equally desirable to build networks of faculty who can support one another and share lessons learned and best practices. They have inspired efforts to build comparable networks to address security issues, usually within a broader framework. A network-building project by ABEO member Austin Ochieng, described in Box 1 below, employs "brain-friendly learning" techniques to conduct training in chemical safety and security in Kenya and surrounding countries.

BOX 1: CHEMICAL SAFETY AND SECURITY IN KENYA

The Kenya Chemical Society (KCS) is spearheading chemical safety and security training in the East African region. To improve on the delivery of the training, KCS has collaborated with US-based Sandia National Laboratories (SNL) for a trainer development program in curriculum development. In February 2017, trainers from Sandia trained several KCS trainers on both chemical and biological agent risk management and on the use of table-top desk exercises. In April 2017, one KCS trainer, along with Libyan participants, participated in a week-long workshop on chemical risk mitigation, held under Sandia's auspices at a meeting in Kuala Lumpur. The three KCS trainers, under the guidance of SNL trainers, have been reviewing previously prepared training materials/modules to reflect new pedagogy skills. These so-called "brain-friendly" training approaches build on trainees' existing knowledge and experiences, with facilitators guiding the learning process to a desired outcome. Learning is far more successful with this new approach than with classical lectures where the trainer is generally the only one who talks. Future training in Kenya will encompass more interaction in the classroom and table-top exercises, and involve participants actively in discussions and role playing. A pilot project module is in the planning stage and is awaiting funding. KCS also is considering plans to make all previous chemical safety and security training material more interactive.

[34] Information about the Institutes is available on the project website at: http://nas-sites.org/responsiblescience/ and in NRC, *Developing Capacities for Teaching Responsible Science in the MENA Region: Refashioning Scientific Dialogue* (Washington, DC: National Academies Press, 2013).

Insights from industry

3.29 One tends to think first of academia when discussing education and training, but industry carries out many activities that are potentially relevant to the OPCW and the States Parties. For chemical companies, recruiting and retaining well-educated and motivated personnel is essential to fulfil their goals of competitiveness, innovative capacity, attractiveness, and reputation. Policy in this area is a matter of good governance and is generally handled at the highest level in a company. This involves extensive and continuing training, which can be tailor-made or for group setting (such as for topics concerning safety and compliance).

3.30 The Responsible Care® initiative requires adequate training on health, safety, security, and environment matters.[35] Companies must also establish and maintain systems to facilitate the flow of hazard and safe handling information and appropriate guidance and training along the value chain to support risk evaluation and risk management of their products, and systems for receiving such information from suppliers on goods and services used by the organisation.

3.31 Training courses are generally delivered by specialised trainers in dedicated company training centres or external institutes where interactions between trainers and trainees are facilitated. Training courses generally take employees away from the office for a few days (e.g., two to three or five days in a row). Companies have also started to develop e-learning for many topics, as it is more flexible than conventional training and allows for broader audiences. Not all approaches are interactive, but industry's interest in the effectiveness of its training makes it a good audience for active learning methods.

Insights from other international non-proliferation and disarmament organisations

3.32 The mandate given to the ABEO includes providing advice on the "development and maintenance of partnerships" with other international organisations. Education and training are considered fundamental to continuing global progress on disarmament and non-proliferation. The most authoritative statement comes from the 2002 *United Nations Study on Disarmament and Non-Proliferation Education*:

> The overall objective of disarmament and non-proliferation education and training is to impart knowledge and skills to individuals to empower them to make their contribution, as national and world citizens, to the achievement of concrete disarmament and non-proliferation measures and the ultimate goal of general and complete disarmament under effective international control."[36]

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35 First launched in Canada in the mid-1980s, Responsible Care® is a global, voluntary effort by chemical companies, national chemical industry associations, and their partners to improve health and environmental performance, enhance security, and communicate with stakeholders about products and processes. Practiced today in more than 65 countries around the globe, Responsible Care® empowers companies to continue to strive for innovative ways to contribute to the vision of the World Summit on Sustainable Development that, by the year 2020, "all chemicals will be produced and used in ways that minimize risks for human health and the environment". See: https://www.icca-chem.org/responsible-care/

36 *United Nations study on disarmament and non-proliferation education*, Report of the Secretary-General, A/57/124 (New York: United Nations, 2002). Available at: http://www.un.org/ga/search/view_doc.asp?symbol=A/57/124

3.33 The United Nations continues to monitor disarmament and non-proliferation education, providing a website with a wide array of resources for different audiences, as well as a biannual report on the activities of different organisations.[37]

3.34 Such education has received considerable attention in recent years, reflected in activities across the spectrum of international organisations. The activities of a number of organisations are described in Annex 5. Some of the activities are focused on encouraging a "next generation" of policy and technical experts to be able to carry out work directly related to reducing the risks of proliferation or supporting the implementation of treaties and agreements. Other efforts focus on engaging wider scientific and technical or policy communities to raise awareness of the existence of treaties such as the Convention and on building support for their goals and effective implementation. Finally, some activities respond to the call to build a global citizenry.

3.35 In December 2013, *OPCW Today* devoted a special issue to E&O, including articles about the activities of other international organisations.[38] These activities offer the potential to cooperate where appropriate, for example in efforts to engage the "next generation" and to share experiences and lessons learned.

Outreach and the science of public communication

3.36 The fundamental concepts that underpin current outreach theory and practice are drawn from a range of social science disciplines, including psychology, sociology, political science, anthropology, communications, and linguistics. They are also increasingly informed by insights from research on how the brain functions in fields such as neuroscience and cognitive psychology. As such, there are ties and connections to the basics concepts discussed above for the science of learning. Here however, there is less consensus and more field-specific terminology to describe research results. It is less a "theory" than a set of interdisciplinary concepts whose insights inform action. For example, the synthesis and application of such concepts and research is at the heart of "strategic communications," the most common term for outreach approaches used by many types of organisations (governments, companies, non-governmental organisations (NGOs), and so on) and in many applications (marketing, political campaigns, public diplomacy, crisis communications, and so on).

3.37 Just as in research on learning, a key insight in outreach studies is that audiences are not empty vessels or blank slates. In general terms, people receive and process information and experiences by relying on "cultural models" that provide an economical way for understanding what is happening around them.[39] The models can be moral values, religious beliefs, cultural values or identity, level of trust in experts, or any combination of these and other factors that help people make sense of information. Whether seen as lenses or filters, these models suggest that the same information or messages will be understood differently by different people depending on their predispositions.[40] "Individuals are also more likely to accept misinformation

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37 See: https://www.un.org/disarmament/education/

38 See: https://www.opcw.org/fileadmin/OPCW/OPCW_Today/OPCW_Today_-_Vol_2_No_5.pdf

39 N. Quinn and D. Holland, "Culture and cognition", in eds. D. Holland and N. Quinn, *Cultural models in language and thought* (Cambridge: Cambridge University Press, 1987): 3-40.

40 D.A. Scheufele, "Five Lessons in Nano Outreach", *Materials Today*, Vol. 9, No. 5 (2006): 64.

and resist the correction of it when that misinformation is identity-affirming rather than identity-threatening."[41]

3.38 In addition, faced with an overwhelming number of issues to which they could pay attention, most people will "…collect only as much information as they think is necessary to make any given decision. They rely on *cognitive shortcuts or heuristics* to efficiently sift through large amounts of information and to form attitudes about issues…."[42] Those with the least expertise are the most likely to rely on such shortcuts.

3.39 Taken together, this research suggests that knowledge plays a relatively limited role in shaping people's attitudes. Simply providing information, even in the most neutral manner possible, is thus unlikely to be the most effective path to engagement. These findings are relevant to any complex topic and underscore the importance of understanding how audiences are likely to regard and respond to an issue when designing outreach activities or campaigns.

3.40 In 2014, the Royal Society of Chemistry (RSC) undertook a major project to study current public attitudes, awareness, interest, and engagement towards chemistry in the United Kingdom of Great Britain and Northern Ireland. The project included several qualitative workshops (also called "focus groups") and a nationally representative face-to-face public survey.[43] Box 2 below offers an extended quotation from the foreword by David Phillips, former RSC President, illustrating how technical experts' beliefs about the public—such as an expectation of widespread "chemophobia"—may not necessarily reflect reality.

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41 D.M. Kahan, "Misconceptions, Misinformation, and the Logic of Identity-Protective Cognition", Cultural Cognition Project Working Paper Series No. 164; Yale Law School, Public Law Research Paper No. 605; Yale Law & Economics Research Paper No. 575 (2017), 1. Available at: https://ssrn.com/abstract=2973067

42 D.A. Scheufele, "Messages and Heuristics: How audiences form attitudes about emerging technologies", in ed. J. Turney, *Engaging Science: Thoughts, Deeds, Analysis and Action* (London, UK: The Wellcome Trust, 2006): 20-25.

43 A number of reports from the research, and a toolkit to enable RCS members and other chemists to communicate more effectively with the public are available at: http://www.rsc.org/campaigning-outreach/campaigning/public-attitudes-chemistry/

BOX 2: WHAT THE BRITISH PUBLIC REALLY THINKS ABOUT CHEMISTRY

As professional chemists, we thought that we knew how the public feels about chemistry, but we had no hard evidence to back this up. Now we do. …

For me the most interesting and surprising finding is that the public perception of chemistry and chemicals is far more positive than professional chemists believed. Having said that, this view is coloured by some confusion over what a chemist is and what a chemist does. For example, the misidentification of chemists as pharmacists, which is a peculiarly British phenomenon.

While we have anticipated this result, we underestimated its scale. We will have to work hard to try to ensure that the noun "chemist" is in future used for what we understand it to mean. We can't easily change the common meaning of a word but we can be consistent with the way we use it. When we talk about ourselves and our jobs and say "I'm a chemist" (and I am always proud to say it!) we could change it to "I am a scientist working in chemistry". And if we think that framing ourselves as scientists sounds obvious, we should look at these findings because it is not obvious at all. It could be a first important step in contributing to a more understandable use of a word that defines who we are.

This research shows that our views of public opinion can be too negative. Chemistry is our profession, our passion, and we care about it so much that we possibly are a little biased. Perhaps we have become defensive owing to poor press over decades. But we should challenge this view and instead start thinking about public opinion in a more evidence-based way.

This research shows us a better picture than anticipated but also a picture of neutrality towards chemistry. Instead of focusing on the minority of negative views we should try to address the neutrality expressed by so many people. I believe that it is with these people that we can make a difference.

We shouldn't rely on content-focused traditional approaches whose motivation is to educate others. We need to embrace a more strategic and contextual approach of public communication where as much planning goes into understanding our audience and crafting an effective narrative as it does in building the content.

To try to influence public attitudes towards chemistry we, as chemists, must rethink our attitudes towards the public.

Source: Royal Society for Chemistry, *Public Attitudes to Chemistry*. Research report TNS BMRB. (London: Royal Society of Chemistry, 2015):3.

3.41 Other concepts that can be important in designing outreach strategies related to chemical weapons and the prevention of their re-emergence include "issue salience" (how important an issue is to the audience) and "efficacy" (how much do audience members believe they can make a difference in addressing the issue). Finally, another key concept is "framing," which is the insight that *how* a message is communicated can be as, or in some cases more, important than *what* is communicated because of the ways in which people process information or how such information interacts with existing cultural models.[44] The same information, framed in different ways, will have different impacts. Awareness of this issue can help inform the OPCW's selection of the key messages for its outreach efforts.

Outreach and public engagement

3.42 Over the last several decades, scholars have devoted considerable attention to the ways in which governments interact with their citizens to implement—and sometimes develop—policy. This interaction is very much affected by the type of government institutions and processes, as well as by broader social and cultural contexts. The OPCW, States Parties, and NAs may benefit from considering some of the insights of this research.

3.43 Scholars and practitioners usually talk about public engagement as a flow of influence and information between authorities and constituents. Depending on the purpose, communication may flow in one or both directions. There is no single methodology for public deliberation. Scholars have described several minimum standards for effective public deliberation, particularly for inclusivity and diversity, the provision of information, and value-based reasoning.[45] Some OPCW Member States could have insights to offer based on their experience with the process of carrying out the destruction of their declared stockpiles. Collaboration and dialogue with stakeholders is also a feature of the chemical industry's Responsible Care® initiative.

3.44 This emphasis on collaboration and dialogue coincides with a fundamental change in the approach experts take in their outreach to key stakeholders. It recognises that effective communication is not simply a one-way flow in which the expert tells an audience what he or she thinks they need to know. As a 2017 report from the United States National Academies of Sciences, Engineering, and Medicine concluded:

> The committee believes that while scientists have a duty to speak about their work, they have an equal duty to listen to the public so as to strengthen the quality of public discourse and increase the perceived and actual relevance of science to society. … It also can clarify what information society needs and wants from scientists.[46]

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44 D.A. Scheufele and S. Iyengar, "The State of Framing Research: A Call for New Directions", in eds. K. Kenski and K.H. Jamieson, *The Oxford Handbook of Political Communication Theories* (New York: Oxford University Press, 2014).

45 See for example, M. Schoch-Spana, "Public archetypes in U.S. counter-bioterrorist policy", in eds. H. Durmaz, B. Sevinc, A.S. Yayla, and S. Ekici, eds., *Understanding and Responding to Terrorism* (Amsterdam: IOS Press, 2007): 364-375.

46 NRC, *Communicating Science Effectively: A Research Agenda,* (Washington, DC: National Academies Press):18.

Public diplomacy as a special form of outreach

3.45 The Secretariat operates a Public Diplomacy Strategy, which was developed and implemented before the establishment of the ABEO.[47] Its primary objective is "to increase recognition of the OPCW's achievements in order to engender greater confidence in multilateralism and international cooperation as means for achieving global peace and security". A three-pronged strategy was developed to achieve this objective:

(a) developing dynamic messaging to highlight the positive achievements of the OPCW;

(b) generating increases in media coverage of the OPCW and traffic to our web and social media sites; and

(c) increasing knowledge about the Convention and OPCW among core stakeholder communities, such as the chemical industry.

3.46 In terms of adapting to changing circumstances, the strategy document cited the shift of emphasis from "disarmament" to "the prevention of the re-emergence of chemical weapons", adaptation "to the virtual mode of information engagement and corporate employment of social media", and maintenance of "the currently high profile of chemical disarmament achievements in the wake of the Syria mission and the Nobel Peace Prize".

3.47 Public diplomacy is difficult to define as a concept. However, it is more than a medium, which the aforementioned Note seems to suggest. Focused engagement with target audiences is central to the concept. Public diplomacy is usually viewed as a "support function, an adjunct or accessory service to major policy initiatives which have high-political, economic, and even military components".[48] More recently the understanding has widened "to capture the emerging trends in international relations where a range of non-state actors with some standing in world politics—supranational organisations, sub-national actors, NGOs, and (in the view of some) even private companies—communicate and engage meaningfully with foreign publics and thereby develop and promote public diplomacy policies and practices of their own".[49]

3.48 It is probably in the latter context that a public diplomacy strategy in support of a major policy initiative by the OPCW must be viewed. The development of a coherent public diplomacy policy (in addition to the communication strategy) ensures timely and regular outreach (in the sense of deepening understanding) to specific stakeholder communities. Public diplomacy highlights and updates the OPCW's goals and policies towards achieving them. In this sense, it translates "prevention of the re-emergence of chemical weapons" for broader audiences, be they specialist constituencies (e.g. industry or scientists) or the public.

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47 Note by the Director–General: "Public Diplomacy Strategy" (S/1215/2014, dated 23 September 2014). Available at: https://www.opcw.org/fileadmin/OPCW/S_series/2014/en/s-1215-2014_e_.pdf

48 A.K. Henrikson, "What Can Public Diplomacy Achieve?" *Discussion Papers in Diplomacy* (The Hague: Netherlands Institute of International Relations "Clingendael", 2006):1.

49 *Ibid*.

3.49 In addition, it establishes an overall framework for communicating confidently each time events challenge the integrity of the Convention. For the OPCW and its Secretariat, public diplomacy has an anticipatory, if not pre-emptive, quality. Through regular and focused interaction, the OPCW could brief specific key stakeholders on its programme of work, achievements, and aspirations. In this way it establishes itself as an authoritative source of information while acquainting target audiences with the goals, intricacies, and complexities of its various activities (all the while respecting any applicable confidentiality modalities).

3.50 It is also on the basis of this understanding that public diplomacy can connect with E&O strategies.

Creating situations for outreach

3.51 In addition to understanding how individuals process and react to information, another body of research from the social sciences, notably anthropology and archaeology, offers insights about the value of creating meaningful situations where E&O can take place. Anthropologists argue that "value" is an effect of all the efforts people have made to maintain, protect, and preserve historical remains as a way to help establish a better future.[50] Value is produced through the management of heritage as the result of public history, anthropological archaeology, community archaeology, and so on, to:

(a) identify significant sites burdened with the shadow of chemical weapons use, which can be properly activated for the benefit of future generations; and

(b) help determine and maintain the value of such sites as the warning monuments for the future.

3.52 The preservation of sites as well as the creation of exhibits to provide the history and experience of chemical weapons to wider audiences can substantially enhance the effectiveness of outreach. Centennial commemorations of the large-scale chemical weapons attacks of World War I have offered the opportunity to use the material remains of those events, including the sites themselves, to promulgate key messages about preventing the re-emergence of chemical weapons. The commemorations on 21 April 2015 in Ieper, Belgium, in which the OPCW played a leading role, are an obvious example.[51] ABEO member Anna Zalewska led the multidisciplinary research (archival studies, excavations, etc.) and the on-site workshops where chemical weapons were used in 1915, using active learning strategies. Her exhibit was first presented at the OPCW Headquarters in March 2015 and then at the Biological Weapons Convention annual meeting in Geneva in December 2015, as well as in Poland.[52] From an outreach standpoint, the public presentations of this troubled past through the exhibit created circumstances that were especially conducive to showcasing OPCW priorities.

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50 D. Graeber, *Toward an anthropological theory of value: The false coin of our own dreams* (New York: Palgrave, 2001).

51 See: https://www.opcw.org/special-sections/ieper-a-centenary-commemoration

52 Professor Zalewska's work is the subject of the film from the FIRES Project "Buried Memories". See also A. Zalewska, "The 'Gas-scape' on the Eastern Front, Poland (1914–2014): Exploring the Material and Digital Landscapes and Remembering Those 'Twice-Killed' ", in eds. B. Stichelbaut and D.C. Cowley, *Conflict Landscapes and Archaeology from Above* (London and New York: Routledge, 2016).

3.53 As with any outreach, communication must recognise the experiences and expectations of the potential audiences to be effective. Research can unearth how national narratives are influenced by difficult pasts (ancient, modern, recent) of chemical weapons use and how civil society, politics, and the media constructed discourses, and which factors and actions—including non-actions—informed both the construction and evolution of such narratives on local and regional as well as global levels. A critical engagement with such negative heritage may also facilitate the construction of more value-oriented identities and deeper reflections on "preventing the re-emergence of chemical weapons."

Existing OPCW resources

3.54 As part of its work in preparing this report, the ABEO reviewed current OPCW activities in E&O and the resources already available to support them. One of the encouraging conclusions to emerge from this review is that many of the Secretariat's E&O resources are already explicitly designed for, or readily adaptable to, the best practices discussed in this report. Resources include the series of short films in the "FIRES" series, which put chemical weapons issues in a human context by focusing on stories of individuals,[53] and The Hague Ethical Guidelines, which identify basic elements for ethical codes that support the fundamental norms of the Convention and provide the basis for discussion of ethical issues related to the practice of chemistry in relation to the Convention.[54] Another example is the "Multiple Uses of Chemicals" website described in Box 3 below.[55]

BOX 3: "MULTIPLE USES OF CHEMICALS" WEBSITE

The earliest example of a resource with the potential to be used in E&O grew out of the OPCW's relationship with IUPAC. In 2005, the OPCW sponsored the creation of a set of interactive electronic materials known as *Multiple Uses of Chemicals*, explicitly based on active learning principles. The website introduces students, educators, and policymakers to the topic of multi-use chemicals, and discusses how they can be used for beneficial purposes but also misused to create illegal drugs or even chemical weapons. The project has been carried out by two leaders from IUPAC's chemistry education work, Peter Mahaffy from Canada and ABEO member Alastair Hay from the United Kingdom of Great Britain and Northern Ireland.

The term "multi-use chemicals" was chosen to emphasise the shades of grey that are present in decision making about the responsible uses of chemicals.[56] Sometimes chemicals are used in ways that are clearly either ethical or unethical, but more often a spectrum of purposes is present and the effect of a chemical substance or reaction depends on the context of its use and the intent of its user. For this reason, particularly in educational and outreach contexts, the materials seek to engage users on the

53 The films can be found at: www.thefiresproject.com, with subtitles in all official OPCW languages.

54 The Guidelines, also available in all official OPCW languages, may be found at: https://www.opcw.org/special-sections/science-technology/the-hague-ethical-guidelines/

55 P. Mahaffy *et al*., "Multiple Uses of Chemicals – IUPAC and OPCW Working Together Toward Responsible Science," *Chemistry International*, Vol. 35, No. 5 (2014).

56 G. Pearson and P. Mahaffy. "Education, outreach, and codes of conduct to further the norms and obligations of the Chemical Weapons Convention" (IUPAC Technical Report), *Pure and Applied Chemistry*, Vol. 78, No. 11 (2006): 2169-2192.

complexity of classification of uses and the challenges in developing responsible practices to guide the choices students, educators, policymakers, and the public make each day about chemicals, most of which are beneficial.

The resource was pilot tested at several workshops for chemists and educators in different regions. In addition to further updating in the summer of 2017, funds have been secured to make the materials available in all official OPCW languages.[57]

3.55 The challenge of how best to design and support ways to expand the applications and lessons learned to all the relevant parts of the Organisation is addressed in the next section.

Conclusions

3.56 The ABEO's review of current research on E&O and current OPCW activities and resources leads to several conclusions that underpin the recommendations requested by the Director-General.

(a) The insights from research into how adults learn apply in many settings, including the classroom, training courses, the laboratory, and the field. They are relevant to the OPCW.

(b) Most of the research on adult learning has been published in the West, but the results and insights have been successfully applied in all parts of the world.

(c) Interactive methods of instruction and engagement, also called "active learning," have been shown to be more effective in achieving learning gains.

(d) People process information through "cultural maps" that reflect prior experience and values; outreach should thus be designed to take these predispositions into account.

(e) It is not enough to simply provide additional information to engage someone; the messages and subject matter need to be made relevant to any participant in an activity.

(f) The most effective approach to E&O is the combination of materials and messages that are relevant to the audience with interactive methods.

(g) Many units across the Secretariat are already engaged in E&O and training activities, to which the insights of research on adult learning are relevant.

(h) The NAs vary significantly in their experience and capacity to carry out E&O. They have identified specific assistance needs to enable them to implement activities effectively.

(i) Several existing E&O resources at the OPCW are already based on insights from research into effective adult learning. Others can be readily used in such activities.

[57] See: https://www.opcw.org/special-sections/education/multiple-uses-of-chemicals/

4. PORTFOLIO OF RECOMMENDED ACTIVITIES

4.1 In his request to the ABEO in March 2017, the Director-General asked the Board "which concrete action (both conduct of activities and development of educational tools) should the Organisation, States Parties, as well as the ABEO and its members pursue as a matter of priority from 2018 onward, so as to enhance both the scope and the reach of the OPCW's E&O activities?" (see Annex 1). In subsequent correspondence, the Director-General requested the ABEO to provide advice on the strategic engagement of several key stakeholders. More specifically, the Board was asked about:

(a) the general approach to take;

(b) the projects to be pursued;

(c) the concrete actions to be undertaken; and

(d) who should undertake the projects/activities (e.g., the Secretariat; States Parties, the ABEO, individual Board members).

4.2 In response to the Director-General's questions about engaging the key stakeholders identified in his request—industry, civil society, scientists, academia, and policymakers—the ABEO has prepared a series of "templates" for each category. An additional template addresses the media, an essential stakeholder for public diplomacy. Scientists are also included because of the emphasis the ABEO has placed on the role of the NAs, even though engagement with this constituency is already well established through the E&O activities of the Scientific Advisory Board (SAB) and the Science Policy Adviser, and the longstanding relationship with IUPAC. Reaching out to NAs is one area in which the SAB and the Science Policy Adviser have not been deeply engaged, and in which there is a particularly good opportunity for collaboration. The templates can be found in Annex 2.

4.3 There is inevitable duplication in the proposed actions, since in several cases the primary difference is how the outreach or education is framed for specific audiences. The discussion of strategies is followed by a section addressing the resources and capabilities that the Secretariat and the States Parties and their NAs will require to implement the recommended projects and actions.

Building capacity for effective E&O

Introduction

4.4 As described earlier in this report, the OPCW and the States Parties, primarily through the NAs, are already actively engaged in E&O. In addition, the OPCW has produced materials that support a range of E&O activities. Making E&O an integral part of the implementation of the Convention will require a more strategic and sustained approach to existing activities, as well as the identification of new or additional approaches. The actions for key stakeholders (described in Annex 2) provide the basis for this more strategic approach. Implementing the recommended actions effectively will require enhancing the capacity of the Secretariat and the NAs by drawing on the insights of E&O theory presented above. This will be a long-term effort—wholesale transformation in the current complex political environment and constrained financial circumstances is simply not feasible. And a more incremental approach, allowing the Secretariat and the NAs to experiment and adapt projects as they learn what works

best in particular circumstances, is more likely to be sustainable. Specific recommendations for how to build that capacity are offered below.

The Technical Secretariat

Recommendation: The Secretariat should systematically develop more interactive approaches to audiences across the full range of its E&O activities. This should include a greater emphasis on assessing the effectiveness of teaching or training. Courses and other activities thus need to be designed with clear goals and measurable objectives.

4.5 One of the key lessons from research about E&O is the overriding importance of using interactive methods to engage audiences in all types of settings. A few events organised by the Secretariat already use some interactive methodologies, and the feedback from the participants is that they want more of this. As discussed further below, NAs are also requesting assistance to promote relevant activities about the Convention and training in how to use educational material prepared for the OPCW; and this provides another opportunity to instil best practices.

For education

4.6 The evidence about effective communication approaches in education from a wide variety of sources is clear, and the message is that audiences need time to digest information. Providing time for discussion is thus critical. Courses and events need to be organised with these insights in mind. Where difficult issues are being debated, an exchange of views will be even more important.

4.7 By clearly stating the objectives and having some mechanism in place to assess that conference participants/trainees have actually learned what has been presented, the Organisation will have useful metrics to demonstrate success.

4.8 Knowing that information has been imparted effectively will allow the Secretariat to ask conference participants/trainees to communicate the same information to others back home. Wherever possible, events should have time set aside for participants to discuss how they can communicate to others what they have learned and to consider how to sustain the activity. It could be a requirement that conference/training workshop attendees do this, and this could be a condition of attendance at meetings. Thought should be given to providing small grants to facilitate meetings in home institutions, as this has proven an effective capacity-building measure.

4.9 Given the scope of what will be required to implement these changes, there are several options for building the relevant capacity within the Secretariat. For example, it might be appropriate to work with one branch of the Secretariat to consider in detail what training it would require for its teachers/instructors to move to a more interactive approach with its audiences. The ABEO could assist in devising and implementing a training plan. Once one branch has gained experience, others could be offered similar assistance. Another option could be to identify individuals from across the Secretariat who could be given intensive training in the fundamentals of active learning, and then serve as a cadre to implement interactive methods more widely.

4.10 In view of staff replacements, and the OPCW’s tenure policy in particular, initial and advanced training in education methodologies must necessarily be a recurring activity.

4.11 In addition to the methods, there is also a need to consider the content of courses and events organised by the Secretariat. If there is too much content, it can prove difficult for participants to grasp everything and feel empowered to act. The same is true for very disparate content. There is a strong case for covering less, but in much greater depth and with ample discussion time to ensure that concepts/ideas are well understood. It is particularly effective when participants have the time to practice what they are expected to take forward.

4.12 This will be very important when demonstrating how the educational materials developed for the OPCW can be used, for example by the NAs. There are many different engagement strategies that can be adopted to communicate the information contained in this material. However, it takes time both to acquire the skills to communicate in a more interactive manner and to build confidence in the teacher/trainer that he or she can do it. A few hours or a half-day session will not be sufficient. There must be adequate time set aside for participants to practice what they are being asked to demonstrate to others. Initially, ABEO members could help with this training and mentor Secretariat staff as they acquire skills in these engagement approaches.

For outreach

4.13 Beyond its education and training activities, there is much more that the OPCW wants to communicate to a wide audience. The work of its various divisions ought to be of great interest, but how the messages are communicated is key to stimulating this engagement. The insights from research on effective outreach make clear that it is essential that OPCW speakers understand the audiences they will address and how they are likely to process communicated information. The same presentation may work for certain groups, for example industry representatives or practising scientists, in different parts of the world. But in all cases the material needs to be relevant to the audience and presented at an appropriate level of detail.

4.14 The OPCW can attract individuals from many different institutions in all regions of the world to help it advance its objective of the prevention of the re-emergence of chemical weapons. Many of these individuals are likely to be more than willing to give time, other than just speaking at a conference, to help make programmes more sustainable. Setting aside workshop time where invited speakers can participate in small group work to develop ideas is a good way to help build participants' engagement with the Convention and its issues.

Assessment and evaluation

4.15 The OPCW currently employs the results-based management (RBM) system, used widely in the United Nations to guide programme development, implementation, and evaluation. "Managing for results" is a popular RBM slogan. A document from the United Nations Development Programme describes the "four pillars" of RBM as:

(a) the definition of strategic goals which provide a focus for action;

(b) the specification of expected results which contribute to these goals and align programmes, processes and resources behind them;

(c) ongoing monitoring and assessment of performance, integrating lessons learned into future planning; and

(d) improved accountability, based on continuous feedback to improve performance.[58]

4.16 Fortunately, the strategic approach and types of assessment discussed earlier in the section on "Education and the science of learning" are compatible with an RBM approach to evaluation.

4.17 If the recommendations in this report are adopted, the Secretariat will need to develop monitoring indicators and other metrics to assess their implementation. This is an important opportunity to reinforce the significant attention paid to assessments of OPCW work. For example, the following concepts could be considered:

(a) NAs should be aware that participants who attend to E&O training workshops should be responsible for preparing and providing training to others, serving as instructors in their respective countries.

(b) The Secretariat would follow up the activities organised by States Parties after the workshops, which should be reported by the NAs.

(c) The Secretariat would keep track of key performance indicators, such as the number of activities developed, the number of attendees, the use of provided material, etc., which could be used to evaluate the success of the programmes.

Making E&O resources accessible

4.18 The redesign of the OPCW website provides an important opportunity to make already available resources more accessible, either through a single point of entry on the new website, which would enable a visitor to easily find a range of materials housed on different parts of site, or through the creation of a dedicated E&O microsite like the one developed for the OPCW's twentieth anniversary. Either of these options would support a much more effective use of resources, whether by the NAs, educators and students, civil society, or others.

The National Authorities

Recommendation: the OPCW should take advantage of its existing processes for supporting the NAs to assist them in building the capacity to carry out E&O. In addition, existing E&O materials need to be augmented to enable them to be used more effectively.

4.19 There is significant diversity in the current capacity of NAs to fulfil the objectives of E&O in preventing the re-emergence of chemical weapons. Achieving success with E&O activities could therefore require assistance be given to the NAs, ranging from minimal to active mentoring and support. Argentina offers an example (see Box 4) of what some of the most experienced NAs are achieving.

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[58] United Nations Development Programme, "Results Based Management: Concepts and Methodologies" (undated), 2, http://web.undp.org/evaluation/documents/RBMConceptsMethodgyjuly2002.pdf

BOX 4: THE ARGENTINE PROJECT ON EDUCATION AND THE CHEMICAL WEAPONS CONVENTION

In 2010, the Argentine National Authority initiated several domestic activities as part of the next stage in the implementation of the Convention, based on the fact that a large number of chemical companies were not registered and the chemical industry had a low level of awareness about the technicalities of the Convention and national implementation norms. For this reason, it was necessary to improve the level of technical knowledge among students of chemistry, chemical engineering, and other related careers who would eventually manage declared chemical plants. Hence, it was proposed to promote a culture, among all professionals in the chemical fields, of the responsible use of technical and scientific knowledge, in order to be aware of the potential danger and to prevent all misuse and abuse of chemicals. (1)

Given the federal nature of the Argentine university system, the Argentine National Authority, based in the Ministry of Foreign Affairs, sought the support of the Ministry of Education. Both ministries agreed to work together and signed a memorandum of strategic cooperation in August 2013, which established the goals and actions to implement a "National Project on Education on the Responsible and Secure Use of the Chemical Sciences and Technologies for the Scientific, Economic and Social Development of the Argentine Republic". This partnership between the National Authority and the Ministry of Education has been key to the success of the Argentine national project.

The four main elements of the project established at the first national meeting in April 2013 on education about the responsible use of chemical knowledge were: (2)

(a) an overarching "network of networks" coordinated by the National Authority and the Ministry of Education, which holds annual meetings;

(b) a "train-the-trainer" programme, whose first workshop was held in Rosario in June 2013;(3) with a second held in Bahía Blanca in November 2014;(4) and a third in Buenos Aires in November 2017; (5)

(c) a virtual classroom; and

(d) a travelling class.

It is important to emphasise that other activities, such as workshops, aimed to graduate students, and the implementation of optional subjects usually complemented the project, with the objective of raising awareness about the Convention or OPCW-related matters, as well as the responsible use of chemical knowledge.

In addition to the project activities, the Argentine National Authority has also shared the experience gained with its Latin American and Caribbean counterparts at the First Regional Meeting on Education in the Responsible Application of Knowledge of Dual-Use Chemicals, co-organised by the Secretariat with the Government of Argentina in April 2014. The meeting was attended by representatives of 44 National Authorities and universities from 22 States Parties. Temporary Working Group and current ABEO member Alastair Hay instructed participants. The event served as a model for another regional meeting in Asia in 2015. The results are described in a national paper which Argentina submitted to the Council at its Seventy-Sixth Session.(6)

(1) C-18/NAT.3 (dated 2 December 2013). Available at: https://www.opcw.org/fileadmin/OPCW/CSP/C-18/national-statements/c18nat03_e_.pdf

(2) For a comprehensive description of the national project, see the presentation by the Executive Chairman of the Argentine National Authority at: https://www.opcw.org/fileadmin/OPCW/Education_Outreach/Proyecto_Educaci%C3%B3n_sep_2014_en_Evento_OPAQ__ingl%C3%A9s__FINAL_rev.pdf

(3) For more information on the June 2013 workshop in Rosario, see Alejandra Suarez and Rolando Spanevello, "Projects in Education and Outreach Relevant to the Convention: A Pilot Activity in Argentina", *OPCW Today*, Vol. 2, No. 5 (December 2013), pp. 27-28. Available at: https://www.opcw.org/fileadmin/OPCW/OPCW_Today/OPCW_Today_-_Vol_2_No_5.pdf

(4) For more information on the workshop in Bahía Blanca see the information at: https://www.opcw.org/news/browse/2/article/second-national-workshop-on-education-and-outreach-held-in-argentina/

(5) See: http://cancilleria.gov.ar/docentes-universitarios-se-capacitaron-en-la-ensenanza-del-uso-responsable-de-la-quimica

(6) EC-76/NAT.1 (dated 5 June 2014). Available at: https://www.opcw.org/fileadmin/OPCW/EC/76/en/ec76nat01_e_.pdf

4.20 Fortunately, there has been a systematic effort to gather information about the interests and needs of the NAs to support E&O. Initially, the Temporary Working Group (TWG) on Education and Outreach engaged with the NAs during the National Authorities Days in The Hague in 2012 and 2013. The goals were to gain insights into the needs of the NAs and to promote active learning approaches for E&O. A more systematic effort was undertaken in 2016, when E&O was on the agenda of all the regional meetings of the NAs. ABEO members made presentations and took part in discussions on current activities and needs. The International Cooperation and Assistance Division followed up with a survey of participants in the regional meetings, achieving a 66% response rate. Insights from the survey included the following:

(a) Even though there is a certain level of awareness among NAs about the importance of E&O activities, there are those who do not yet recognise E&O as part of their mandate or do not consider it a priority.

(b) There are NAs in every region that are aware of the significance of E&O. Some have implemented activities at the national level, so there are experiences and lessons that could be shared among the NAs.

(c) Several NAs cited a lack of resources as a barrier to undertaking E&O activities. In addition to limited financial resources, they also cited the need for OPCW materials to be translated into languages other than the six official

ones, a limited availability of capacity-building for NAs, and a general lack of human resources.

(d) The OPCW has materials that can be used by the NAs, but there is a need for accessible and practical guidance on how to use them, including the interactive methods that are most effective for engaging individuals and groups.

4.21 These efforts provide a picture of what the NAs believe they need to undertake E&O. Very broadly, these can be divided between the *process* that would enable the NAs to acquire relevant knowledge and skills and *needs* identified by the NAs to improve their capacity to engage specific stakeholders, on the one hand, and the *materials and resources* necessary to carry out E&O activities.

The process

4.22 E&O should become a regular agenda item for the regional and annual meetings of the NAs. Creating this kind of systematic process is one of the best ways to ensure that E&O becomes an integral part of the implementation of the Convention. The item should include opportunities both to acquire and supplement knowledge and skills and to share lessons learned and best practices. Such opportunities will further the capacity-building effort. It is important to note that time for E&O should be added to meetings and not taken away from other fundamental responsibilities of the NAs. As recommended by the ABEO at its Third Session, it would be a desirable initial step to hold a special workshop on E&O just before the next annual meeting of the NAs.[59] The workshop would bring together NAs from across the regions that have been active in E&O, along with additional experts, to share experiences, such as those related to the recent twentieth anniversary celebrations, and lessons learned. In this respect, it would be important to include NAs from the Western European and Others Group (WEOG). The results of the workshop could provide practical guidance for future activities, including those recommended in this report. Workshops like this would also constitute a profitable forum for the exchange of experiences in which NAs with the most advanced educational and outreach programmes could share lessons learned, which could be a source of motivation for less well-resourced NAs.

4.23 As discussed earlier in this report, the capacity of NAs to carry out E&O activities varies substantially from country to country. Train-the-trainer workshops at the regional or subregional level, organised by the Secretariat with assistance from the ABEO, could provide the basic skills to undertake E&O activities, as well as foster a network across the regions that would become a resource for others.

4.24 Another possibility to support regional capacity-building would be to identify one or two NAs in each region who could be “Champions” for E&O, providing advice, examples, and potentially even resources. There is already enough experience in most regions to make this feasible. Over time it could significantly supplement the assistance provided by the Secretariat.

[59] ABEO-3/1. Available at: https://www.opcw.org/fileadmin/OPCW/ABEO/abeo-3-01_e_.pdf

Needs

4.25 During the discussions with representatives from the NAs in 2016, a common theme was a lack of skills or resources to reach national key stakeholders to support full implementation of the Convention. The NAs expressed their need for assistance in the design of outreach strategies, the organisation of activities, and the crafting of messages for specific target audiences, including industry, policymakers, civil society, the media, and the public. For example, while NAs engage regularly with their national chemical industries, especially those subject to inspections or making declarations, they were interested in advice about effectively reaching out to industry more generally about the potential misuse of toxic chemicals, especially in light of the use of chlorine as a weapon. They also recognised that involvement with and advocacy through chemical industry bodies and associations may provide effective avenues for engagement with entities that, in turn, could disseminate information to their member companies via association journals, newsletters, and workshops/training activities. Nevertheless, many NAs were uncertain how best to engage with such bodies.

4.26 In principle, civil society should be an important audience and partner of NAs in preventing the re-emergence of chemical weapons. In the case of more developed States Parties, civil society organisations frequently assist NAs in raising awareness and promoting E&O, providing technical assistance, or undertaking public advocacy. For less developed States Parties, however, civil society does not usually play an active role in relation to NAs; such NAs expressed the need for training about how to best contact different relevant organisations and about how to reach out to engage them. There was also interest in learning more about outreach strategies for specialised cultural organisations such as museums and institutions dedicated to children's education and adult learning.

4.27 NAs recognised that successful communication with the public will reinforce their messages to other stakeholders, but expressed a need for training in the best outreach approaches. In this regard, the experience gained by various States Parties through their national commemorations of the Convention's twentieth anniversary could be a good starting point for sharing lessons learned and best practices. More broadly, responding to the needs of the NAs with outreach to key stakeholders provides an excellent opportunity to showcase and promote the advantages of interactive methods across a wide range of activities.

Materials and resources

4.28 The OPCW is fortunate to have several educational materials that were developed for use in interactive E&O settings. These include the "FIRES" documentary series, the Multiple Uses of Chemicals website, and The Hague Ethical Guidelines. But the NAs want accessible and practical guidance on how to use such materials, including examples of exercises and other interactive approaches to engaging individuals and groups. Realistically, education activities are more likely to be undertaken in partnership with academic experts, but it is still important for the NAs to understand and feel comfortable with the best methods. In the case of outreach, it is much more likely that the NAs will undertake activities themselves, from individual talks to conferences co-sponsored with local organisations. Particularly in this area they expressed their need for assistance.

4.29 Several options for providing the requested guidance exist, for example via a basic handbook with checklists, suggested exercises, and examples of potential outreach activities, as well as with short videos that could demonstrate specific methods. The new OPCW website could accommodate a dedicated space for E&O resources for the NAs; most of the content could simply be provided by links to more general resources. Customisation of the provided material should be encouraged, with NAs working jointly with national educators to identify target audiences and local resources. Effectively implementing such guidance will require the development of supporting materials for the major OPCW education resources at a minimum. Here too the ABEO could aid the Secretariat.

4.30 A continuing theme in the discussion of materials is the need to have them available in more languages besides English. At a minimum, materials should be available in all of the OPCW's official languages. The ABEO has offered specific recommendations to address this problem, such as identifying special sources of funds, especially at the regional level, to support translation.[60]

List of References (English only)

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Annex 1: Director-General's Request to the Advisory Board on Education and Outreach to Provide Advice on the Incorporation of Education and Outreach (E&O) Theory or Practice into the E&O Activities of the OPCW, as the Organisation Transitions to a Focus on Preventing the Re-emergence of Chemical Weapons

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[60] ABEO-3/1. Available at: https://www.opcw.org/fileadmin/OPCW/ABEO/abeo-3-01_e_.pdf

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Annex 1

DIRECTOR-GENERAL'S REQUEST TO THE ADVISORY BOARD ON EDUCATION AND OUTREACH TO PROVIDE ADVICE ON THE INCORPORATION OF EDUCATION AND OUTREACH (E&O) THEORY OR PRACTICE INTO THE E&O ACTIVITIES OF THE OPCW, AS THE ORGANISATION TRANSITIONS TO A FOCUS ON PREVENTING THE RE-EMERGENCE OF CHEMICAL WEAPONS[61]

1. As the Organisation for the Prohibition of Chemical Weapons (OPCW) shifts its focus, in the short to medium term, from chemical disarmament to preventing the re-emergence of chemical weapons, the role of education and outreach (E&O) in implementing the Convention takes on greater importance (EC-79/DG.11, dated 29 May 2015). A holistic approach to preventing the re-emergence of chemical weapons could affect verification activities, capacity development, engagement with a broad range of stakeholders, as well as the governance of the Organisation (S/1252/2015, dated 6 March 2015).

2. The mandate of the Advisory Board on Education and Outreach (ABEO) has at its core the provision to ensure that the Organisation's E&O activities, and those of States Parties, are effective, sustainable, cost-effective, and benefit from the latest advances in education and outreach theory or practice (C-20/DEC.9, dated 3 December 2015).

3. The Director-General therefore requests the ABEO to address the following questions in a written report to be submitted to him by the end of 2017:

   (a) Given the mandate of the ABEO (as mentioned in paragraph 2), what are current best practices as well as the latest advances in education and outreach theory or practice that are of relevance to the E&O activities of the OPCW?

   (b) How could the practices and advances identified in the ABEO's answer to question (a) be best utilised to enhance the Organisation's E&O activities in support of the different aspects of preventing the re-emergence of chemical weapons identified in paragraph 1 above?

   (c) Based on the answer to question (b), which concrete action (both conduct of activities and development of educational tools) should the Organisation, States Parties, as well as the ABEO and its members pursue as a matter of priority from 2018 onward, so as to enhance both the scope and the reach of the OPCW's E&O activities?

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61 Originally contained in Annex 2 to ABEO-3/1.

Annex 2

PORTFOLIO OF RECOMMENDED EDUCATION AND OUTREACH ACTIVITIES

INTRODUCTION

The Director-General requested the Advisory Board on Education and Outreach (ABEO) at its Third Session to address a number of questions about engaging key stakeholders, including industry, civil society, scientists, academia, and policymakers (see Annex 2 to ABEO-3/1, dated 16 March 2017). In response to this request, the ABEO has prepared a series of activity templates for each category of stakeholder. An additional template addresses the media, which is an essential target for public diplomacy. Scientists are also included because of the emphasis the ABEO is placing on the role of the National Authorities (NAs), even though engagement with this community is already well established through the education and outreach (E&O) activities of the Scientific Advisory Board (SAB) and the OPCW Science Policy Adviser, and the longstanding relationship with the International Union of Pure and Applied Chemistry (IUPAC). However, engagement with the NAs is one area in which the SAB and the Science Policy Adviser have not been deeply involved, and in which there is a particularly good opportunity for collaboration.

1. INDUSTRY

Audiences and messages

Who are they?

1.1 Recent global events, and the use of chlorine as a weapon in particular, have demonstrated the need to define the scope of "industry" broadly to cover all dimensions along the value chain: the manufacture, transportation, storage, and trade of chemicals with potential applications as weapons or that present significant risks to industrial safety. In addition, the scope and scale of the chemical industry constitutes a complex grid of enterprises ranging from micro-, mini-, small-, medium-, and large-scale operations in the organised formal sector, to the decentralised and unorganised entrepreneurial activity of the "informal" sector.

Why is it important to engage industry?

1.2 The chemical industry has been one of the most relevant stakeholders in the Chemical Weapons Convention (hereinafter "the Convention") and its successful implementation, ever since the negotiations on a chemical weapons ban started to make progress in the late 1980s and ratification of the Convention was championed by important States Parties.

1.3 The chemical industry's support of the Convention has recently been elevated to a higher level of engagement, through more formalised cooperation in the Joint Steering Committee of the OPCW and the International Council of Chemical Associations (ICCA) and the establishment of the Chemical Industry Coordination Group (CICG). However, with the transition of the Organisation's focus from chemical weapons destruction to the prevention of the re-emergence of chemical weapons, the relationship with chemical industry will also have to evolve and be further

strengthened. ICCA can play a key role in supporting engagement with industry; it is already one of the two formal observers of the ABEO (the other being IUPAC).

1.4 Industry plays a particularly important role in preventing the re-emergence of chemical weapons since, for example, there is a need to expand attention beyond the chemicals listed in the Annexes to the Convention and a growing need for chemical risk mitigation. Industry offers additional advantages as a key partner. Cultural similarities among industries relevant to the Convention grow because of the globalised mobility of technology and trade. As an interested partner, industry can also exert its influence to mobilise support for the responsible use of science and technology in States Parties to the Convention. In addition, in view of industry's highly structured nature—in fact, the highest among the OPCW's stakeholders—it may be easier, more cost-effective, and more sustainable to organise E&O activities.

Why would industry engage with the Convention and chemical disarmament?

1.5 The chemical industry often describes itself as "the industry of the industries", or as a "solution provider" or "part of the solution" for a sustainable future. Preventing the re-emergence of chemical weapons contributes to global peace and helps to ensure a sustainable future. Misuse of chemical substances as weapons tarnishes the chemical industry's reputation. The sector has a clear stake in conducting its businesses for purposes not prohibited by the Convention. Successfully doing so could also enable more limited regulatory requirements, which would reduce the financial and organisational costs of compliance. However, the scope of implementation requirements should drive the OPCW's E&O activities.

Which messages should be delivered?

1.6 The chemical industry already undertakes extensive education and training activities for its own purposes, such as regulatory compliance and health and safety practices. From an industry perspective, E&O have to create value for money, enhance employees' self-esteem and generate benefit for the structure in which they work. To produce expected results, a general course on the OPCW and the Convention should relate to employees and their current activity in the structure; that is, not only describe what the OPCW and the Convention are, but also why, how, and to what extent the OPCW and the Convention affect their activities. They should be knowledgeable about the conditions, requirements, and consequences of working in domains that fall under the Convention or are controlled by the OPCW. To be effective, the choice of topics for courses and their content will be critical, and may vary from one company to the other.

1.7 Small and medium-sized enterprises (SMEs) need attention as well. These companies tend to have less training and awareness-raising activities than the larger companies. SMEs will most likely cover training for employees to ensure adherence to regulations and basic safety principles. They may be less familiar with matters like the Convention and OPCW mandates.

1.8 Strategies for increasing engagement with industry can take advantage of a number of already well-established initiatives and concepts—Responsible Care®, Green Chemistry, and chemical safety and security—to frame relevant messages across the full extent of the chemical industry.

Projects

Outreach projects

For major chemical-producing nations that are part of Responsible Care® and/or ICCA

Actions

1.9 Assuming that ICCA will formally endorse The Hague Ethical Guidelines in the near future, draft a letter from the Director-General should be addressed to national chemical associations with a copy of the Guidelines. The letter should:

(a) offer support for activities to promulgate the Guidelines; and

(b) direct associations to the relevant portions of the OPCW website with materials to be used in outreach.

1.10 Work with ICCA and the CICG to expand Convention-relevant outreach should be undertaken via the type of workshops that are already commonly used by industry for outreach activities. These workshops are generally organised by national chemical federations and can be sponsored by ICCA.[62] Current cooperation could be strengthened for countries where strategic alignment can be found. IUPAC's expertise could also be engaged.[63]

1.11 Work should be undertaken with ICCA and the CICG, as well as with key regional or national industry associations, to identify resource people from industry who can participate in or assist with E&O activities and capacity-building.

1.12 The OPCW could encourage the CICG to foster partnerships between key national industry associations and States Parties, perhaps via a memorandum of understanding or more informally, to spread the message among individual industries of the transition in focus to the prevention of the re-emergence of chemical weapons.

1.13 In cooperation with the CICG and ICCA, industry leaders within each region who could become "OPCW Ambassadors" should be identified.

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[62] ICCA currently funds capacity-building events in about 25 different countries each year. Top priorities areas are China, India, and Africa. Many more events are scheduled each year across ICCA membership, but are not reported at the level of ICCA.

[63] IUPAC has a Committee on Chemistry and Industry and the organisation's membership includes chemists employed in industry, not just academia.

For small and medium-sized enterprises not subject to inspections or the reporting requirements of the Convention, including those in major chemical-producing nations

Actions

1.14 The letter from the Director-General to national chemical associations, with a copy of the Hague Ethical Guidelines enclosed, should include a message that the Guidelines are relevant beyond companies that are subject to the Convention. An effort should be made to identify additional organisations that can reach out to SMEs to which the Director-General could write a targeted letter. The letter should:

(a) offer support for activities to promulgate the Guidelines; and

(b) direct associations to the relevant portions of the OPCW website with materials to be used in outreach.

1.15 Work with organisations involved with SMEs should be undertaken to develop or augment outreach about the Convention. It could be undertaken as part of industry association conferences to include material on preventing the re-emergence of chemical weapons, including The Hague Guidelines. This could be done either as part of the regular programme or through specialised activities in conjunction with the primary event.

1.16 Support could be given to the establishment of help desks for SMEs, along the model used in India, perhaps with initial pilot programmes in different regions.

Who takes responsibility for the projects?

1.17 Better coordination is needed between OPCW and industry efforts on topics of mutual interest in the area of E&O. As E&O is part of their respective mandates, the CICG and the ABEO could identify, discuss, and agree on actions of mutual interest.

1.18 Both ICCA and IUPAC should be engaged to receive suggestions about the kinds of training and outreach that their constituencies need most. For the OPCW, this will be an important part of the planning process.

1.19 The Technical Secretariat (hereinafter "the Secretariat") and States Parties, via their NAs, would have an essential role in implementation.

Education projects

For industries subject to certain provisions of the Convention (e.g., declarations)

Actions

1.20 Training materials used by industry associations and initiatives such as Responsible Care® should be reviewed to identify opportunities to augment or add to material relevant to preventing the re-emergence of chemical weapons, in addition to the material provided about compliance with formal treaty requirements.

1.21 Efforts should be made to identify companies whose training could serve as a model for both content and method, and ways should be found to showcase them, such as through a feature on the OPCW website.

For industries, including small and medium-sized enterprises, not subject to certain provisions of the Convention

Actions

1.22 Any opportunities should be explored to introduce the Convention and the prevention of the re-emergence of chemical weapons into the materials that relevant associations offer to member companies. Topics could include compliance with relevant regulations or the broader social responsibilities of the industry, such as Green Chemistry.

Who takes responsibility for the projects?

1.23 The exploration and development of possible E&O strategies could be a cooperative activity between the CICG and the ABEO, with input from IUPAC and ICCA.

1.24 The Secretariat and States Parties, via their NAs, could adapt the suggestions to their specific needs and implement the activities.

2. SCIENTISTS

Audiences and messages

Who are they?

2.1 Scientists include individuals with scientific, engineering, or other technical backgrounds working in any sector relevant to the implementation of the Convention and to the broader challenge of preventing the re-emergence of chemical weapons.

Why is it important to engage scientists?

2.2 Scientists constitute one of the supporting pillars of the Convention. They therefore represent a community whose engagement is crucial to preventing the re-emergence of chemical weapons. The negotiators of the Convention recognised developments in science and technology (S&T) and provided for the establishment of the SAB.[64] It is therefore not surprising that, perhaps apart from the chemical industry, scientists have been the group most targeted for engagement in the Convention.

2.3 Given their multiple roles, scientists work in academic and scientific settings as well as in industry and for governments. Scientific researchers can thus provide expert opinions to government agencies, educational institutions, industry, or other organisations. They can also exert influence on future generations as mentors,

[64] See: subparagraph 21(h) and paragraph 45 of Article VIII of the Convention.

scientific leaders, or educators. Finally, because scientists play a crucial role in society, encouraging them to base their research on the highest ethical standards supports preventing the re-emergence of chemical weapons.

Why would scientists engage with the Convention and chemical disarmament?

2.4 Scientists are a cross-cutting category and may be reached as a group or as members of other stakeholder communities.

2.5 Some scientists will engage with these issues because they are directly involved in or affected by the implementation of the Convention. This includes, for example, scientists in industries working with scheduled chemicals or otherwise subject to inspection, government scientists charged with responsibilities for national implementation or development of Convention-related policies, or researchers whose experiments or teaching involve scheduled chemicals.

2.6 For chemists and chemical engineers, preventing the re-emergence of chemical weapons can be framed as part of their broader professional responsibility. This forms the foundation of The Hague Ethical Guidelines.

2.7 For the wider community of scientists, regardless of whether their work relates to chemical disarmament, preventing the re-emergence of chemical weapons bears on the broader responsibilities of science in society. As such, programmes such as the United Nations Sustainable Development Goals or Green Chemistry may introduce those scientists to viable alternatives for multiple use chemicals.

Which messages should be delivered?

2.8 Specific messages should be based on awareness-raising about Convention-related issues, as well as the potential dual use of chemical knowledge and related technologies. The overall approach should be based on an ethical perspective, taking advantage of existing frameworks such as the Responsible Conduct of Science, Green Chemistry, chemical safety and security, and Responsible Care® to develop messages that will be relevant to specific groups of scientists.

Projects

Outreach projects

Enhancing and broadening the OPCW's efforts to reach the scientific community

2.9 Even though the OPCW already carries out a number of activities aimed at the scientific community, additional engagement with this critical audience is recommended.

Actions

2.10 Actions to reach the scientific community could include:

(a) continuation or even an incremental increase of the OPCW's participation in international scientific meetings by means of lectures, posters, or any other relevant activity;

(b) engagement of other international scientific associations in addition to IUPAC and ICCA, for example in fields such as biochemistry;

(c) engagement of scientific associations at the regional level;

(d) increased efforts to raise awareness through publishing in relevant scientific journals, including:

(i) technical articles about the scientific work carried out by the OPCW; and

(ii) awareness-raising about chemical safety and security policies;

(e) greater awareness-raising about the Research Projects Support Programme at scientific meetings and through chemistry and related sciences journals; and

(f) identification of scientific leaders within each region who could become "OPCW Ambassadors."

Who takes responsibility for the projects?

2.11 The responsibility for outreach projects to engage the scientific community falls with:

(a) the Secretariat, namely the International Cooperation and Assistance Division (ICA), and in particular through the International Cooperation Branch (ICB);

(b) States Parties, through their NAs at the local level; and

(c) the SAB and the ABEO, in collaboration with and through individual members in support of the ICB and NAs.

Education projects

Presenting the Convention to the scientific community

2.12 The OPCW could reach the scientific community by means of workshops based on interactive learning methodologies.

Actions

2.13 Workshops for scientists could be organised at OPCW Headquarters, focusing on Convention implementation, how the OPCW functions, and the importance of a culture of responsibility. An example that emerged in discussions with the Director-General during the Third Session of the ABEO was a workshop on ethics in science to bring together a group of experts to discuss how framings such as the Responsible Conduct of Science and resources such as The Hague Ethical Guidelines

could be used to engage chemists, chemical engineers, and the wider community of scientists.

2.14 Workshops could be organised at OPCW Headquarters exclusively for young scientists (covering the same subjects as above), but taking advantage of the participants' early stage careers and providing specific, tailored content, along with ideas for how to remain engaged.

2.15 Regional activities to consider the same content and issues could also be organised once "OPCW Ambassadors" are identified.

2.16 Regional workshops could be organised about laboratory chemical safety and security, during which the importance of a culture of responsibility regarding scientific work could also be instilled.

Who takes responsibility for the projects?

2.17 The responsibility for education projects to engage the scientific community falls with:

(a) the Secretariat, namely the ICA, and in particular through the ICB;

(b) States Parties, through their NAs at the local level;

(c) the SAB and the ABEO, in collaboration with and through individual members in support of the ICB and NAs.

3. ACADEMIA

Audiences and messages

Who are they?

3.1 For the purposes of this document, "academia" includes all persons involved in an institution of higher learning (e.g., universities and colleges) across fields ranging from science and technology to law, international relations, social sciences, humanities, business, and others.

3.2 Educators in secondary and even primary schools are also potential audiences with whom the OPCW can engage and for whom it has developed materials relevant to E&O. Going forward, the OPCW could explore partnerships with other international organisations—the United Nations Office for Disarmament Affairs (UNODA), the United Nations Educational, Scientific and Cultural Organization (UNESCO), and so on—that already work in primary and secondary education, to leverage those capacities rather than undertake separate initiatives. Here, however, the focus is on higher education.

Why is it important to engage academia?

3.3 In general, academics are a respected group of individuals in society and are often opinion formers through their research, writing (journalism), blogs, websites, or appearances in front of a camera.

3.4 They are influencers of the next generation—a hugely important role—since preventing the re-emergence of chemical weapons is an ongoing and never-ending mission.

3.5 Some may be future policymakers, scientists, engineers, or ecologists dealing with disarmament in general and chemical weapons issues in particular. Others may work directly or indirectly with chemicals.

3.6 As professionals, academics are a relatively easy group to reach, and they are more likely to be influenced by evidence than some other audiences. Those employed in institutions are easier to reach (and measure) as a percentage of society, so that outreach efforts can be assessed and evaluated.

Why would academics engage with the Convention and chemical disarmament?

3.7 As a very broad audience that may or may not reach others involved in chemical weapons issues, any message must be a broad one. Nevertheless, one must bear in mind that academics are usually swamped with information. Therefore, targeting this group will always affect or influence a small percentage only. But this may be all that is necessary.

3.8 The message needs to be multifaceted, and may depend in part on the field in which the academics in question are working. The general approach proposed for scientists working in academia is discussed above, and some additional specific suggestions may be found below. Several cross-cutting narratives that can engage academics in a variety of disciplines are described below.

(a) The Convention is the most successful disarmament treaty ever, with global elimination of declared chemical weapons stockpiles under OPCW supervision within reach. The world is safer as a result. But getting to this position has taken decades of work by many actors, including the chemical industry, governments, academics, and non-governmental organisations (NGOs), benefiting from increasing public distaste for these indiscriminate weapons. This is the global picture, but much is to be gained by studying the brushstrokes that make up this canvas. There is the horror of chemical weapons arising from their use in World War I. And yet, between this post-World War I aversion and the Convention there was an interregnum of 80 years. Why so long? And what happened to bring about the new thinking? Many attitudes changed in those eight decades. The chemical industry changed from being the manufacturer of chemical weapons to an active partner in pressing for disarmament. Military attitudes to chemical weapons also shifted with a growing acceptance of their limited value. And there is more recent awareness that the use of chemical weapons in conflicts in the Middle East is causing more civilian than military casualties.

(b) Converting these attitudinal changes and awareness into a programme to actively neutralise chemical weapons required input from a wide cast of characters from politics, law, and international affairs, as well as the sciences, including chemistry, physics, and biology. Mathematicians, engineers, and bomb disposal experts were needed too, to craft a programme for the physical destruction of existing munitions. How the input from each discipline helped mould the language of the Convention is a valuable teaching tool for others in the field, and for new generations. The Convention has inbuilt strength and ubiquity through its general purpose criterion, which covers any chemical that might be used to deliberately harm others. The elegance of the language bears scrutiny by anyone contemplating disarmament in other fields.

(c) On the practical side, there are many cases, some for general and others for specialised audiences:

(i) The physical destruction of old (and possibly unstable) weapons, requiring first the disarming of fuses and removal of explosives, followed by the extraction of toxic chemicals either for incineration or neutralisation, and the subsequent detonation of the munitions, is a hugely complex exercise. Understanding the thinking behind this work and the design of physical infrastructure is rich in content for chemists and chemical engineers.

(ii) The prevention of damaging emissions from destruction facilities requires active monitoring and engagement with local communities to alleviate environmental and health concerns. These experiences again provide lessons for all those who may have to engage with communities on difficult, potentially life-altering activities.

(iii) Industry inspections require trained scientists. The process, considering all its security implications and the need to protect industrial intellectual property, carries lessons for others. Key to ensuring the non-production of chemical weapons is the ability to inspect chemical facilities. But the chemicals used to make weapons are a small subset of all those manufactured globally, and chemical companies were understandably nervous about inspections encroaching on perfectly legal operations. The way the OPCW has managed these inspections and retained the active support of the chemical industry provides evidence that preventing the re-emergence of chemical weapons rests on a mutual recognition of disarmament and business interests. This offers vital lessons for those in chemistry and chemical engineering, law and international relations, and security studies. It also makes an instructive case for business students who may work in any number of regulated industries.

(iv) More recently, the OPCW’s investigations into the use of chlorine and sarin-based chemical weapons in the Syrian Arab Republic provide another urgent, contemporary case study to engage wider audiences. The evidentiary process followed by the Organisation and the

robustness of its findings are models for others to follow and discuss. Communicating those experiences to a wider public in an informative manner will help the OPCW to engage a wider audience in preventing the re-emergence of chemical weapons.

Which messages should be delivered?

3.9 The messages proposed for scientists in the previous section rooted in the Responsible Conduct of Science and the role of science in society also apply to academics. In addition, preventing the re-emergence of chemical weapons can serve as a key example of the challenges facing the current international system for those in law, politics, international relations, or security studies. More generally, preventing the re-emergence of chemical weapons requires insights from many fields. Understanding the multi- and interdisciplinary approaches will help to prepare students to understand and address complex international problems.

Projects

Outreach projects

Engaging audiences in politics, international relations, social sciences, humanities, etc.

Actions

3.10 Professional societies should be contacted and provided with a brief introduction to the OPCW and the Convention, stressing their importance and global reach, the importance of disarmament, and the need to prevent re-emergence. This could be achieved by:

(a) providing links to relevant websites;

(b) offering to provide details of speakers for events, conferences, etc. and material for articles in professional journals, including those focused on education or relevant societal issues;

(c) highlighting opportunities for interns at the OPCW to learn about international affairs;

(d) providing details about upcoming OPCW events of possible interest; and

(e) presenting the possibility of visits or workshops at the OPCW to discuss relevant issues.

3.11 Academic leaders within each region who could become “OPCW Ambassadors” should be identified.

Who takes responsibility for the projects?

3.12 States Parties and NAs can identify candidate societies and contacts and advise the Secretariat on the preparation or packaging of appropriate material, perhaps with the assistance of the ABEO. If appropriate, the Director-General could send a letter to the leadership of the association.

Engaging other academic disciplines, e.g., other sciences, mathematics, engineering, etc.

Actions

3.13 Actions for this project are similar to those in the first project, but the emphasis would be placed on scientific achievements as well as the need to prevent the re-emergence of chemical weapons.

Who takes responsibility for the projects?

3.14 The same actors listed above would take responsibility for the projects.

Introducing the Convention to student audiences

Actions

3.15 Student newspapers could be contacted with any topical information relating to chemical weapons. A brief about the OPCW and the Convention, stressing their importance for a safer world, could also be provided.

3.16 Student associations on campus could be contacted to offer speakers or share information about upcoming relevant events.

3.17 The OPCW could participate in "career days" to introduce students to the potential of working in the field of disarmament.

Who takes responsibility for the projects?

3.18 The same actors as those listed above would be responsible for carrying out this out activity, if possible in cooperation with the Ministry of Education or relevant academic associations in each country.

Education projects

Getting the Convention into university curricula (and possibly high school curricula, although this group is not covered by the scope of the present report)

3.19 Cooperation will be necessary between relevant government departments, particularly ministries of defence, foreign affairs, and education. This is a long-term goal and opportunities will vary between countries, depending on how independent or closely linked universities are to the central government and how curricular material is developed and approved.

Actions

3.20 Direct contact with academic departments (dealing with international affairs, etc.) should be considered in order to develop collaborative courses with OPCW involvement (and when possible, support students visiting the OPCW for debates, etc.).

Who takes responsibility for the projects?

3.21 Responsibility for the projects lies with the States Parties through their NAs, who could begin discussions.

4. CIVIL SOCIETY

Audiences and messages

Who are they?

4.1 The OPCW has developed relationships with various civil society organisations, particularly through the Chemical Weapons Convention Coalition (CWCC), an umbrella grouping of national and international NGOs established in 2009. Other disarmament, security and environmental NGOs are also potential targets for engagement in preventing the re-emergence of chemical weapons. The social roles of academics and scientists have already been discussed, but other but other civil society constituencies, including policy think tanks and groupings representing specific demographics such as youth or women, could also be target audiences, even though some will be captured by other initiatives.

Why is it important to engage civil society?

4.2 Civil society is an important source of support for chemical weapons disarmament and can play significant roles in the prevention of the re-emergence of chemical weapons.

(a) First, civil society contributes to awareness-raising. These constituencies are not only recipients of relevant information, but they also transmit such information to their membership or the society and communities of which they are part. In a more general sense, civil society constituencies help preserve the legitimacy of disarmament as a viable security policy, which in turn supports the efforts to maintain and strengthen the norm against chemical weapons use and acquisition.

(b) Second, civil society can identify challenges and raise new issues for the Convention.

(c) Third, the more academic civil society representatives can provide foresight, meaning that they can identify and critically evaluate social, political, economic, scientific, and technological trends that may affect the future relevance of the Convention and the operations of the OPCW.

4.3 To maximise those opportunities, the OPCW needs to identify key stakeholders within civil society and actively engage with them.

Why would civil society engage with the Convention and chemical disarmament?

4.4 In the case of the members of the CWCC, a commitment to the Convention and chemical disarmament already exists, so the goal regarding these NGOs is to maintain and strengthen their engagement.

4.5 For NGOs whose core mandate is focused on other issues, the challenge is to provide reasons and rationales that are relevant to them. For example, beyond the risks that chemical weapons use may pose to the environment, preventing the re-emergence of chemical weapons will require the successful development of Green Chemistry and the continued extension of the Responsible Care® initiative. Green Chemistry's relevance to both the Sustainable Development Goals and preventing the re-emergence of chemical weapons may provide an opportunity to engage environmental and development NGOs.

4.6 For security and disarmament NGOs, the challenge is not to raise awareness about the Convention and chemical disarmament but to raise their priority among other, competing issues. This is not a new challenge, and the recent use of chemical weapons in the Syrian Arab Republic has underscored the importance of preventing the re-emergence of chemical weapons in the broader agenda of preserving disarmament as a viable part of international security. For NGOs focused on security issues in the Middle East, the approach needs to show how successful action to address chemical weapons use supports broader security goals in the region.

Which messages should be delivered?

4.7 For CWCC members, the message would be to recognize the vital role that civil society plays in preventing the re-emergence of chemical weapons. For other security and disarmament NGOs, the message could focus on the current challenges to disarmament and non-proliferation as vital components of international security by showing how the Convention supports peace and security. For environmental NGOs, the message could be the risks to the environment posed by chemical weapons use and toxic chemicals more generally, and the mutual benefits to be gained through the continued successful implementation of the Convention for advancing Green Chemistry and chemical safety and security.

Projects

Outreach projects

Promoting civil society's engagement with the Convention

Actions

4.8 Active support should be given to the participation of civil society organisations in major OPCW events and activities at Headquarters and in Member States.

4.9 Civil society representatives should be invited to hearings, seminars, and more technical events whenever desirable and appropriate to solicit their input and insights.

4.10 In cooperation with the CWCC, civil society leaders within each region who could become "OPCW Ambassadors" should be identified.

Education projects

Actions

4.11 Materials and courses should be provided on the functioning of the OPCW in its different aspects and the implementation of the Convention at the national and international levels.

Public diplomacy projects

Actions

4.12 A policy of continuously engaging with key civil society constituencies should be maintained through briefings and updates, e.g. via teleconference sessions or through the organisation of briefing sessions during visits by senior OPCW officials to Member States.

Who takes responsibility for the projects?

4.13 The Secretariat would be responsible for the projects through:

(a) the External Relations Division (ERD) and the Office of Strategy and Policy (OSP), which could be the primary interfaces between the OPCW and civil society; and

(b) other divisions and branches, which should incorporate civil society outreach whenever their E&O activities allow for such a possibility.

4.14 Civil society constituencies and some of their representatives act as social entrepreneurs on the international or local level. Their assistance should be actively sought by the OPCW whenever setting up E&O activities directed at broader audiences.

5. POLICYMAKERS

Audiences and messages

Who are they?

5.1 Policymakers are individuals who are able to make or influence policy at the national, regional, and international level. They may be government ministers, ministry officials, diplomats, or parliamentarians. In view of their respective capacities and responsibilities, they can affect implementation of the Convention in many settings.

Why is it important to engage policymakers?

5.2 As the definition above indicates, policymakers constitute a broad group, but the key to their importance is that they are in the most immediate position to influence how the Convention operates and what its reach will be.

5.3 Diplomats who participate in influential bodies of the OPCW have a specific responsibility for directing the actions of the OPCW, and many have an encyclopedic knowledge of the Convention and the operation of the OPCW. However, newer diplomats have much to learn, and it is essential that they receive regular and accurate briefings and, where necessary, training, on all aspects of the OPCW's work. In turn, they can feed this back to their governments. If governments are to continue to finance the activities of the OPCW as its actions shift towards preventing the re-emergence of chemical weapons, they need to appreciate the value of their investment.

5.4 Policymakers who are directly employed in government ministries, whether as government employees, or advisers brought in to help individual ministers, or as part of the NAs, or who may interact with the NAs, are critical to the successful implementation of the Convention at the national level. This is the core group who will advise ministers, help to set national policy, liaise with industry, universities, and research institutions that develop, produce, or consume chemicals, provide chemical manufacturing data to the OPCW, organise OPCW inspections, and engage in a broader educational programme to promote and safeguard the Convention. The skill set required to undertake all these roles is considerable and should be available to and deployed by many players. The reality for many countries is quite different and often there are only a few individuals responsible for this work. Those tasked to work in NAs therefore require multifaceted information on the workings of the OPCW and the Convention, training on legal measures to achieve successful implementation, guidance on chemical information returns, and tutoring on engagement techniques to persuade academics to run courses on the Convention and its requirements.

5.5 Government ministers who oversee foreign, domestic, trade, defence, and education policy are those who will make the key decisions on chemical weapons policy in countries. They will introduce and have parliamentarians vote on enabling legislation and financial resources for the OPCW. They will frame the policy on how chemicals are dealt with at the national level. These individuals will have considerable portfolios of work to deal with and many issues that require immediate action. Unless there is an immediate challenge to the Convention, such as the situation in the Syrian Arab Republic, it will require ingenuity to get the Convention discussed. But it is important to stress to these individuals that the work of the Convention is only partly done, that treaties need nurturing if they are to remain relevant, and that ministerial involvement will be necessary to move the emphasis of the Convention to the prevention of the re-emergence of chemical weapons as many more actors will become involved in achieving this objective.

Why would policymakers engage with the Convention and chemical disarmament?

5.6 The Convention has been in force for 20 years, with over 96% of declared chemical weapons destroyed under its requirements. Few would deny that with a class of weapons no longer available there is more security from attacks with indiscriminate weapons. Unparalleled cooperation among States and determined action in countries to meet their obligations have contributed to this outcome. The financial resources allocated to eliminate chemical weapons, which have been provided by former possessor States or offered in the form of destruction assistance by other States Parties, underline the global commitment to chemical weapons disarmament. Policymakers are also key to reaching out to the national chemical industry, scientists, and academia to facilitate monitoring and auditing of chemicals, to set national standards for responsible science, and to promote the norm embedded in the Convention.

5.7 Successful disarmament can be very visibly demonstrated by the destruction of weapons, statistics of inspections, and the number of countries that have joined the Convention. More difficult to showcase is the non-emergence of chemical weapons. Preventing the re-emergence of this class of weapons requires continued engagement and cooperation by an even broader cast of characters. Terrorist or criminal acquisition of chemical weapons follows different pathways than the traditional weapons in military stockpiles. The discussion on how to sustain the unrelenting goal of no new chemical weapons will need to take place on many levels, include many disciplines, and require the sharing of ideas on good practice within and between countries. Policymakers need to be conscious that actions in their country involving, for example, teaching in universities about the Convention through curricula changes can be best communicated to other States Parties through the OPCW. They can also transmit or reinforce messages about the chemical industry's activities to produce chemicals safely and securely. These conscious transfers of knowledge and expertise need to be increased, as there are many smaller companies and research units that may not be hearing the messages about how to prevent the re-emergence of chemical weapons.

Which messages should be delivered?

5.8 The Convention has been, and continues to be, a great success. The awarding of the Nobel Peace Prize in 2013 demonstrates that those concerned about world peace and not directly involved with the chemical weapons disarmament nevertheless approve of the OPCW's activities. But the work is far from over. Future vigilance and activity by many stakeholders, as noted above, is needed to ensure that the treaty is upheld under fast-changing circumstances. Political, intellectual, and financial support for the OPCW and its partners will be needed indefinitely if the Convention is to meet its promises. Herein lies a major responsibility for policymakers.

Projects

Outreach projects

Expanded efforts to engage government ministers and key decision makers

Actions

5.9 Work should be undertaken with and through States Parties to inform governments that moving to a programme to prevent the re-emergence of chemical weapons will require the cooperation of many more partners, as well as continued resourcing; the elimination of declared chemical weapons is just the first phase of the disarmament process.

5.10 Individual decision makers should be specifically targeted, brought together, and made aware of what is required to effectively implement the Convention. In cases where fundamental work has not been completed, the focus could be on creating an NA, as well as the drafting and adoption of national Convention implementing legislation. The OPCW held such a meeting with officials from Timor-Leste in September 2015, where senior decision makers and key stakeholders were gathered to discuss the issues referred to above. Similar events can play a crucial role in those regions where States Parties are having difficulty implementing the Convention.

5.11 Cooperation between the OPCW, States Parties, and civil society should be increased to help bring the Convention to a wider range of society, which will be essential to ensure continued support for the OPCW and implementation of the Convention.

5.12 Links should be established with the media in all countries and local spokespersons able to comment on all aspects of the OPCWs work should be found; this will help to ensure visibility of the activities of the Organisation. The proposed "OPCW Ambassadors" drawn from key sectors could also assist with this outreach.

5.13 Work should be undertaken with States Parties to encourage more publications by OPCW staff in peer-reviewed scientific and policy journals, to demonstrate to the world the quality of the work done by the Organisation. For example, the Head of the OPCW Laboratory, Marc-Michael Blum, was a guest editor of a special edition of *Analytical and Bioanalytical Chemistry* in August 2014 entitled "Analytical chemistry and the Chemical Weapons Convention."[65] Having the OPCW's work, including its methodology, reviewed by other professionals is an important professional validation which could lead to much greater support in the scientific community for the OPCW.

Who takes responsibility for the projects?

5.14 The responsibility for such projects falls with the Secretariat working in conjunction with States Parties, when necessary with the Director-General and other senior OPCW officials, and with the information and advice from the ABEO when required.

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[65] Blum, M.M., and R.V.S.M. Mamidanna, "Analytical Chemistry and the Chemical Weapons Convention", *Anal Bioanal Chem* Vol. 406 (2014): 5067-69, https://doi.org/10.1007/s00216-014-7931-4

Education projects

Providing diplomats and National Authorities with relevant information

Actions

5.15 The approach to government ministers, particularly in education, should be strengthened, to impress upon them the need to engage with relevant audiences on the importance of safe and secure use of chemicals, as well as government obligations under the Convention.

5.16 The message should be impressed upon government ministers that introducing the discussion of the Convention in chemistry course curricula along with responsible use of chemicals would help to encourage a debate about ethical actions in chemistry and help the drive to prevent the re-emergence of chemical weapons.

5.17 The following should be maintained, increased, or introduced:

(a) training programmes for diplomats and NAs on the operation of the Convention and its multifaceted activities;

(b) courses on science relevant to the Convention for diplomats; and

(c) awareness of how education around "Multiple Uses of Chemicals", The Hague Ethical Guidelines, safe use of chemicals, etc., can be used to promote discussion in a wide range of forums about the responsible conduct of science and use of chemicals; government ministers must also be made aware of this.

Who takes responsibility for the projects?

5.18 In general, responsibility for these projects lies with the Secretariat, along with the Director-General and other senior officials, with informational support from the ABEO. The Secretariat would be responsible for the first and second recommended actions, and should work with members of the ABEO or other invited individuals on the third set of actions.

6. MEDIA

Audiences and messages

Who are they?

6.1 With the rise of the Internet and social media, the concept of "media" has broadened beyond the traditional press outlets—newspapers, magazines, television, and radio. The dissemination of information and opinions is no longer the preserve of professionally trained journalists and expert commentators whose contributions are vetted by news producers. Anybody seeking to communicate an insight or opinion on certain issues, however marginal they may be socially, can now launch a blog or simply respond to Internet postings by other people.

6.2 The more traditional written and audio-visual press retains an interest in broad-based reporting on international security events. However, in the 24-hour news cycle, the rapid succession of events raises impediments for more profound analysis of issues and trends. Moreover, to reach the headlines—internationally and domestically—an event has to be rather dramatic, highly visual, or involve prominent individuals. The Internet and social media offer access to far wider and more diverse sources of information than was previously possible. Time and space exists for more substantive reflection, and for professionals to interact with broader audiences. New media also allow much broader access to specialised news, including that primarily produced for industrial sectors, businesses, professional and scientific communications, or specific social interests.

6.3 At the same time, new media also create opportunities for selective exposure to information that tends to confirm existing belief systems or biases. As a result, they may contribute to international or national social fragmentation. Such trends run counter to the aims of E&O as presented in this report, and may complicate the achievement of its objectives. Furthermore, deliberate misinformation campaigns can exploit weaknesses in the validation of the accuracy of information or seek to reinforce certain belief systems in the pursuit of specific objectives.

Why is it important to engage the media?

6.4 The OPCW generates significant media interest in two sets of situations. First, major achievements tend to generate positive news. This was for instance the case with the awarding of the Nobel Peace Prize in 2013; the successes in the removal and elimination of Syrian chemical weapons under hostile circumstances; the achievement by States Parties of significant milestones in the destruction of their arsenals; or the commemoration events for the twentieth anniversary of the Convention’s entry into force. Second, challenges to the core norm may lead to public questioning of the efficacy of mechanisms foreseen in the Convention, while partisan interests may split opinion and ultimately undermine the legitimacy of procedures and findings by the Secretariat.

6.5 The OPCW, however, cannot control or dominate the news cycle for however short a time. The issues it covers, most of which involve routine implementation operations, are complex, technical, or legalistic. Activities and information are also often covered by confidentiality, a characteristic that does not favour spontaneous public outreach. Consequently, media communications tend to be terse, contextually uninformative, and in a few cases, ruinous. Moreover, legitimate queries by stakeholder communities about, for example, health, safety, or the environmental impacts of certain operations, remain unaddressed. Taken together, these elements create an environment for selective leaks, communications by other international organisations with different media policies, or confidentiality standards. The public debate about the OPCW, if and when it happens, falls outside the control of the OPCW.

6.6 To enhance effective communication, especially when attention is focused on the Organisation, the OPCW should develop a clear public diplomacy policy. The core components of public diplomacy are summarised and discussed in paragraphs 3.45 to

3.50 of the main report (under the section "Public Diplomacy as a Special Form of Outreach").

Why would the media engage with the OPCW and be interested in chemical disarmament?

6.7 Chemical weapons remain an emotional subject and will therefore generate media interest. Successes will be celebrated in the media, whereas acts of war or terrorism involving toxic substances will feed a fear cycle that is difficult to control.

6.8 Responsible journalists and authors will contact the OPCW as a source of authoritative information. If the OPCW cannot fulfil that role, they will turn to other informants. Engagement with the OPCW will continue and even expand if journalists and other authors continue to interact with the Organisation in meaningful ways. It is consequently in the interest of the OPCW to develop meaningful relations with various global, regional, and national media outlets, as well as other types of news providers (e.g. commentators, bloggers, etc.) to reliably inform the public—and its key stakeholder communities in particular—about current events and other developments. Public diplomacy actions contribute significantly to the prevention of the re-emergence of chemical weapons.

Which messages should be delivered?

6.9 The messages to be delivered are essentially like those listed under other projects. The role of public diplomacy, however, is to ensure that the messages can be communicated against a background of reliable and substantive information on the multiple goals and tasks of the OPCW, irrespective of the complexity or technicality of these operations.

Projects

Public diplomacy projects

Actions

6.10 A review should be undertaken and improvements made to the Note by the Director-General on the "Public Diplomacy Strategy" (S/1215/2014, dated 23 September 2014), so that it features core elements of public diplomacy.

6.11 Regular dialogue should be developed with stakeholder communities, particularly representatives of the media and civil society constituencies. Its purpose is to build mutual trust and deepen understanding of issues, processes and concerns, as a general background against which specific issues can be placed in context by those stakeholder representatives.

6.12 Sets of tools that can be immediately deployed whenever a particular situation occurs should be developed. For example, a series of issue briefs can be prepared and published on the new OPCW website. They will enable the OPCW to offer meaningful responses to specific queries, while avoiding potential sensitivities.

6.13 A global network should be built to comprise reliable interlocutors (e.g., the "OPCW Ambassadors", local stakeholder representatives, and relevant civil society constituencies) who can address international and national media on issues affecting the Convention or related to preventing the re-emergence of chemical weapons.

6.14 A series of informal, off-the-record meetings (lunches, teleconferences, etc.) should be organised with members of the press and stakeholder representatives to have discussions on the functioning of the OPCW, challenges facing the Convention, the future ambitions covered by the overarching theme of "prevention of the re-emergence of chemical weapons", etc., with a view of deepening their understanding and providing authoritative information through a process of dialogue.

6.15 An international stakeholder network with representatives from different States Parties should be established. Whenever an OPCW official visits a State Party, a press briefing (targeting primarily local media) should be organised or the stakeholder in question could be asked to set up an informal, off-the-record briefing, such as that suggested above, with other national or local stakeholders. One could think of academic institutions or certain civil society representatives.

Who takes responsibility for the projects?

6.16 The Secretariat should:

(a) prepare and publish via the OPCW website a series of issue briefs that highlight different facets of the OPCW's operations, decision-making processes, and institutional aspects. These briefs are intended as a backbone for the public diplomacy strategy, and should therefore be updated regularly or whenever opportune. To meet the core purpose of public diplomacy, they should also be developed in function of and establish direct and pertinent links to the overarching theme of "preventing the re-emergence of chemical weapons";

(b) for each engagement of a strategic stakeholder community, set a core objective under the umbrella of "preventing the re-emergence of chemical weapons", and decide on and develop a core message to be transmitted during the interaction (general statements have no role in these types of activities);

(c) identify and actively engage strategic stakeholder communities on a regular basis. This action also serves to organise public diplomacy events whenever senior OPCW officials travel abroad. It should present a clear theme and establish links to the overarching theme of "preventing the re-emergence of chemical weapons"; and

(d) prepare select staff members for a specific public diplomacy engagement to ensure cohesion of the communication and maximal effect.

6.17 The ABEO and its members can also assist in the development of a range of public diplomacy tools and strategies.

Annex 3

THE DEVELOPMENT OF EDUCATION AND OUTREACH AT THE OPCW

1. The OPCW began to undertake education and outreach (E&O) activities early in its history. In 2001, the "Ethics Project" was launched to raise awareness of the OPCW and it goals.[66] The primary audiences were the professions that would be directly affected by the new regime being created for chemical disarmament, that is, chemists, chemical engineers, and life scientists. Recognising early the importance of fostering the next generation, the Ethics Project also targeted students in those fields. The OPCW's collaboration with the International Union for Pure and Applied Chemistry (IUPAC) began in 2000, with the planning of a workshop requested by the Scientific Advisory Board (SAB) on trends in science and technology (S&T) to inform its recommendations to the First Special Session of the Conference of the States Parties to Review the Operation of the Chemical Weapons Convention (hereinafter "the First Review Conference").[67] In addition to the 2002 workshop's review of S&T developments, participants recognised the importance of E&O to the successful implementation of the Convention.[68] The SAB's own report to the First Review Conference concluded that:

> … efforts in the area of education and outreach are important to further the objectives of the Convention; these efforts include raising awareness, assuring that the principles of the Convention become firmly anchored in professional ethics and teaching, and promoting international cooperation in the field of chemistry.[69]

2. The SAB continued to recommend further activities in E&O, leading to an agreement in 2004 on a joint project with IUPAC for a workshop on "The Chemical Weapons Convention, Chemistry Education and the Professional Conduct of Chemists."[70] The meeting was held at Oxford University in 2005, with 27 participants from 18 countries who worked in a combination of plenary sessions and specialised breakout groups.[71] The workshop recommended that chemists should develop their own codes

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66 OPCW, *Education and Engagement*, 11.

67 L. Sydnes, "IUPAC, OPCW and the Chemical Weapons Convention", *Chemistry International*, Vol.35, No. 4 (July-August 2013).

68 G.W. Parshall *et al*., "Impact of Scientific Developments on the Chemical Weapons Convention", (IUPAC Technical Report), *Pure and Applied Chemistry*, Vol. 74, No. 12 (2002).

69 "Report of the Scientific Advisory Board on Developments in Science and Technology", (RC-1/DG.2, dated 23 April 2003). Available at: https://www.opcw.org/fileadmin/OPCW/CSP/RC-1/en/RC-1_DG.2-EN.pdf

70 As early as 2004, the SAB also recommended in the report of its Sixth Session that "the Director-General establish a temporary working group on education and outreach, which would discuss further the contribution that the SAB might make to enhancing awareness of the Convention" (subparagraph 10.1(c) of SAB/6-1, dated 18 February 2004). Available at: https://www.opcw.org/fileadmin/OPCW/SAB/en/sabVI01.pdf

71 G. Pearson and P. Mahaffy. "Education, outreach, and codes of conduct to further the norms and obligations of the Chemical Weapons Convention" (IUPAC Technical Report), *Pure and Applied Chemistry*, Vol. 78, No. 11 (2006): 2169-2192.

of conduct, and also that educational materials should be developed to raise awareness of the Convention and place chemical weapons disarmament in a larger framework of the multiple uses of chemicals, both beneficial and harmful. The recommendation for educational materials led to the joint IUPAC-OPCW project that produced the first version of "Multiple Uses of Chemicals." IUPAC also undertook a project to create a code of conduct, which eventually led to a set of principles that should underlie any code, and to its active participation in the development of The Hague Ethical Guidelines.[72]

3. Although the primary focus of the OPCW's activities in E&O has been on the scientific community, it has undertaken other initiatives. Since 2010, for example, the OPCW has collaborated with the T.M.C. Asser Institute in The Hague on an annual Summer Programme on weapons of mass destruction (WMD) disarmament and non-proliferation. The event is specifically designed for advanced graduate students and professionals who are interested in pursuing careers in the field of non-proliferation and WMD disarmament. Its primary objectives are to:

   (a) provide an understanding of the diplomatic, legal, and technical aspects of organisations dealing with WMD;

   (b) explore how WMD treaties are implemented at the national level; and

   (c) create networking opportunities for participants by bringing them into direct contact with officials of leading organisations in the field of WMD.[73]

4. In November 2013, the OPCW and the Vienna Center for Disarmament and Non-Proliferation (VCDNP) organised an "International Workshop on Disarmament and Non-Proliferation Education and Capacity Development" in Vienna to share experiences and lessons learned from a range of international organisations and practitioners in the field of non-proliferation and disarmament education.[74] The workshop was supported financially by the Foreign and Commonwealth Office of the United Kingdom of Great Britain and Northern Ireland and the Federal Ministry for European and International Affairs of Austria. It brought together practitioners in the field of disarmament and non-proliferation education, particularly from the international organisations described above, as well as experts from selected leading academic centres and professional networks.

5. And in September 2014, the OPCW hosted a major international conference on *Education for Peace: New Pathways for Securing Chemical Disarmament*, in an effort "to go beyond previous OPCW activities, which ha[d] been to date largely focused on science and technology."[75] The conference, intended to be the first in a

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72 See: G.S. Pearson, E.D. Becker, and L.K. Sydnes, "Why Codes of Conduct Matter", *Chemistry International*, Vol. 33, No. 6 (November-December 2011).

73 See: https://www.opcw.org/programme2016/about-the-programme/

74 See: http://vcdnp.org/international-workshop-on-disarmament-and-non-proliferation-education-and-capacity-development/

75 See: https://www.opcw.org/special-sections/education/education-for-peace/themes-and-objectives/

series, sought to provide a forum for wide-ranging discussion and exchange of ideas and best practices on ways to raise awareness about disarmament and non-proliferation issues, especially in educational institutions. This included demonstrations of materials and tools in various media formats. The objective was to identify new approaches and synergies arising from discussions between different groups to better inform the OPCW's future efforts.

6. The most significant single activity undertaken by the OPCW in E&O was the creation by the Director-General in 2012 of a temporary working group (TWG) on education and outreach, under the auspices of the SAB. In his discussions with the SAB about such a working group, the Director-General noted that "the education and outreach activities of the OPCW are not limited only to chemistry, and the group's efforts should be seen in this context".[76] The group, chaired by SAB member Djafer Benachour from Algeria, began its work in 2012 and produced its report in late 2014.[77] As part of its activities, the TWG participated in the projects to develop several new OPCW resources, including the first "FIRES" film and the updated "Multiple Uses of Chemicals" website. Among its recommendations was the creation of an Advisory Board on Education and Outreach to provide a continuing source of expertise and support for E&O as a fundamental part of the OPCW's mission.

[76] Director-General's "Response to the Report of the Seventeenth Session of the Scientific Advisory Board", (paragraph 24 of EC-67/DG.11, dated 9 February 2012).
Available at: https://www.opcw.org/fileadmin/OPCW/EC/67/en/ec67dg11_e_.pdf

[77] OPCW, *Education and Engagement: Promoting a Culture of Responsible Chemistry* (The Hague, 2014), https://www.opcw.org/fileadmin/OPCW/SAB/en/Education_and_Engagement-v2.pdf

Annex 4

VISION, MISSION, AND OBJECTIVES: CURRENT ROLES AND FUTURE GOALS FOR EDUCATION AND OUTREACH

1. The Third Special Session of the Conference of the States Parties to Review the Operation of the Chemical Weapons Convention was the first to formally recognise the contribution of education and outreach (E&O) to the full and continuing implementation of the Chemical Weapons Convention (hereinafter "the Convention") and the norm against chemical weapons. Its final report[78] contained four recommendations, which:

   (a) Encouraged the Secretariat, in concert with the SAB Temporary Working Group on Education and Outreach, to assist States Parties, upon request, in implementing E&O activities, including by disseminating materials, conducting workshops and regional meetings (subparagraph 9.103(e));

   (b) Encouraged the Secretariat to continue to develop relationships and partnerships with other relevant bodies, national and international, that are working to promote the peaceful and responsible use of chemistry, including capacity building (subparagraph 9.131(j));

   (c) Encouraged the Secretariat to continue to develop relations and partnerships as appropriate with relevant regional and international organisations, as well as chemical industry associations, the private sector, academia, and civil society, in order to raise awareness of the activities of the OPCW (subparagraph 9.131(l)); and

   (d) Called upon States Parties and the Secretariat, as part of efforts to promote the ethical norms of the Convention, to encourage and promote efforts by the appropriate national and international professional bodies to inculcate awareness among scientists and engineers at an early stage in their training that the knowledge and technologies used for beneficial purposes should only be used for purposes not prohibited under this Convention (subparagraph 9.155(d)).

[78] RC3/3*, dated 19 April 2013. Available at: https://www.opcw.org/fileadmin/OPCW/CSP/RC-3/en/rc303_e_.pdf

2. E&O activities support the vision and mission of the OPCW. Their most recent articulation may be found in the medium-term plan (MTP) of the Organisation for 2017 to 2021,[79] published in the second quarter of 2016:

(a) The Organisation's vision is … to continue to be the premier international organisation working for a world free of chemical weapons, with a focus on preventing their re-emergence, by implementing all provisions of the Convention in an effective, efficient, and non-discriminatory manner.

(b) … the mission of the Organisation is to contribute, as a treaty-based international organisation, to the disarmament of chemical weapons, to preventing their re-emergence, to providing assistance and protection against them, to supporting national implementation of the Convention, and to facilitating peaceful uses of chemistry through verification, capacity development, or engagement activities.

3. To fulfil the above, the MTP sets out a series of medium-term goals. One set envisions "Engagement to Utilise Others' Capabilities," of which the most relevant to E&O is goal 10: "Strengthened engagement with broader group of relevant stakeholders."

4. Successful implementation of the Convention cannot be achieved simply through a regulatory approach by national governments. It also requires instilling a sense of ownership into relevant stakeholders in the chemical industry, research, academia, NGOs, and civil society in order to garner their support and active collaboration. Generating and sustaining such support from a broader base of relevant stakeholders will require that the Organisation establish more regular interaction with them with a view to soliciting their views, putting it in a better position to utilise their capabilities. The Advisory Board on Education and Outreach, established in accordance with a decision by the Conference of the States Parties at its Twentieth Session (C-20/DEC.9, dated 3 December 2015), will support this process. The Organisation will further develop effective networks and new partnerships with different stakeholder communities in order to leverage their expertise to help it address new implementation challenges as they emerge.[80]

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[79] EC-83/S/1 C-21/S/1, dated 8 April 2016. Available at: https://www.opcw.org/fileadmin/OPCW/EC/83/en/ec83s01_c21s01_e_.pdf

[80] *Ibid.*

Annex 5

EDUCATION AND OUTREACH ACTIVITIES OF OTHER INTERNATIONAL ORGANISATIONS FOR NON-PROLIFERATION AND DISARMAMENT

1. The most ambitious education and outreach (E&O) initiatives by international organisations are in the realm of nuclear non-proliferation and disarmament. The International Nuclear Security Education Network (INSEN) of the International Atomic Energy Agency (IAEA) has grown since its creation in 2010 to include over 90 universities and research institutes from all over the world.[81] The IAEA supported the development and publication of a guidance document that provides the model for both a masters-level graduate programme and a certificate programme in nuclear security.[82] INSEN continues to sponsor and support a variety of workshops and other training and collaborative activities.

2. In addition to providing more traditional short courses and training, the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO) has put particular emphasis on the use of innovative approaches, such as the growth of online education through the creation of an e-learning platform. CTBTO's goal is "building and maintaining the necessary capacity in the technical, scientific, legal and political aspects of the Treaty and its verification regime." As part of its outreach to the broader public, it has an "iTunes U" page to provide access to lectures, briefings, and materials from CTBTO staff and other experts.[83] CTBTO has also created a Youth Group, an example of the "next generation" initiatives that could provide the potential for collaboration across regimes.[84]

3. The United Nations Educational, Scientific and Cultural Organization (UNESCO) has activities related to encouraging innovative approaches to teaching and also to ethics in science, in particular through its World Commission on the Ethics of Scientific Knowledge and Technology (COMEST) (http://www.unesco.org/new/en/social-and-human-sciences/themes/comest/). Every two years, in partnership with the International Council for Science (ICSU), UNESCO organises the World Science Forum: the theme for the 2017 event was "Science for Peace," and included partners

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81 J. Harris, "Networking for nuclear security: The International Nuclear Security Education Network", OPCW Today, Vol. 2, No. 5 (December 2013), 40-41. See: https://www.opcw.org/fileadmin/OPCW/OPCW_Today/OPCW_Today_-_Vol_2_No_5.pdf. See also: http://www-ns.iaea.org/security/workshops/insen-wshop.asp#1

82 International Atomic Energy Agency, Educational Programme in Nuclear Security (Vienna, 2010), http://www-pub.iaea.org/MTCD/publications/PDF/Pub1439_web.pdf

83 See: http://www.ctbto.org/specials/ctbto-cdi/. Created by Apple, "iTunes U provides everything an instructor needs to bring the classroom together on iPad—build lessons with apps and your own materials, collect and grade assignments from students, start class discussions or talk with students one-on-one to answer questions and provide feedback" (https://itunes.apple.com/us/app/itunes-u/id490217893?mt%3D8).

84 See: https://youthgroup.ctbto.org/

from a number of scientific organisations.[85] The broader UNESCO vision is outlined in "Science for Peace and Sustainable Development".[86]

4. A new cooperative project between the German commission to UNESCO (DUK) and the German Chemical Society (GDCh) began in 2017. GDCh, represented by ABEO member Hans-Georg Weinig, is establishing a small working group with representatives from DUK, GDCh (chemistry didactics), the German Physical Society (DPG) and VBIO—the German Life Sciences Association. The goal is to create educational material that includes aspects from chemical, biological, and nuclear weapons. This educational material will be developed as a dedicated contribution to Sustainable Development Goal on Education 4.7: global citizenship education (GCED) and education for sustainable development (ESD). A first concept drafted by DUK includes four options for the establishment of a teaching unit on "disarmament as a success story of global collaboration" in textbooks:

   (a) option 1: interdisciplinary teaching unit (4 to 6 hours per week) including lessons in history, chemistry, physics, biology, politics, and social sciences;

   (b) option 2: interdisciplinary project week (10 to 15 hours in one week, content the same as option 1);

   (c) option 3: recommended coverage text only: two double pages in secondary school textbooks (ca. 5,000 characters); and

   (d) option 4: minimum coverage text only: one box in secondary school textbooks (ca. 1,000 characters).

5. The German pilot project could then serve as a blueprint for broader international implementation of the new educational material. It could be an example of how the OPCW could effectively reach a wider range of students, particularly at the primary and secondary level, by working through organisations for which such education is a basic part of their missions.

6. The Biological Weapons Convention (BWC) has long recognised the importance of education as part of the "web of prevention" to counter biological threats.[87] Endorsements of education are routinely included in the final documents of BWC review conferences, and education was a topic of annual discussions in 2005 and 2008 and a standing agenda item in the intersessional period between the Seventh and Eighth Review Conferences (BWC, 2011 and 2016). In this case, BWC-relevant education projects and programmes are largely the result of initiatives by individuals and NGOs supported by foundations and governments, except for some projects under the regional Chemical, Biological, Radiological, and Nuclear (CBRN) Centres of

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85 See: http://worldscienceforum.org/

86 UNESCO. Science for Peace and Sustainable Development. (Paris: UNESCO, 2013).

87 The term was coined by the International Committee of the Red Cross as part of its "Biotechnology, Weapons and Humanity" campaign in the early 1990s. More information is available at: http://www.icrc.org/eng/resources/documents/misc/5vdj7s.htm

Excellence supported by the European Union (EU).[88] The current EU Council Decision in support of the BWC includes funding for education for:

> **Enabling tools for awareness-raising, education and engagement** to increase awareness of the issues of biological weapons, responsible conduct of science, and ethical issues among students and their teachers. The project will also promote the use of the tools produced using previous EU voluntary contributions.[89]

7. In recent years, the OPCW has also held several side events and panel discussions during the annual BWC meetings of experts and States Parties, reflecting common interests in E&O and in the implications of increasing convergence in some areas of chemistry and the life sciences. The BWC Implementation Support Unit (ISU) has also participated in relevant events in The Hague, and an ISU staff member participated in the temporary working group (TWG) on convergence.

8. In November 2013, the OPCW and the Vienna Center for Disarmament and Non-Proliferation (VCDNP) organised an "International Workshop on Disarmament and Non-Proliferation Education and Capacity Development" in Vienna.[90] The workshop provided an opportunity for this broad range of professionals to share experiences and best practices—particularly with regard to specific tools and methods—and to explore potential collaboration and synergies between international organisations and other key stakeholders in the areas of disarmament and non-proliferation education and training, awareness-raising, and outreach. Workshop participants identified several challenges that are relevant to the OPCW, including:

   (a) Audiences. Participants underlined that disarmament and non-proliferation education and training efforts need to be tailored to the audience and noted that specific accommodation needs to be made for different types of audiences (of different age, profession, educational background, as well as country- and region-specific audiences), different levels of technical expertise, different generations and learning preferences, and even different technical capabilities (e.g. download capacities).

   (b) Framing. Framing the issues of disarmament and non-proliferation to maximise interest and acceptance was discussed, with some suggestions including framing the issues as either a component of human or environmental security, or of responsible conduct of science. The issue of framing was mentioned as being particularly challenging when attempting to add disarmament and non-proliferation education into an existing curriculum, especially in grade schools and high schools whose curriculum is often controlled by state authorities.

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88 Information about the Centres of Excellence may be found at: http://www.unicri.it/topics/cbrn/coe/

89 See: https://www.unog.ch/80256EE600585943/(httpPages)/7EA198C35415C020C1257F9B003E1BB1?OpenDocument

90 A link to a description of the workshop may be found on the OPCW website at: https://www.opcw.org/special-sections/education/other-resources/

(c) Funding. Many participants, especially those from NGOs and academia, spoke of the challenges of managing programmes within funding limitations, with E&O often being one of the first programmes to be cut from budgets. International organisations also discussed experiencing funding limitations, especially when funds allocated to E&O do not come from regular budgets, but instead rely on voluntary contributions.

(d) Programme management and leadership. Participants pointed to the difficulties of measuring programme effectiveness and success, especially because of the lack of sufficient resources to devote to these efforts. It was made clear that measuring the impact and the effectiveness of education and training should be a long-term endeavour. Participants also spoke of the need for leaders and champions, which can often come from international organisations.

(e) Promotion. Many participants spoke about the challenges presented by trying to develop interest and incentivise students to undertake training in disarmament and non-proliferation.

(f) Tools and methods. Educational tools and methods were discussed by participants as both a challenge and a solution, with the challenge being learning how to use the new tools and methods and employ them.

(g) Sustainability. Programme and message sustainability were mentioned by several participants as challenges. Many of the attendees expressed concern that educational initiatives, to be truly successful, must not be one-time occurrences and must have a long-term impact.

(h) Synergies and collaboration. Several workshop participants underlined that many artificial barriers exist between disarmament and non-proliferation education within the main weapons of mass destruction (WMD) regimes: chemical, biological, and nuclear. Participants specifically spoke of the challenge to overcome the invisible "silos" that exist, separating chemical-, biological-, and nuclear-focused organisations, including international organisations. It was mentioned that identifying a set of core competencies or functional competencies common to these three areas could be a first step.[91]

9. As the OPCW gives more systematic attention to developing its capabilities for E&O, it may be able to learn lessons from the experience of others and perhaps find ways to form productive collaborations to support common goals.

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[91] Vienna Center for Disarmament and Non-proliferation, *International Workshop on Disarmament and Non-Proliferation Education and Capacity Development.* (Vienna: VCND, 2013), 2-5.

Annex 6

MEMBERS OF THE ADVISORY BOARD ON EDUCATION AND OUTREACH

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Annex 7

ABBREVIATIONS AND ACRONYMS

ABEO	Advisory Board on Education and Outreach
BWC	Biological Weapons Convention
CBRN	Chemical, biological, radiological and nuclear
CCE	Committee on Chemistry Education
CICG	Chemical Industry Coordination Group
COMEST	Commission on the Ethics of Science and Technology
CTBTO	Comprehensive Nuclear-Test-Ban Treaty Organization
CWCC	Chemical Weapons Convention Coalition
E&O	Education and outreach
IAEA	International Atomic Energy Agency
ICB	International Cooperation Branch
ICCA	International Council of Chemical Associations
INSEN	International Nuclear Security Education Network
ISU	Implementation Support Unit
IUPAC	International Union of Pure and Applied Chemistry
KCS	Kenya Chemical Society
MTP	Medium-Term Plan
OPCW	Organisation for the Prohibition of Chemical Weapons
OSP	Office of Strategy and Policy
RBM	Results-based management
RSC	Royal Society of Chemistry
S&T	Science and technology
SAB	Scientific Advisory Board
SMEs	Small and medium-sized enterprises
SNL	Sandia National Laboratories
TWG	Temporary Working Group
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNODA	United Nations Office for Disarmament Affairs
VCDNP	Vienna Center for Disarmament and Non-Proliferation
WEOG	Western European and Others Group
WMD	Weapons of mass destruction

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