**NOBEL PEACE PRIZE**
The Director-General's Lecture

**EDUCATION AND OUTREACH**
Turning awareness into ongoing support

**CASE STUDIES**
Education and outreach put into practice

# OPCW Today

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# OPCW wins the Nobel Peace Prize

ORGANISATION FOR THE PROHIBITION OF CHEMICAL WEAPONS

# OPCW Today Impressum

*OPCW Today* is published twice a year and distributed without charge to readers interested in the OPCW and the peaceful uses of chemistry.



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# Foreword by the Director-General

2013 has been a watershed year for the OPCW and for the international regime against chemical weapons. Tragically, it saw the first confirmed use of such weapons for over 25 years causing a large number of deaths and injuries. As I stated at the time, "Any use of chemical weapons is abhorrent and stands fully condemned by the international community as embodied in the Chemical Weapons Convention and underlined in its near universal acceptance."

The use of chemical weapons in Syria also set in motion a chain of diplomatic activity which resulted in that country's accession to the Convention on 14 October, thus becoming our 190th State Party. The strong action taken by the international community in reaction to the use of chemical weapons has presented the OPCW with the biggest challenge in our 16-year history. However, it also presents the opportunity to demonstrate that effective multilateralism and international cooperation can be brought to bear on even the most difficult of situations.

"The strong action taken by the international community in reaction to the use of chemical weapons has presented the OPCW with the biggest challenge in our 16-year history."

I was deeply honoured to recently accept the 2013 Nobel Peace Prize on behalf of the OPCW. The award recognises the "extensive efforts" of the OPCW to eliminate chemical weapons. While the elimination of Syrian chemical weapons is the current and most visible demonstration of these efforts, the real success has been the verified destruction of over 80 percent of the world's chemical weapons. Destruction of all the world's chemical weapons is a goal which is rapidly coming within our grasp.

This issue of OPCW Today is devoted to education, outreach and awareness-raising. Clearly, events in Syria and the award of the Nobel Peace Prize have increased awareness about the OPCW and the Convention to an extent hardly imaginable by the Secretariat. A key objective now will be sustaining this awareness and turning it into ongoing support for the OPCW and for securing the peaceful uses of chemistry into the future. In my statement to the 74th session of the Executive Council, I proposed that 2014 should be a year of awareness-raising on the Convention.

In this issue, I am pleased to see contributions from many practitioners and eminent experts in the field. The authors range from those involved with teaching chemistry in high schools, through university professors, academic experts and members of National Authorities. In their contributions, they give practical examples of tools, materials and approaches for raising awareness about the Convention and for incorporating it into education and outreach programmes. For those of us in international organisations, or for most National Authorities, such ideas should be of great utility as we reach out to stakeholder groups beyond those with which we are used to interacting.

The range of contributions included in this issue also highlights the importance of involving a wide range of stakeholders in the implementation of the Convention. Many of the actions necessary to raise awareness about the Convention are those which the OPCW cannot take alone, or for which it is not suitably equipped or funded. Therefore, activities in this field must be based upon a partnership approach, as demonstrated for example by our strong relationship with the International Union of Pure and Applied Chemistry.

I would finally like to reflect that, as a treaty organisation grounded in science, it is important for us in the OPCW to promote the concept of "responsible science". Chemistry is a wonderful science which has done, and will continue to do much good for humanity. Chemistry has a vital role to play in the sustainable development agenda and in our joint efforts to address such global challenges as climate change. However, as with any science, there is the possibility that chemistry may be misused as it has been in the past. All those in relevant positions, not only chemists, must be aware of the responsibility to promote the peaceful uses of chemistry.

Only with a focus on the long-term and on the education of and outreach to future generations will we come closer to our common goal of a world free of chemical weapons.

Ahmet Üzümcü
OPCW Director-General

# The Nobel Peace Prize for 2013

The decision by the Nobel Committee to bestow this year's Peace Prize on the OPCW is a great honour for our Organisation.

We are a small organisation which for over 16 years, and away from the glare of international publicity, has shouldered an onerous but noble task – to act as the guardian of the global ban on chemical weapons that took effect in 1997.

That year, a hundred-year effort was crowned with success as the Chemical Weapons Convention entered into force.

Our organization was tasked to verify the elimination of chemical weapons from the world and to encourage all nations to adhere to this hard-earned norm.

We have since then worked with quiet determination to rid the world of these heinous weapons – weapons which have been used to horrific effect throughout the twentieth century, and, sadly, in our own time too.

Events in Syria have been a tragic reminder that there remains much work yet to be done. Our hearts go out to the Syrian people who were recently victims of the horror of chemical weapons.

Today we are engaged in work which is meant to ensure that this atrocity is not repeated.

Never in the history of our organisation have we been called on to verify a destruction program within such short timeframes – and in an ongoing conflict.

We are conscious of the enormous trust that the international community has bestowed on us.

Working to realize the vision of a world free of chemical weapons, we rely on the expertise, professionalism and dedication of our staff – qualities that have been forged through a solid record of achievement.

This would clearly not be possible without the steadfast support and commitment of our States Parties.

The recognition that the Peace Prize brings will spur us to untiring effort, even stronger commitment and greater dedication.

I truly hope that this award, and the OPCW's ongoing mission together with the United Nations in Syria, will help broader efforts to achieve peace in that country and end the suffering of its people.

I take this opportunity to commend all those who have contributed to making the ban on chemical weapons an enduring and universal norm.

I look forward to accepting this award in humility and in recognition of the professionalism of our staff, both past and present, and the strong support we have received from our States Parties.

Ahmet Üzümcü
Director-General
11 October 2013

**2013 Nobel Peace Prize Lecture**

# Working Together for a World Free of Chemical Weapons, and Beyond

Your Majesties,
Distinguished members of the Norwegian Nobel Committee,
Excellencies,
Ladies and gentlemen,

It is with profound humility that I accept this prize on behalf of the Organisation for the Prohibition of Chemical Weapons, its Member States, their Ambassadors and Secretariat staff, past and present – some of whom are with us today, including my immediate predecessor, Ambassador Rogelio Pfirter.

This award recognises our combined efforts.

Efforts which flow from the collective spirit of the OPCW in working towards a common good that serves all humanity.

I feel deeply privileged to be able to address you on this occasion.

I also take this opportunity to honour the memory of Nelson Mandela.

He will remain, for all of us and future generations, a beacon for what can be achieved against overwhelming odds to advance peace, dignity and reconciliation.

**********

The Nobel Committee has a long history of honouring achievement in disarmament.

Yet, this is the first time that the Peace Prize has been awarded to an organisation that is actively engaged in disarmament as a practical and ongoing reality.

For sixteen years now, the OPCW has been overseeing the elimination of an entire category of weapons of mass destruction.

Our task is to consign chemical weapons to history, forever.

A task we have been carrying out with quiet determination, and no small measure of success.

Under the terms of the Chemical Weapons Convention, the OPCW has so far verified the destruction of more than 80% of all declared chemical weapons.

We have also implemented a wide range of measures to prevent such weapons from re-emerging.

And with 190 states now members of this global ban, we are hastening the vision of a world free of chemical weapons to reality.

The remarkable success of chemical disarmament has born out the promise made by Nobel Peace Prize laureate and former UN Secretary-General Kofi Annan, when he characterised the first meeting of Member States, back in 1997, with the following words:

“It is not merely a great step in the cause of disarmament and non-proliferation. It is not merely a signal of restraint and discipline in war. It is much more. It is a momentous act of peace.”

**********

Excellencies,
Ladies and gentlemen,

There can be no doubt about the value of this work.

For chemical weapons have been used with brutal regularity over the twentieth century – and, tragically, in this century as well.

No weapon, of course, has a monopoly on cruelty or lethality.

But chemical weapons have, by any measure, an especially nefarious legacy.

Almost one hundred years since their first large-scale use on the battlefields of Flanders, it is worth reminding ourselves of the reasons why these weapons invoke such horror, right up to our own time.

Chemical weapons stir the deep-rooted and pathological fear all humans share of being poisoned.

They do not discriminate between combatant and civilian, nor between battlefield and village.

You cannot see them.

You cannot smell them.

And they offer no warning for the unsuspecting.

But their effects are devastating – burning, blinding or suffocating their victims.

Death is rarely instant and never painless.

And when they fail to kill, as they often do, these weapons inflict lasting damage on people and their environment, denying them the opportunity to repair and rebuild in the wake of conflict.

I need not describe these effects in all their gruesome variations. They would defy any description.

It is enough to look at the pictures of victims to understand the agony that they must have gone through – from Ieper in Belgium to Sardasht in Iran, from Halabja in Iraq to Ghouta in Syria.

**Director-General Ahmet Üzümcü delivers the Nobel Peace Prize Lecture on 10 December 2013. © Ken Opprann / Nobel Foundation 2013**

And we only need to look at the fate of the survivors of such attacks – people destined to spend the rest of their lives suffering unbearable physical and psychological pain – to understand why such weapons must be banned.

Chemical weapons evolved over time, with the discovery of new and deadlier agents.

But, whatever their form, they share one common purpose – to invoke fear and submission through the horrifying nature of their impact.

Scores of victims beyond the battlefield have attested to this.

In accepting this prize on behalf of the OPCW, I also pay homage to all these victims.

**********

The first attempt to ban the use of chemical weapons under international law was the Hague Convention of 1899.

The fact that this treaty was not observed during the First World War prompted immediate efforts to negotiate a stronger norm. These efforts resulted in the 1925 Geneva Protocol.

While it prohibited the use of chemical weapons, the Protocol did not ban their production or possession.

History, alas, did not bear out its robustness.

Chemical weapons continued to be used across the globe, including against civilian populations. And, alarmingly, large and more sophisticated arsenals were developed during the Cold War.

It was not until the 1980s that negotiations for a more comprehensive chemical weapons treaty got underway in earnest. Chemical attacks being perpetrated at that time by the former regime in Iraq added to the urgency of this process. Fortunately, it was not only the brutal effects of chemical weapons that focused minds.

What drove the negotiators was also the imperative to ensure the effectiveness of the future norm to ban these weapons.

States were adamant that chemical weapons had to be made a thing of the past – by deeds, not just words.

What they strove for was a treaty that all but enforced compliance, coming closer than any predecessor to guaranteeing adherence to its provisions.

And, after almost two decades of difficult negotiations, they succeeded.

Their efforts gave birth to the full global ban that came to be known as the Chemical Weapons Convention.

And to an entirely independent organisation, the OPCW, to oversee its implementation.

**********

As difficult as the challenges in bilateral arms control have been, concluding this multilateral treaty was, clearly, a singular achievement.

It also stands as a major triumph in the history of multilateralism.

Almost eighty years after the first large-scale use of chemical weapons, the collective determination of states was finally able to shine through in comprehensively banning these weapons.

This resolve of the community of nations lays testimony to the very best that can be achieved by multilateralism in the cause of peace and security.

As Benjamin Disraeli observed, "Through perseverance, many people win success out of what seemed destined to be certain failure."

I pay tribute here to all those who, through their dedication and resolve, contributed to this hard-won success for chemical disarmament.

And I commend Governments for their courage and foresight in taking this bold step.

**********

It was out of these negotiations that the crucible of the unique success of the Chemical Weapons Convention was forged – a comprehensive international verification mechanism.

A mechanism that had no prior model and had to be developed from scratch.

> "We only need to look at the fate of the survivors of [chemical weapon attacks] – people destined to spend the rest of their lives suffering unbearable physical and psychological pain – to understand why such weapons must be banned."

A mechanism that obliges every one of the Convention's 190 Member States, without discrimination, to destroy its chemical weapon stocks and production facilities.

And to lay bare, through inspection, any industrial facilities that could be used for purposes prohibited by this treaty.

A mechanism that brooks no exceptions, and can conduct inspections at short notice to investigate alleged use of chemical weapons, or suspicions over banned activities.

In short, a mechanism that places the onus on states to ensure full transparency vis-à-vis their obligations – with the OPCW acting as arbiter and guardian of the Chemical Weapons Convention.

With the entry into force of the Convention in 1997, we have thus been able to cross, and link, the wide space in disarmament between passion and practicality, between sentiment and action, between noble ambition and concrete achievements.

And, for the first time in the history of multilateral diplomacy, we were able to show that consensus-based decision-making can yield practical, effective and, above all, verifiable results in disarmament.

From where we stand now, I commend Member States' commitment to effective implementation of the Convention.

**********

The Convention's achievements make the recent chemical attacks in Syria, which shocked us all, even more tragic.

For they highlight the manifest security advantages that states adhering to the Convention enjoy.

In the sixteen years that the Convention has been in force, no Member State has experienced an attack with chemical weapons.

Thankfully, the international response to those attacks set in motion an extraordinary series of events.

These resulted in Syria's accession to the Convention and a front-line role for the OPCW, working together with the United Nations, to eliminate Syrian chemical weapons.

Never in its history has the OPCW overseen the destruction of such a major chemical weapons stockpile in the midst of a civil war, and in such compressed timeframes.

But, as much as this mission is testing our capacities and resources, our progress so far has only strengthened our confidence that we can succeed.

I am immensely proud of those staff members, from the OPCW as well as the UN, who have volunteered to work in Syria in what are extremely challenging circumstances.

Their dedication and personal courage do great credit to both organisations.

**********

Excellencies,
Ladies and gentlemen,

International consensus on the elimination of Syria's chemical weapons has as its basis the same consensus that drove the Chemical Weapons Convention to conclusion.

The challenge now is to persuade those six countries still outside the Convention to join it – without delay or conditions.

There has long been no reasonable defence for not doing so – all the more now in the wake of the robust international

reaction to recent use of chemical weapons.

No national interest can credibly outweigh either the security or economic benefits of adhering to the global chemical ban.

It is my fervent hope that this award will spur on efforts to make the Chemical Weapons Convention a truly universal norm.

Universal adherence to the Convention would be the most enduring investment in its integrity – and the best guarantee of its reach.

We cannot allow the tragedy that befell the people of Ghouta to be repeated.

**********

The durability of the Chemical Weapons Convention owes as much to what followed in the implementation of the treaty as to what was negotiated into it.

Key in this regard are the OPCW's active partnerships with science.

These partnerships have in significant measure defined the success of the Convention because of the dual-use nature of what goes into making chemical weapons.

Many of their materials and technologies also have beneficial commercial and industrial applications.

Without a common understanding of where the line must be drawn between what helps us, and what harms us, there can be no effective verification.

It is the OPCW's partnerships with science that have drawn this line – in a clear and defensible way.

They have done so by devising tools and methods for defining, detecting and protecting against chemical weapon agents, and monitoring new and emerging technologies of potential concern.

More than this, they have facilitated the sharing of such information between peers.

And, crucially, they have opened up a new sort of dialogue that makes the impact of scientific discoveries better understood.

We need to deal with the situation in which, as Isaac Asimov put it, "science gathers knowledge faster than society gathers wisdom."

It is for this reason that the OPCW has worked hard to enhance awareness of the often fine line between beneficial and harmful applications in chemistry through education programmes and outreach to academia.

Our aim is to contribute to efforts towards fostering a culture of responsible science.

This will ensure that current and future generations of scientists understand – and respect – the impact that their work can have on security.

What we are striving to create, together with our partners, is a two-tiered structure for supporting advances in chemistry.

One that accommodates a collective early-warning system for scientific discoveries that could be misused, and a global repository for knowledge, expertise and technologies that should benefit all nations.

**********

Industry has been no less important a partner for the achievement of goals enshrined in the Chemical Weapons Convention.

> "Never in its history has the OPCW overseen the destruction of such a major chemical weapons stockpile in the midst of a civil war, and in such compressed timeframes."

Its concerns were discussed and addressed from the very beginning of the negotiations on the Convention.

Specifically, industry had to have complete confidence in arrangements made for commercial protection.

Without such arrangements, there could be no productive collaboration and, therefore, no access to commercial chemical facilities for inspection.

Given the degree to which the Convention's verification requirements are entangled with normal commercial and industrial processes, industry's active participation is vital.

Some 2,500 inspections later, in more than 80 countries, we have shown that the Convention's arrangements work.

Our ambition now is to better integrate industry as a partner working to ensure continued and effective implementation of the Convention.

More broadly, this sort of partnership with the private sector points a way forward for many of the non-traditional multilateral challenges we are facing, from climate change to poverty alleviation.

It is a key area of focus for the OPCW's efforts to augment the Convention's profile, and adherence to it.

**********

When the Chemical Weapons Convention was concluded in 1992, it was rightly heralded as the most tangible disarmament outcome of the immediate post-Cold War period.

But over the more than two decades since then, we have little else to show in the area of disarmament for the enormous peace dividend that the end of the Cold War brought us.

It is high time to move towards a different, more durable security in keeping with the extraordinary opportunities that globalisation has brought.

A security that accommodates human development, economic cooperation and mutual prosperity.

Effective implementation of the Chemical Weapons Convention has played a definitive role in empowering a broader community of stakeholders to this end.

Their voices are persuasive because they are pragmatic.

They eschew moral argument in favour of facts.

And their modes of presentation only enhance their credibility.

These include: objective assessments of verification methods, innovative cost-benefit analyses of retaining weapons of mass destruction, and frank reviews of the commercial impact of treaty compliance.

Finally, they have been able to give expression to their voices and test their judgements through new habits of dialogue and cooperation between scientists and policy-makers, between industry and academia, and between civil society and government officials.

It is these sorts of habits that the OPCW is committed to fostering.

As a means of preserving the legacy of the 2013 Nobel Peace Prize, I announce here that the prize money awarded by the Nobel Committee will be used to fund annual OPCW awards.

These awards will recognise outstanding contributions to advancing the goals of the Convention.

I am sure that along with other stakeholders the civil society will continue to play a significant role in this regard.

**********

For its part, the OPCW will do its utmost to remain a highly effective organisation.

An organisation that continues to invest in its most valuable asset – a cadre of highly skilled and dedicated people.

An organisation that anticipates future challenges.

And an organisation that adapts its resources and expertise to be able to respond to them.

Syria has tested us in this regard.

Verifying the declaration of a Member State is a routine activity for the OPCW. But there is clearly nothing routine about the circumstances in which we are doing so in that country.

We would welcome the opportunity of new Member States submitting themselves to the verification regime of the Convention.

At the same time, we are looking beyond what we do, to how we do it.

Our aim is to build on our sixteen-year record of success by increasing our efficiency and broadening our reach.

This not only means staying abreast of scientific and technological advances that may test our understanding of what constitutes a chemical weapon.

It also requires us to ensure that we are making the best possible use of advances in communication, especially publicly available tools.

Having seen how rapidly information can be conveyed by social media and, critically, verified through images, we need to consider how we might harness such tools for our monitoring, verification and investigation activities.

This could render particular benefits for our work with Member States to prevent non-state actors from gaining access to dual-use materials and know-how.

And, in our world of globalised trade and supply chains, it could potentially help Member States further improve their ability to track exports of dual-use goods and materials, to ensure that these goods go where they are supposed to go, and are used for purposes they are intended to be used for.

We are also thinking about how we can employ new communication tools to raise awareness of the need to practise responsible science, to instil the highest ethical standards in our future scientists and researchers.

Finally, we are expanding and deepening our interaction with other international organisations.

The United Nations is central in this regard, whether in partnership on the ground in Syria, or in our broader,

mutually reinforcing efforts to promote disarmament.

We are likewise engaging regional organisations to use their forums and networks for raising awareness of the goals of the Chemical Weapons Convention, including in helping to secure universality.

Our interaction with other specialised international agencies is usefully identifying areas of overlap that enhance chemical security, ranging from addressing transnational crime and terrorism, to building capacity for chemical emergency response.

And we are working with other arms control treaty organisations to exchange best practices in areas ranging from dual-use challenges to verification methods.

Institutional cooperation is the bedrock of the broader stakeholder engagement on which the OPCW prides itself.

Cooperation which I hope we can underwrite with increased communication and social networking, stimulating fresh ideas and innovative inputs.

**********

Your Majesties,
Distinguished members of the Norwegian Nobel Committee,
Excellencies,
Ladies and gentlemen,

The history of arms control has shown no lack of passion.

Yet, when so much is at stake, passion must take care to ground itself in reality, if it is to achieve its ambitions.

This means being pragmatic, clear-minded – even dispassionate – about acquiring the best possible tools for achieving and consolidating disarmament goals.

And it often means governments showing the political courage to take tough decisions for the benefit of the community of nations.

The Chemical Weapons Convention has shown that this sort of an approach yields results.

For the Convention is more than mere words and promises on a piece of paper.

It is a comprehensive regime geared towards ridding the world of chemical weapons, and making sure they never again threaten humankind.

In this regime, member states provide the will behind the Convention

And it is the OPCW that provides the force for making its goals a reality.

Our work, imbued with resolve and certitude, is the international community's guarantee of the Convention's implementation.

It shows that from lofty dreams we can carve out steps leading us from vision to reality.

It took almost a century to achieve a total ban on chemical weapons.

A century over which thousands fell victim to these heinous weapons.

A century at whose end we can now look to a future free of the scourge they represent.

No value can be placed on this achievement.

And no effort should be spared in sharing the gains it has brought us.

Those of us who have worked towards chemical disarmament recognise that with our success also comes an obligation to broaden it.

The Chemical Weapons Convention has given us a legacy that no future disarmament effort can afford to ignore.

A legacy that has, at its core, verification, broad stakeholder engagement, consensus born of trust and, above all, a commitment to science that actively serves the cause of peace and security.

It is this legacy that we must set as the keystone in an ever-widening arch of disarmament.

Only by building such an arch will we be able to bridge our security and our prosperity.

Destiny has ruled that we rid the world of chemical weapons.

And that we achieve this in our lifetime.

This is our place in history.

And this is the future we are creating.

A future for which our children and grandchildren can be truly thankful.

# Education, outreach and awareness-raising after the Third Review Conference

By Djafer Benachour and Daniel Feakes

**During the Third Review Conference of the Chemical Weapons Convention in April 2013, States Parties to the Convention gave a strong mandate to the OPCW to undertake activities in the fields of education, outreach and awareness-raising. In the Political Declaration agreed at the Review Conference, States Parties underlined their determination to "maintain the Convention's role as a bulwark against chemical weapons; to that end to promote, inter alia, outreach, capacity building, education and public diplomacy."**

In accordance with this, and specific recommendations from the States Parties' review of the operation of the Convention, the Secretariat has already undertaken a range of activities during 2013 and will further enhance such activities in 2014, particularly in light of the centenary in that year of the outbreak of the First World War, and the centenary in 2105 of the first large-scale use of chemical weapons.

In its activities, the Secretariat is guided by the advice that it receives from the Scientific Advisory Board (SAB), particularly from its Temporary Working Group on Education and Outreach in Science and Technology Relevant to the Convention. The Group, comprising of 13 international experts on the Convention and chemistry education, is chaired by Professor Djafer Benachour of Algeria and has recently concluded its third meeting. The Group is an extremely valuable source of guidance and advice for the Secretariat, particularly with regard to recommendations for sustainable approaches to education and outreach in the long term.

**Objectives**

Awareness of the Convention is, of course, high among those most directly involved in its implementation. However, it remains low among other communities, for such as practising chemists, those trading, transporting and otherwise handling chemicals, those responsible for regulating chemicals, and chemistry educators and students. These communities should have a higher level of awareness given the knowledge and expertise they possess and their access to toxic chemicals.

A higher level of awareness among such groups will help to ensure that their members do not inadvertently contribute to the re-emergence of chemical weapons or chemicals being used for purposes prohibited under the Convention.

Sixteen years after the entry into force of the Convention, a more systematic approach to this issue should be introduced. The objectives of such an effort would include:

- Significantly increasing the level of awareness, particularly among the scientific and academic communities, about the Convention and its prohibitions, which will in turn contribute to its full and effective implementation;
- Developing more specific education and training materials for current and future chemists, chemical engineers and others;
- Organising a series of regional meetings to sensitise the relevant communities to the issue, to catalyse regional networking, to share best practices and to exchange information;
- Providing tools for National Authorities to assist them in effective national outreach to the relevant communities; and
- Building sustainable relationships with other national, regional and international actors in the areas of responsible science, the peaceful uses of chemistry and disarmament education.

**Possible approaches**

In concert with the SAB's Temporary Working Group on Education and Outreach and several States Parties, the Secretariat has identified certain approaches that could be explored by States Parties in their outreach efforts to national scientific and academic communities. National Authorities could partner with appropriate national agencies, for example ministries of education or science and technology, or with research councils or academic funding bodies. Frequently such national bodies have well-developed links with the academic and scientific communities and conduct regular outreach activities during which issues related to the Convention could be

raised. The article in this issue by Gustavo Zlauvinen provides a good example of such partnership in Argentina. In general, the advice received from the Temporary Working Group is that the Convention should be introduced to chemists and those in related fields within the broader context of "responsible science". Many modern chemistry curricula are already very crowded and it is not realistic to expect educators to be able to make space for specific courses on the Convention. However, many curricula already require students to study the responsible conduct of science, and issues relating to the Convention and the OPCW could be incorporated into these existing courses. Such an approach may be more effective than promoting tailored courses on the Convention. Of course, where necessary and appropriate, more specific education and training can follow.

National Authorities in some States Parties may find the need to raise awareness among communities with which they do not have regular contact challenging, so this special issue of OPCW Today presents some practical examples of existing approaches, tools and materials that National Authorities can provide to educational institutions and scientific associations.

**United Nations Secretary-General Ban Ki-Moon addresses the Third Review Conference in April 2013**

**Following up the Review Conference recommendations**

The final report of the Third Review Conference sets forth four recommendations specifically on education, outreach and awareness-raising. The following paragraphs summarise activities undertaken in follow-up of each recommendation.

*"… Encouraged the Secretariat, in concert with the SAB temporary working group on education and outreach, to assist States Parties, upon request, in implementing education and outreach activities, including by disseminating materials, conducting workshops and regional meetings." (paragraph 9.103(e))*

The Secretariat has already begun to support the development of educational materials. Such materials will be made available on the OPCW public website, but more tailored assistance could also be provided on request. Much wider dissemination of such material is planned, as is its translation into all official OPCW languages during the course of 2014. The Secretariat will also seek voluntary funding to establish a global network of educators for the exchange of information and best practices and also to facilitate "train-the-trainer" programmes at the national or regional level. The Fifteenth Annual Meeting of National Authorities in November 2013 included the theme of education and outreach to encourage States Parties to share best practices and exchange information. The Secretariat is already supporting two projects to develop educational materials in concert with the Temporary Working Group (see the articles in this issue by Ludo Juurlink and Peter Mahaffy and Alastair Hay) and also supported a pilot "train-the-trainer" workshop in Argentina (see the article in this issue by Alejandra Suarez and Rolando Spanevello).

*"…. 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." (paragraph 9.131(j))*

The Secretariat already benefits from valuable relationships and partnerships in this area, most notably with the International Union of Pure and Applied Chemistry (IUPAC). In 2012, the Director-General gave a keynote speech at IUPAC's International Conference on Chemistry Education in Rome and again (via video) at the IUPAC World Chemistry Congress in Istanbul in 2013.

However, this existing partnership is being broadened and deepened, and partnerships with other such organisations, for example the International Council for Science (ICSU) and the United Nations Education, Cultural and Scientific Organisation (UNESCO), are being established.

Such partnerships could take the form of, inter alia, the joint organisation of meetings on relevant topics and the reciprocal participation in meetings and conferences of each organisation, joint awareness-raising and outreach activities, and coordinated dissemination of educational materials. A member of the SAB participated in the recent World Science Forum in Brazil, the declaration of which stated that "scientists are individually and collectively ethically responsible for the advancement of Science and the use of its benefits for society."

*"… 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" (paragraph 9.131(l))*

The Secretariat will continue its existing relationship

with the United Nations Office for Disarmament Affairs and will provide OPCW information and material for use by UNODA's disarmament education programme. Strengthened activities by the Secretariat in this area also contribute to the implementation of the recommendations contained in the 2002 report of the Secretary-General's group of experts on disarmament and non-proliferation education (A/57/124). As appropriate, the Secretariat will share experiences and best practices with other relevant international bodies and organisations, particularly the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization, the International Atomic Energy Agency, the World Health Organization, and the Implementation Support Unit of the Biological Weapons Convention. A meeting bringing together many of these organisations took place in November 2013 (see the article in this issue by Elena Sokova and Daniel Feakes).

*"…. 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 amongst 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" (paragraph 9.155(d))*

As mentioned above, the Secretariat has collaborated with IUPAC for many years, including on the development of educational materials on the multiple uses of chemicals and on guidelines for codes of conduct. The Secretariat has also worked with national professional bodies and academies of science in many States Parties in order to generate awareness of the potential risks posed by toxic chemicals. The Secretariat intends to intensify such efforts and encourages States Parties to involve such bodies in any national education and outreach activities. The Secretariat will also initiate relations with relevant regional and international bodies such as the InterAcademy Council.

**Conclusions**

The Director-General will continue to report to States Parties on the implementation of the Review Conference's recommendations, and encourages active contributions from States Parties in a position to do so. This issue of OPCW Today is devoted to the subject of education and outreach and includes information on ongoing Secretariat activities as well as contributions from other bodies and organisations.

With the unique confluence of events presented by the 2013 Nobel Peace Prize, the centenary of the First World War, and the approaching centenary of the first large-scale use of chemical weapons, the OPCW has an unparalleled opportunity to reach out beyond its traditional audiences and to ensure that the peaceful and responsible use of chemistry is inculcated in future generations.

*Daniel Feakes is the Strategy and Policy Adviser in the Office of Strategy and Policy at the OPCW. In 2009, Daniel joined the OPCW as a Senior Policy Officer within the Verification Division of the Technical Secretariat. From 1997-2009 Daniel worked at the Harvard Sussex Program on Chemical and Biological Weapons (HSP) at the University of Sussex and in The Hague. With HSP he studied developments relating to both the CWC and the BWC, undertook numerous research projects and published widely. Daniel is the Secretary to the OPCW Temporary Working Group on Education and Outreach in Science and Technology Relevant to the Chemical Weapons Convention.*

*Djafer Benachour is Director of the research laboratory on "Multiphase Polymeric Materials" since July 2000 at the Ferhat ABBAS University of the Ministry of Higher Education and Scientific Research, Setif, Algeria. He was also Vice-president of the Algerian Chemical Society from 1991 to 2009. He is currently President of the Scientific Committee of the Department of Chemical Engineering. His areas of expertise are on industrial and engineering chemistry.*

# The Argentine Project on Education and the CWC

By Gustavo Zlauvinen

**In 2010, the Argentine National Authority launched a number of activities and projects, at national level, as part of the next stage in its implementation of the obligations of the Chemical Weapons Convention (CWC) in Argentina. Five working groups were established, aimed at specific areas that required further implementation. The groups included representatives from several ministries and federal agencies with direct responsibility in the targeted areas or fields, as well as representatives from the private sector, national chemical societies, civil society organisations, and scientific groups.**

One of the groups was assigned to work on outreach, in particular to devise innovative ways to identify and reach out to those companies that had not yet fulfilled their obligations under the Convention and the national legislation, i.e., to register with the National Authority and/or to submit correctly their annual declarations of activities.

**The opening ceremony of the national meeting on Education and the responsible use of scientific knowledge in the chemical fields, held in Buenos Aires on 7 May 2013.**

Like any other national system that controls listed chemical substances and the chemical industry in its territory, the Argentine system depends on actions by particular actors. For this reason it is impossible for the National Authority to know in advance the full range of individual companies that have the obligation to register and make declarations of their activities. However, there are certain indicators that point to the efficiency - or not - of the system.

Bearing that in mind, the working group conducted a comparative evaluation of the number of companies in Argentina that have declared their activities to the National Authority, vis-à-vis those registered in countries in the region with similar industrial developments and outputs. The study showed that the number of registered companies in Argentina was much lower than in comparable countries.

Another study showed a systemic lack of correct understanding, among the companies´ owners, managers, and/or legal representatives, of the obligations under the CWC and the national laws and regulations. This study was corroborated by the field experience of personnel from the National Authority during inspections at the plants. For example, activities that ought to be declared were not, and activities that did not need to be were indeed declared. A new outreach document was issued and distributed to the private sector through several Chambers or Associations of Industries.

The document described the obligations, in simpler terms, and also provided examples of common misunderstandings by the companies. In addition, staff from the National Authority conducted outreach seminars and meetings with representatives of industries, by sector. New guidelines for the submission of the annual declarations were designed by the Ministry of Industry, with the approval of the National Authority. The new guidelines sought to get more information from the companies, while at the same time simplifying the process of submission. An electronic submission system for the annual declarations was developed and tested in a trial mode.

The activities conducted by the Argentine National Authority in the field of outreach proved to be very successful – in just three years, the number of registered companies increased by 485%, and the number of declarable companies increased by 215%.

Nevertheless, during several inspections at facilities in Argentina, plant managers, production managers, and senior staff showed an incorrect or incomplete understanding of the technicalities related to the provisions of the CWC and the national norms. Although most managers held degrees in chemical engineering, chemistry or biochemistry, they claimed that they had not received adequate information about the legal norms and obligations under the CWC during their university studies. This was proof that, in addition to its outreach campaign to the private sector, the National Authority had to find other ways to improve the level of technical understanding by plant managers and senior staff.

Consequently, the working group on outreach was asked to consider the question of education as another way of promoting the correct implementation of the CWC

obligations in Argentina. The working group took into account the recommendations by the Advisory Panel on Future OPCW Priorities, as well as the work by the Temporary Working Group on Education and Outreach of the Scientific Advisory Board (SAB). A member of the SAB, from Argentina, was invited to join the working group.

The working group analysed the Argentine university system, in particular the legal courses taught at graduate level that have a direct relationship to the obligations under the CWC. The group reached the conclusion that most of the graduate courses in chemistry, chemical engineering, biochemistry, pharmacy, environmental issues, and industrial security taught at Argentine public and private universities did not include the teaching of the national laws and regulations implementing the CWC obligations in Argentina. Therefore, the group proposed that the National Authority implement a project, in collaboration with the Ministry of Education, to promote the inclusion of specific courses in the curricula of these disciplines.

During its discussions, the group considered that the subject was too important to be limited to providing a better understanding of the obligations and norms of the CWC for future plant or production managers of declarable facilities. The group therefore proposed a broader scope for the project, with a view to promoting a culture of the responsible use of technical and scientific knowledge among all professionals in the chemical fields, in order to be aware of the potential danger and to prevent all misuse and abuse of chemicals. It was proposed that the project should also include practising chemists, research scientists, and university laboratory professionals. The group also considered that, at a second stage, the project should be targeted at students in secondary education.

The National Authority agreed with all the recommendations from the working group and decided to launch a national project to implement them. Taking into account the federal nature of the Argentine university system, the National Authority sought and got the support of the Ministry of Education. They agreed to work together in a project on education in the responsible use of scientific and technical knowledge in the chemical fields. To that end, they signed a strategic partnership agreement, setting the goals and actions required to implement the project.

For the project, over 150 faculties with graduate courses in chemistry, chemical engineering, biochemistry, pharmacy, environmental issues, and industrial were identified in Argentina. The respective associations of deans were contacted, and information about the project was sent to all deans through their channels of communication.

In May 2013, the National Authority and the Ministry of Education convened a national meeting to launch the project. Deans and heads of studies from over 50 universities attended the meeting. All participants welcomed the initiative and recognised the need to include the teaching of the national norms relevant to the CWC in their respective graduate courses. However, as most vocational curricula were already crowded with regular courses, it was decided to leave it up to each university to decide how to include the new subjects. It was proposed that, where changing the curriculum was not possible or desirable, alternative educational tools should be devised to introduce the new subjects, such as workshops, seminars, optional courses, special assignments. Alternatively they could be incorporated into existing courses.

Since then, many other universities have expressed their intention to participate in the project. The first stage of the project, which started in July 2013, includes the following actions:

- The establishment of a network of universities, coordinated by the Ministry of Education and the National Authority, to help deans and heads of studies share their experiences, needs and recommendations on how to implement the project in their respective disciplines.
- The development of relevant course material to cover these topics, to be used by participant universities.
- The planning and running of a training programme for faculty members of participating universities, in particular chemistry professors.
- The development and implementation of a model virtual classroom, for those universities without trained faculty staff.
- The establishment of a “travelling class”, for those universities with no trained faculty staff or access to the virtual classroom.

Specific universities were appointed as coordinators of each course of action, in order to provide a sense of “ownership” of the initiatives. All activities in the project are implemented on a voluntary basis by the participating universities.

Furthermore, the Ministry of Education has recently included, in its improvement programme for careers in chemistry, a specific, mandatory component on CWC obligations and national legislation. The new component is a requirement for those universities that, having received certification for their chemistry courses, intend to apply for funding support from the Ministry of Education. The Ministry of Education intends to include similar components as requirements in the improvement programmes of other relevant disciplines, such as chemical engineering. The Ministry of Education has allocated funds to support universities´ activities in the implementation of the components.

Since the launch of the project, several universities have organised seminars and workshops on the subject, which were attended by a significant number of students and professors. The National Authority and the Ministry of Education gave presentations at those events, as well as at other meetings, such as the XVI Meeting of Argentine Professors of Chemistry, and the XVIII National Congress of Chemical Engineering Students.

The National Authority and the Ministry of Education will use specific indicators to measure the implementation of the project and the impact of its activities, both at the industry level, and at overall society level. They intend to release a report on the results by the end of 2014.

The Director-General of the OPCW has expressed his support to the Argentine project, as the Organisation is also increasing its work on education and outreach. The OPCW has contributed to the participation of external experts in the first "train the trainers" workshop in Argentina, organised by Universidad Nacional de Rosario. In addition, the Technical Secretariat has expressed its readiness to co-organise and support the first regional meeting on education and outreach, to be held in Buenos Aires in April 2014. At that meeting, the National Authority of Argentina intends to share the experience gained in implementing the national project with its counterparts in Latin America and the Caribbean.

As stated by the International Union of Pure and Applied Chemistry, "education, outreach, and awareness-raising are vital all over the world, and issues related to chemical weapons may be effectively embedded within a broader context of risk and messages about the responsible acquisition, use, and disposal of chemicals."

In that sense, National Authorities have a wider role to play, in addition to the crucial one given to them by the CWC. They are uniquely positioned to engage and interact with all stakeholders, at national and international levels, that have responsibilities, interests or obligations related to the use of toxic chemicals. When they work together, they produce synergies that help in achieving the goal of the CWC: a world free of chemical weapons, where toxic chemicals and their related technologies and knowledge are used in a safe manner, exclusively for the benefit of mankind.

From its own perspective, the National Authority of Argentina believes that its national project on education is a contribution to this goal, and hopes that the experience gained in its implementation could be of use to other National Authorities. In this regard, Argentina submitted a report on its activities to the eighteenth session of the Conference of the States Parties in November 2013 (see C-13/NAT.3, dated 2 December 2013).

*Since May 2010, Mr. Zlauvinen has been the Executive Chairman of the National Authority of Argentina for the implementation of the Chemical Weapons Convention. From 2001 to 2010 he was the Representative of the Director-General of the International Atomic Energy Agency (IAEA) to the United Nations in New York. In 2000 and 2001 Mr. Zlauvinen served in the Cabinet of the Argentine Secretary of State for Foreign Affairs, in Buenos Aires. From 1995 to 1999 he served as the Senior Political Adviser to the Executive Chairman of the UN Special Commission on the disarmament of Iraq (UNSCOM), in New York. From 1991 to 1995 he served in the Argentine Permanent Mission to the IAEA, in Vienna. Mr. Zlauvinen joined the Argentine Diplomatic Service in 1989.*

# How Codes of Practice Enhance a Chemical Security Culture

By Aaron C. Gluck

**Human awareness is often the first line of defence against a successful act of violence, whether it is spotting suspicious behaviour on-board an aeroplane or when seeing an unattended package at a transit terminal. The same is true for thwarting any attempt to use chemicals to kill or maim others. Changing practices to ensure that people watch for warning signs at a laboratory or industrial facility can prevent individuals with hostile intentions from exploiting security weaknesses to get the materials, technology, or information they need to carry out an attack.**

Ongoing disarmament and demilitarization of chemical weapons stockpiles means stealing chemical weapons will grow exceedingly difficult, which will increase the need for malicious actors to either make their own chemical weapons or use highly toxic industrial chemicals.

That is one reason why Director-General Ahmet Üzümcü of the Organization for the Prohibition of Chemical Weapons (OPCW) said that the OPCW needs to transition away from its emphasis on disarmament and demilitarization to other core elements of the Chemical Weapons Convention (CWC)[1].

**A security checkpoint at a National Institutes of Health (NIH) facility, which helps "ensure that the mission of NIH is not impeded by personal attacks, loss of assets, criminal activity or acts of terrorism." Security Guards, Office of Research Services (Bethesda: National Institutes of Health), www.ors.od.nih.gov.**

With the ongoing destruction of chemical weapons, this additional objective would encompass the OPCW addressing non-proliferation in a greater capacity by raising awareness amongst the scientific community, promoting best practices in safety and security, and educating small and medium sized chemical companies about the CWC.

Those activities are vital for fostering a greater culture of responsibility – beyond safety and environmental protection – by expanding ethical behaviour and practices to include the security of society. One measurement of the current environment of rooted non-proliferation ideals is the amount of publicly available codes of practice (codes) at chemical associations and companies. Codes are moral compasses that reflect the principled foundation upon which laws stand.[2]

Having guns, guards, and gates are important traditional security measures, but are ineffective if guards fall asleep at their post, are unprepared to use weapons to subdue an infiltrator, or do not ensure appropriate entryways are kept locked. This is where codes act as a tool, by setting expected or required behaviour of a company's employees or an association's members based on a set of ethical values.

The applicability and enforceability to bring about behavioural change is based on the type of code: aspirational codes set out ideals to champion; educational/advisory codes establish guidelines on appropriate behaviour; and enforceable codes codify practices by connecting behaviour to professional and legal regulations.[3]

Thus, codes can be utilized to establish a security culture that gives a moral impetus for all employees, not just security guards, to, for example, lock storage areas containing chemicals or equipment that could be exploited by others to kill, injure, or terrorize.

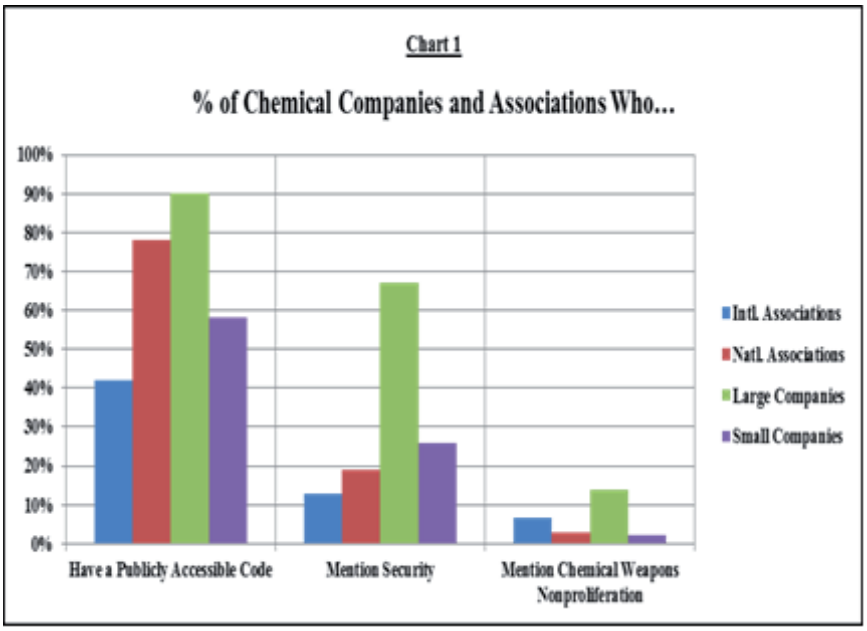
Providing a greater sense of social responsibility is why many companies and associations have codes, whether it is a company edging out a competitor because of its practices or an association member demonstrating greater professionalism. However, the public acknowledgement of chemical weapons non-proliferation and security as a written value in chemical industry and association codes remains mostly lacking, which indicates why there is a need for greater awareness and education programmes to promote buy-in.[4]

Codification of non-proliferation ideals tracks and maps the spread of non-proliferation in associations and industry, and acts as a tool to safeguard against the negative consequences of future Fritz Habers – winner of the Nobel Prize in Chemistry and the "father of chemical warfare" – and leaving only the good for humanity.[5]

**Chemical Companies[6]**

The chemical industry is one of the primary areas of focus Mr. Üzümcü mentioned for awareness and education because they are the group that is the most likely to handle and trade large amounts of toxic chemicals or have access to dual-use equipment. Chemical companies treat codes as a catalyst for investment, new business opportunities, and consumer confidence with a company's practices, which is evident by companies placing codes either in their "investor relations" or "social responsibility" section of their website.[7]

Large chemical companies were the most likely to include security and non-proliferation in their code as compared to small chemical companies. As seen in Chart 1, large chemical companies and small chemical companies treat security as a business principle on opposite spectrums; 67 large and 13 small chemical companies include security in their code.[8] This is an area where large chemical companies can act as advocates in education and awareness-raising programmes for small companies.




For large chemical companies who handle over a billion dollars' worth of sales globally every year, it is understandable that two-thirds of the companies consider security an important factor for maintaining constant operations by reducing any risk as much as possible.

Security provides tangible benefits for profitability – such as protecting against theft, diversion, and sabotage – whether or not they are conscious of the simultaneous benefits for non-proliferation.[9] These positive effects of security measures can be the starting point for education and awareness-raising programmes for small chemical companies, which in large part do not include security as a business principle.

However, the ideal situation is that companies include security in their code because they know of the added benefit for non-proliferation. While large chemical companies are more likely (see Chart 1) to be flag bearers for chemical weapons non-proliferation as a business principle, overall the low amount of companies which include it in their codes is troubling considering they are most likely aware of such efforts because of strict export and import control, chemical security, and anti-terrorism laws in industrialized countries.

Even though small chemical companies are less likely to handle the same quantities of toxic chemicals as their larger counterparts, they are just as susceptible to theft or diversion of chemicals, equipment, or information. Small chemical companies that face the same threat without the capital to purchase expensive security systems should address that limitation by including security and non-proliferation consciousness as a principle so employees know how to react to a security incident.

Adherence to relevant laws is significant, but including non-proliferation within their code would strengthen the adoption of the international norm against chemical weapons as a practice also at the organizational level.

Codes also influence employees to not just follow the law because it is the law, but because it is the right thing to do with little to almost no investment needed. Companies who include security and non-proliferation in their code could serve as "champions" for awareness-raising and education programmes, as they demonstrate the feasibility of such ideals with profitable business operations.

**Chemical Associations[10]**

Codes in chemical associations provide a second window through which to explore the prevalence of security and non-proliferation in the larger chemical community because of the diverse nature of their membership. The language within an association's code reflects a collective agreement of what members from industry, academia, and the government consider to be universal moral practices.

Codes demonstrate an understanding that adverse behaviours by an individual can negatively impact upon the community, thus serving as a way to harmonize socially responsible behaviour to distinguish members from others. Only about a sixth of the surveyed national and international chemical associations include security in their code. Even fewer associations include non-proliferation, two national and two international chemical associations.[11]

The low amount of associations that include non-proliferation and security within codes can reflect either a lack of agreement that it is the responsibility of the profession, a lack of appreciation of their importance, or a mixture of both. Considering the low amount of such language in codes, engaging with chemical associations for programmes would accomplish two goals Mr. Üzümcü mentioned.

International chemical associations can use a code to help members implement security and non-proliferation best practices, which facilitates the secure international trade of goods, services, or knowledge between likeminded members. In turn, national associations can incorporate international best practices and ideals into national action plans that utilize the local environment and culture.

**A photo of a group of students from developing countries who receive training from the OPCW in an effort to facilitate national implementation of the CWC. This is an excellent example of how to train new generations of scientists about the importance of the CWC's ideals, while also demonstrating the leadership role companies can take in spreading CWC awareness by hosting these students. OPCW photo.**

CWC education and awareness-raising programmes aimed at chemical associations that accomplish buy-in would foster the adoption of non-proliferation ideals amongst membership and provide a forum for determining best practices for different sectors of chemistry. Such programmes can tap into the fact that many chemical associations include the advancement of chemistry in their mission statement, and public acknowledgement that security and non-proliferation are ethical practices per their code would show that advancement does not come at the cost of peaceful applications of the science.

### Conclusion

A vast majority of large chemical companies include security language in their code, but they and other chemical entities have yet to endorse publicly on a significant scale chemical weapons non-proliferation as an ethical practice within their codes. Mr. Üzümcü's remarks speak to a real need to prevent non-state actors with malevolent intent from acquiring chemicals, technology, or information.

While including security and non-proliferation in codes is not the only measurement of commitment, it links morals to practices. Current non-proliferation funding is being outpaced by the growth of the chemistry sector, which adds emphasis for prioritizing the promotion of the CWC's ideals through education and awareness raising programmes. Increasing the amount of public commitments to non-proliferation and security as ethical practices influences the formation of industry and professional standards in a self-sustaining momentum that brings new people into the fold and pinpoints the outliers.

Current and future champions can help translate those ideals from treaties and laws to moral behaviour within associations or amongst those who get their first exposure to non-proliferation in education and awareness raising programmes.[12] Chemical company and association codes illustrate the need and the distribution of the CWC's ideals, the same ideals that are necessary to prevent rogue scientists, technicians, employees, and individuals from tainting chemistry with malevolence.

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## Notes

[1] Ahmet Üzümcü, Sharon Squassoni, and Cindy Vestergaard, A Conversation with His Excellency Mr. Ahmet Üzümcü, Video (Washington, D.C.: Center for Strategic and International Studies, 23 May 2013).

[2] Graham S. Pearson, Edwin D. Becker, and Leiv K. Sydnes, Why Codes of Conduct Matter, Chemistry International: Vol. 33 No. 6, November-December 2011 (Research Triangle Park: International Union of Pure and Applied Chemistry, 2011).

[3] Brian Rappert, Codes of Conduct and Biological Weapons: An In-Process Assessment, Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science, Volume 5, Number 2, 2007 (New Rochelle: Mary Ann Liebert, Inc., 2007).

[4] An interesting case study is UNSCR 1540 implementation in the Caribbean. O'Neil Hamilton, Engaging Whole Community: The Role of Industry and Intergovernmental Organizations in Furthering Nonproliferation Goals and Implementing UNSCR 1540, Policy Analysis Briefing, (Muscatine: The Stanley Foundation, 2012).

[5] Fritz Haber won the Nobel Prize in Chemistry in 1918 for his work in creating nitrogen from the air into a compound, which revolutionized agriculture. He is also known as "the father of chemical warfare" because of his involvement with the research, development, and first successful use of chemical warfare agents in World War I. Dan Charles, The Tragedy of Fritz Haber, Morning Edition (Washington, D.C.: National Public Radio, 2002).

[6] The 100 large chemical companies used in this report are based on the Independent Chemical Information Service's (ICIS) Top 100 Chemical Companies 2012 list. The 50 small chemical companies in this report are defined as companies not part of the ICIS list. Top 100 Chemical Companies 2012, ICIS Chemical Business, 10-16 September 2012 (Vergiate: Independent Chemical Information Service, 2012).

[7] Global Business Barometer, A Survey Conducted by the Economist Intelligence Unit (London: The Economist, 2007

[8] 53 out of the 67 large and 12 out of the 13 small chemical companies that include security in their code do not mention chemical weapons nonproliferation. The large and small chemical companies that mention nonproliferation in their code also had security language.

[9] In a study of the chemical process industry in the Flanders region of Belgium, "approximately one out of three of the respondents have already experienced security-related incidents." Genserik L.L. Reniers, Security within the Chemical Process Industry: Survey Results from Flanders, Belgium, Chemical Engineering Transactions, Vol. 26, 2012 (Milano: Associazione Italiana Di Ingegneria Chimica, 2012).

[10] International chemical associations and national associations are distinguished by whether its mission or membership focus is national or international.

[11] Two out of the four international and 11 out of the 13 national chemical associations companies that include security in their code do not mention chemical weapons nonproliferation. The international and national chemical associations that mention nonproliferation in their code also had security language.

[12] Frost & Sullivan: Specialty Chemicals and Plastics propels strong growth in Asia Pacific chemical industry, PR Newswire (Sunyvale: Yahoo! Finance, 2013).

# Images from the Eighteenth Session of the Conference of the States Parties

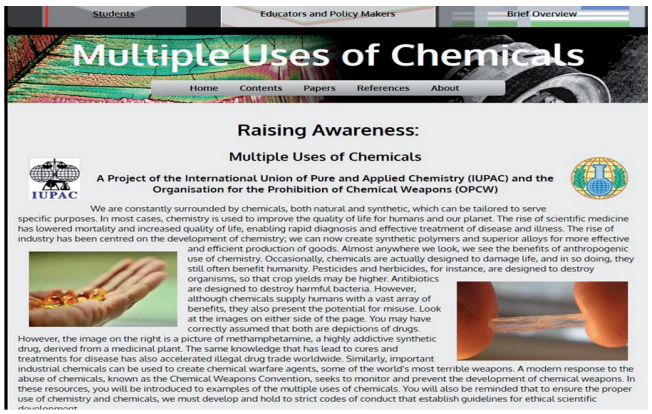
Case Studies

# Multiple Uses of Chemicals: Choices for Chemists and the Public

By Alastair Hay and Peter Mahaffy

**The awarding of the Nobel Peace Prize every year celebrates outstanding achievements that contribute to making peace in our troubled world. There has been speculation about why Alfred Nobel, who invented dynamite and the smokeless propellant Ballistite, chose peace as a Nobel Prize category. Perhaps his motivation came from Bertha von Suttner, a close friend who was a peace activist, or perhaps Nobel simply wished to honour choices made by scientists and ordinary individuals to work for peace.**

The OPCW received the 2013 Nobel Peace Prize for its tireless work to rid the world of chemical weapons. Millions of hours of political negotiations have led to the Chemical Weapons Convention (CWC), which with the addition of Syria, is now signed by 190 countries. The most visible features of the OPCW are its work at the political level, as well as scientific and technical work to verify the implementation of the Convention, and to anticipate and proactively address new areas of potential concern, such as the convergence of biology and chemistry.




**A screenshot from the Multiple Uses of Chemicals website**

Following joint discussions in 2005 with the International Union of Pure and Applied Chemistry (IUPAC), the OPCW and IUPAC agreed that if the world is to truly be free of threats from chemical weapons, it would be crucial to also engage students, teachers, and the general public, so that the next generation of scientists, citizens, and decision makers thinks about choices and understands their responsibilities.

This workshop led to several joint IUPAC/OPCW projects that created an initial set of interactive electronic educational materials. These were used with chemists and educators around the world to communicate the responsibility each of us has to make the right choices to use chemicals responsibly and for beneficial purposes.

In August 2013, following a recommendation from the OPCW Temporary Working Group on Education and Outreach in Science and Technology Relevant to the CWC, a joint IUPAC/OPCW project was launched with two goals: to create a new interactive website, and to model engaging ways of presenting material on choices and responsible use of chemicals. The site, available at www.multiple.kcvs.ca, takes the approach of helping different audiences think about responsible choices they can choose to make with respect to the use of chemicals.

Using case studies, questions, and role play, the interactive materials start with the beneficial uses of chemicals, and then lead users through examples of the misuse and abuse of chemicals.

The site ends by introducing the CWC, which represents an example of choices made by nations to work for peace. Students, educators, policymakers, and the general public are invited, through different portals, to explore what is being done to monitor the abuse of multi-use chemicals, and to discover the responsibilities of both scientists and the public in responding to the misuse of chemicals, such as in the production of chemical weapons.

The interactive web materials, developed through this joint project of the OPCW and IUPAC, were created by the students and faculty at the King's Centre for Visualization in Edmonton, Canada, working closely with members of the OPCW's Education and Outreach temporary working group, OPCW staff, and its Scientific Advisory Board.

In addition to providing interactive resources, a second goal of the joint project is to model ways in which information about the multiple uses of chemicals and the CWC, can be presented in engaging and interactive ways. Project Task Force co-leaders Alastair Hay and Peter Mahaffy piloted the new interactive materials with chemists and educators at the IUPAC World Chemistry Congress in Istanbul in August 2013. The interactive session, which included role playing about making choices regarding the use of chemicals, was filmed professionally by the OPCW.

Excerpts of the footage will soon be available on the website to help educators and other communicators see how audiences can be engaged with the new materials.

One of the examples included on the new multiple uses education website and discussed at the IUPAC Congress workshop in Istanbul is the nerve agent Sarin. The need for widespread understanding among all citizens of the world about the multiple uses of chemicals and the CWC was demonstrated emphatically by the horrific use of Sarin in Damascus, just five days after the IUPAC Istanbul workshop.

For further information about the website, or suggestions for other materials and approaches that could be included, please contact:

- peter.mahaffy@kingsu.ca
- A.W.M.Hay@leeds.ac.uk

*Peter Mahaffy and Alastair Hay are members of the OPCW Temporary Working Group on Education and Outreach, and have worked together on developing and implementing educational materials related to multiple uses of chemicals since the 2005 Joint IUPAC/OPCW Oxford workshop.*

*Peter Mahaffy is Professor of Chemistry at the King's University College Edmonton, Canada, Co-director of the King's Centre for Visualization in Science, and Past-Chair of IUPAC's Committee on Chemistry Education.*

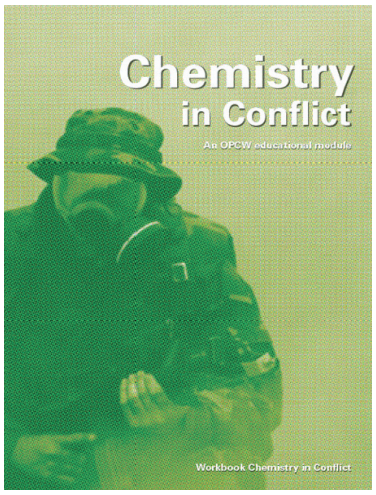
*Alastair Hay is Professor of Environmental Toxicology at the University of Leeds, England. He has worked on chemical weapons issues for more than 35 years and conducted six investigations of real and alleged chemical weapon use.*

# Chemistry in conflict: Spreading the word to high school students

By Ludo Juurlink

**Only recently has the OPCW acquired world-wide fame. Before being awarded the Nobel Peace Prize in October 2013 its name, its mandate, and the location of its headquarters were unknown to most people. Even chemistry teachers and students in the vicinity of The Hague knew very little about the OPCW. Now, with the production of a high school module on the OPCW, there are new ways to keep awareness high, even when the public's memory of the Nobel Peace Prize has faded.**

One of the activities proposed by the OPCW Temporary Working Group on education and outreach was the production of educational materials for high school students and teachers. For practical reasons, practitioners such as teachers, lecturers and chemists, should be the ones to develop these materials. Furthermore, it was proposed that a pilot project would be undertaken with a group of Dutch educators.




**Front Cover of the first draft of the Chemistry in Conflict workbook.**

The project was a collaborative venture between the municipality of The Hague, Leiden University, and the OPCW. Chemistry teachers from the Johan de Witt college, the Vrijzinnig-Christelijk Lyceum (VCL) and the International School of The Hague proved to be interested and were therefore engaged to help write an educational module for upper level high school students. In order to reach a wide audience the module was written in English, and the International Baccalaureate Global Office in The Hague was also approached to participate.

Funded by the UK Foreign and Commonwealth Office, the City Council of The Hague and Leiden University, a team of five writers was formed, headed by Dr. Ludo Juurlink, director of Leiden University's Junior Science Lab. They decided to write a student workbook based on three topics: chemical weapons, the Chemical Weapons Convention (CWC), and ethics in science.

The first topic was chosen because teachers would probably require a direct link to their chemistry curricula if they were to even consider incorporating an extracurricular project into their already busy schedules. The first chapter therefore not only focuses on topics such as a definition of chemical weapons, dual use chemicals, and widely known chemical weapons, but also discusses topics such as synthesis and GC-MS detection, and physiological effects explained in terms of proteins and DNA. Chapter One provides content for three chemical topics that can be treated separately.

Chapter Two introduces the CWC and OPCW, mostly through self and group study. The film "A Teacher's Mission", produced recently by the OPCW Media and Public Affairs Branch (see the article by Chretien Schouteten in this issue of OPCW Today), is used to trigger students' interest in the historical background of chemical weapons. This is followed by an individual assignment to write an article on the CWC for a popular science journal. The third activity is a class debate on Xanadu, a country considering ratifying the Convention following the recent use of chemical weapons in a local armed conflict. Students present the positions of various stakeholders, e.g. members of Xanadu's armed forces, chemistry students, owners of a chemical company, concerned civilians, OPCW delegates, and victims of chemical weapons.

Chapter Three introduces ethical considerations in science and technology in general, and with regard to chemical weapons in particular. The first topic uses a historical perspective and invites students to consider uses of chemical weapons since the First World War. This is followed by an introduction to three normative ethical systems, and their application to the use of chemical weapons.

Finally, students apply their knowledge to a case study. As the workbook will initially be tested in the Netherlands, the current case study focuses on the supply of monoethylene glycol (MEG) to Syria by a Dutch company. Students use internet sources and media articles to prepare for a classroom debate. This particular topic could easily be changed to something more relevant to another country.

To enable teachers to incorporate experiments into the project, Chapter Four offers suggestions for laboratory experiments. As available laboratory equipment and funds vary across high schools, simple experiments and chemicals were used. The chapter therefore starts with background information on the physical and chemical

background of activated carbon, a cheap material used to filter chemicals from gaseous and liquid streams.

Three separate experiments are described; in these students test the actual activated carbon used in gas masks for quality, again relying on prior chemical knowledge and skills, such as acid-base and redox titrations. Finally, two additional suggestions are provided for students interested in basing their final year research project on this material. Breakthrough – the point where chemicals make it through the filter – was chosen as the problem to study.

As the amount of time that teachers can spend on this project will vary, the workbook and materials have been designed in a modular fashion. Teachers are recommended to spend at least three lessons covering the first topic of each of the first three chapters. However, the module will take approximately 12 lessons if the entire workbook is used.

**Chemistry students at the Vrijzinnig Christelijk Lyceum in The Hague, conducting one of the experiments included in the workbook.**

Two out of the three schools which participated in the production of the workbook, will test it in the next few months. To this end, a teacher's manual and lesson guides are currently being written. Two other schools that were not involved in the writing will also test these materials.

Feedback from these schools will be incorporated into the final version of the first edition, which is expected to be freely available to schools around the world in May 2014.

From then on it should be much easier to spread the word about the OPCW, to keep a new generation informed on the need for continued compliance with the CWC, and to implement ethical considerations in chemistry in high schools around the globe. The third activity is a class debate on Xanadu, a country considering ratifying the Convention following the recent use of chemical weapons in a local armed conflict. Students present the positions of various stakeholders, e.g. members of Xanadu's armed forces, chemistry students, owners of a chemical company, concerned civilians, OPCW delegates, and victims of chemical weapons.

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# Projects in Education and Outreach Relevant to the CWC: A Pilot Activity in Argentina

By Alejandra Suarez and Rolando Spanevello

**Education and outreach are long term strategic tools for the implementation of the Chemical Weapons Convention (CWC) and the peaceful use of chemistry. They are also considered key elements in preventing the re-emergence of chemical weapons.**

Considering the limited exposure that chemists have to ethical norms and the aims of the CWC during their careers, this approach is particularly important for the chemical community. On the other hand, the new developments in science and technology that are paving the way for a multitude of opportunities beneficial to humankind could also open the door to unforeseen challenges and abuses. For this reason, awareness-raising about the multiple uses of chemical substances and the dual use nature of scientific knowledge is an urgent need in the field of chemical education.


**From left-to-right: Alistar Hay, Stefan Mogl, Alejandra Suarez, Djafer Benachour for the TWG on Education and Outreach and Daniel Feakes from the Technical Secretariat.**

In order to contribute towards this endeavour a pilot works entitled "Chemistry for peace: ethics and professional responsibility in education" was held in Rosario, Argentina, on 27 and 28 June 2013. The participants in the workshop were academics, scientists, and representatives of professional and scientific associations, from all over the country. The objectives of the workshop were to provide an opportunity to exchange experiences, and to develop proposals for chemical education related to emphasising the potential risks posed by the multiple uses of chemicals, and the dual use nature of scientific knowledge. In this way, the workshop could contribute to the prevention of the misuse of toxic chemicals; facilitate chemical safety and chemical security; build skills and capabilities in areas related to the peaceful uses of chemistry; raise awareness of the CWC among the broad community of relevant professionals who should be aware of it; and build networks in chemical education.

The speakers were Professor Alastair Hay, Mr Stefan Mogl and Professor Djafer Benachour from the OPCW's Temporary Working Group on Education and Outreach; Mr Daniel Feakes from the OPCW Technical Secretariat; Professor Rolando A. Spanevello, former member of the OPCW Scientific Advisory Board and Minister Jaime Beserman from the National Authority of Argentina.

The workshop included two round tables: one on institutional policies, and one on sstrategies in chemical education. The first was devoted to discussing programmes carried out in education, science, and technology, while the second addressed new challenges in approaching the issues of ethics and professional responsibility, and the CWC. The round table panels were made up of representatives of the Ministry of Education, the Ministry of Science and Technology, the National Research Council, Professional and Scientific Associations, and the Forum of Deans from Schools related to chemistry.

The participants engaged in very profitable discussions on general topics such as:

- How can undergraduate and graduate education programmes address the ethical and practical aspects of preventing the misuse of chemistry?
- How can we encourage universities to reflect the issues of the CWC in their curricula?
- What information should be provided?
- What are the strategies for implementation?
- What teaching material can be made available to professors?

As a practical example, an interactive exercise, involving a broad spectrum of students, took place during the last session of the workshop, under the guidance of Professor Alastair Hay. In this exercise the students were confronted with different ethical dilemmas. As the result of this experience, the students became highly motivated and proposed that activities to prevent the misuse of chemistry should be considered throughout the course of their careers.

Workshop participants also watched the OPCW film "Fires: A Teacher's Mission" (see the article by Chrétien Schouteten in this issue of OPCW Today), which was considered a very useful means of promoting the mission of the OPCW to both students and the general public.

In summarising the outcome of the workshop, we can mention that the participants enjoyed the meeting, finding it to be very dynamic as a wide range of opinions was expressed. It was clear that the topics had generated plenty of discussion, and what is also important is that, in many cases, the participants were exposed to a new approach to chemical education.

The main conclusion from the workshop was that there was a complete general consensus on the urgent need to address the subject of professional ethics and responsibility at different levels during the careers of the future professionals. and it was proposed that each institution develop actions in order to include both them and the issues relevant to the CWC in the chemical curricula.

The participants identified the following goals:

- the implementation of “train-the-trainer” courses;
- the development of educational tools and materials for chemistry teachers; and
- the promotion of active collaboration through the recently organised network of education in chemistry.

It is important to emphasise the key role that the National Authority of each country can play in education and outreach. The workshop in Rosario reflected the joint efforts made by the National Authority and the academic community in Argentina to develop activities towards the implementation of the CWC, and to prevent the re-emergence of chemical weapons.

We are very grateful to the OPCW for facilitating the participation of international experts and to the European Union for providing the necessary financial support.

*Alejandra G. Suárez is Professor of Organic Chemistry at the Universidad Nacional de Rosario and researcher of the Consejo Nacional de Investigaciones Científicas y Técnicas, Argentina. Since 2009 she has been a member of the OPCW Scientific Advisory Board, and its Chairperson since June 2013. Her main research interest focuses on the sustainable production of materials from biomass for their application in asymmetric organic synthesis.*

*Rolando A. Spanevello is Professor of Organic Chemistry at Universidad Nacional de Rosario, Argentina. He has been visiting scholar at the University of Michigan and Universidad Complutense. From 2003 to 2009 he served as a member of the OPCW Scientific Advisory Board. In 2013 he was elected President of the Argentine Research Society on Organic Chemistry. His research encompasses the interest in green chemistry, natural products synthesis and development of new materials.*

# Celebration of the 40th Anniversary of the Finnish Research Project on the Verification of Chemical Disarmament

By Vesa Häkkinen

**The Finnish Institute for Verification of the Chemical Weapons Convention (VERIFIN) celebrated its 40th anniversary on 4 October 2013. VERIFIN's forerunner, the Finnish Research Project on the Verification of Chemical Disarmament (CW project), was established in 1973. VERIFIN itself was established in 1994 as an independent institute at the University of Helsinki.**

The initiative for the CW project came from Jorma K. Miettinen, a highly regarded expert in disarmament. The goal of the project was to produce and publish scientific data on chemical warfare agent-related chemicals to support the Geneva negotiations aiming for a universal Chemical Weapons Convention (CWC). Finland's mission in these negotiations was, with the help of the CW project, to create efficient verification measures for the convention.


**H.E. Director General Ahmet Üzümcü at the 40th anniversary celebration of VERIFIN at the Ministry for Foreign Affairs, together with (from the left) Chancellor Thomas Willhelmsson, Under-Secretary of State Jaakko Laajava, Minister for Foreign Affairs Erkki Tuomioja and Director Paula Vanninen. Photo: Eero Kuosmanen, Ministry for Foreign Affairs**

The celebration started with a scientific seminar at the Chemicum, University of Helsinki. VERIFIN has been part of the Department of Chemistry since the beginning of 2010. VERIFIN's director, Professor Paula Vanninen, opened the seminar by welcoming the audience. This was followed by expressions of congratulations by Professor Markku Räsänen, the director of the Department of Chemistry, and Professor Marja-Liisa Riekkola, the Vice-Dean of the Faculty of Science. The first speaker was international disarmament consultant Dr Ralf Trapp, a respected expert on chemical weapons disarmament who had a long career at the OPCW. Dr Trapp gave an interesting overview of how the threat of chemical warfare has changed over the last 40 years.

The presentation highlighted the process of negotiations which resulted in the CWC and its achievements. Dr Trapp ended his presentation by describing the dramatic use of chemical weapons in Syria and the repercussions, including the international agreement to destroy these weapons by the end of June 2014. Dr Trapp firmly believes that the weapons can be destroyed as planned and that the OPCW will be able to accomplish this difficult mission.

Dr Maciej Sliwakowski explained the differences between chemical warfare investigations as undertaken by the OPCW and by the United Nations Monitoring, Verification and Inspection Commission (UNMOVIC).

Dr Sliwakowski described the UNMOVIC mission in Iraq, where the tasks varied from sample collection to field analysis and chemical weapons destruction, which made planning the necessary actions difficult. Much improvisation was required to solve unexpected problems.

The varied background and short training of the UNMOVIC inspectors also caused problems in unforeseen situations. The OPCW inspectors are well trained and used to working in teams. OPCW inspections follow well defined procedures which help to fulfill the inspection tasks.

Dr Robert Read from dstl, UK, gave an overview of biomedical sample analysis in cases of alleged use of chemical weapons. Dr Hugh Gregg from the OPCW Laboratory briefed the audience on OPCW's preparedness to collect environmental and biomedical samples in Syria.

Dr Gregg said that although the OPCW is well prepared for environmental sampling, prior to 2013 preparedness for collecting biomedical samples was poor. Because of the events in Syria improvements have been made and currently the OPCW is also well prepared to collect biomedical samples, as was demonstrated in Syria.

Dr Robin Black, a former member of the OPCW Scientific Advisory Board , gave an overview of the impact of the latest scientific developments in chemistry and technology on the CWC. Ms Kansikas-Debraise illustrated the export control mechanisms of dual use goods carried out by the Ministry for Foreign Affairs. Mr Söderström gave an overview of challenges in the analysis of chemical warfare agents – what has been done in the past and what is planned for the future.

The scientific session ended with a round-table session, and it was not surprising that most of the discussion was on the events in Syria.

The afternoon session, held at the Ministry for Foreign Affairs of Finland, focused on general issues relating to disarmament. Opening remarks were made by Secretary of State Pertti Torstila from the Ministry for Foreign Affairs. H.E. Ahmet Üzümcü Director General of the OPCW, gave the keynote speech on verification in disarmament. H.E. Üzümcü emphasized the important role of Finland and VERIFIN in establishing reliable verification methods to support the CWC, and congratulated the institute on its 40th anniversary.

The Minister for Foreign Affairs of Finland, Erkki Tuomioja, highlighted Finnish disarmament policy and its goals. In his speech Minister Tuomioja mentioned the valuable work of VERIFIN in analysing the samples from Syria, and offered the assistance and support of Finland in the destruction of chemical weapons in Syria.

Emeritus Professor Erkki Rahkamaa shared his memories of the early days of the CW project. It was amazing to see how many scientists had voluntarily contributed to making the project a real success. The Director of VERIFIN, Professor Paula Vanninen presented VERFIN's current activities. The afternoon session was closed by the Chancellor of the University of Helsinki, Thomas Wilhelmsson, who congratulated VERIFIN on its valuable 40 years of work for Finland and for the University.

The celebration of the 40th anniversary of VERIFIN ended with a reception hosted by the Ministry for Foreign Affairs of Finland.

*Vesa Häkkinen graduated from the University of Helsinki in 1986 (Analytical Chemistry) and joined VERIFIN in 1989 as a research scientist. HIs current duties consist of providing training on several annual training courses in Finland and abroad (research scientist and instructor of training laboratory 2004 – 2008 and from 2008 Laboratory manager of training laboratory) and duties of National Authority in national implementation of the CWC.*

# On Disarmament and Non-Proliferation Education

By Onur Güven

**Since 2010, the OPCW and the T.M.C. Asser Instituut (Asser Institute) have organised an annual Summer Programme on 'Disarmament and Non-Proliferation of Weapons of Mass Destruction' (led by Michael Luhan from the OPCW and Tanya Mehra from the Asser Institute), taking place in early September. What began as a summer programme attracting mainly students, has gradually grown into an advanced programme attracting students and young professionals alike, from a wide range of countries. This diversity enhances the Summer Programme as it reflects the complex nature of the topic and its global orientation.**

Throughout the years, the programme has incorporated an expanding set of tools, in addition to lectures, to enrich the participants' experience and to increase the dissemination of knowledge. These tools include field visits (a tour at and around the TNO laboratory, with a live exercise by the OPCW involving an investigation of alleged use of chemical weapons; a demonstration of OPCW industrial inspection equipment in Rijswijk; a tour of a chemical plant site in Rotterdam that is the subject of inspections; and a visit to the TU Delft nuclear research reactor); access to an online information platform (providing the presentations and articles by the speakers, a reader containing introductory material and a collection of the various treaties, agreements, and instruments); an introductory multiple choice quiz to provide food for thought on the various topics; and discussion panels to provide opportunity for discourse on various matters.


**OPCW Director-General Ahmet Üzümcü addresses participants in the summer programme**

Besides the opening and closing receptions, the programme also includes two other social events: a dinner, which offers an opportunity for the participants to get acquainted with each other and the programme organisers; and a brown bag lunch, where participants have the chance to hear from one of the speakers about how to pursue a career in the world of WMD disarmament and non-proliferation, and to reflect on the speaker's personal experiences.

The Summer Programme usually kicks off on a Sunday with a welcoming reception, after which the intensive programme starts on Monday morning and lasts until Friday afternoon, when the programme concludes with a closing reception and the awarding of the certificates.

This year's Fourth Summer Programme was attended by twenty-six participants from various parts of Europe, Asia, Africa, and North America. The majority of these participants were young professionals working for various stakeholder organisations such as governments, international organisations, research centres, industry, and NGOs. Moreover, during the Third and Fourth Summer Programmes, participants in the UN Programme of Fellowship on Disarmament joined the programme for one day during their visit to The Hague.

The programme's curriculum consists mainly of lectures on matters covering policy, law, science and technology, and the organisation of WMD disarmament and non-proliferation. This approach not only reflects the interdisciplinary nature of the field, but also provides an opportunity for professionals to get acquainted with dilemmas and instruments outside the scope of their professional expertise/ academic discipline.

The lectures are given by diplomats, consultants, and researchers from various organisations (OPCW, BWC ISU, IAEA and CTBTO Preparatory Commission, universities and NGOs).

This year's programme started on Monday with introductory topics, including the historic uses and impact of WMDs, the law of collective security, the role of the EU in WMD disarmament and non-proliferation, and a condensed introduction to the dual-use nature of chemistry, biology, and nuclear physics.

On Tuesday, the programme dived into the field of nuclear weapons and disarmament, addressing the legal frameworks of the NPT and CTBT, the organisational frameworks of the IAEA and the CTBTO Preparatory Commission, compliance and verification instruments

related to nuclear programmes and explosive testing, the importance of the Fissile Material (Cut-off) Treaty, the various multilateral export control regimes, and issues concerning nuclear security.

On Wednesday, the programme focussed on the disarmament and non-proliferation of chemical and biological weapons, addressing the history and achievements of the OPCW and the BWC ISU; CWC and BWC compliance and verification instruments; national implementation under the CWC; and the challenges facing the OPCW and the BWC ISU.

On Thursday, the programme included the various field visits mentioned above, and concluded with a presentation on the prospects for the Nuclear Security Summit to be held in The Hague in 2014.

On Friday, the programme concluded with lectures on the UN investigative mechanism, and the impact of WMD programmes. These were followed by discussion panels on, among other subjects, nuclear safety and security, chemical safety and security, and engaging academia and civil society in WMD disarmament and non-proliferation. Throughout these four years the programme has grown to become a prominent event in the field of education and outreach on disarmament and non-proliferation.

*Mr Onur Güven <o.guven@asser.nl> is a researcher on arms control, disarmament and non-proliferation law at the Asser Institute. This writing reflects his personal experience as a participant in the First Summer Programme, and through his assistance in the Third and Fourth Summer Programmes.*

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# Chemistry and Ethics in Secondary Education: 25 years of experience with classroom teaching on chemical weapons

By Chrétien Schouteten

**Why the choice of this project? As a teacher I wanted to make a contribution to the moral education of my students. So, as a teacher of chemistry, I seized the opportunity to devote a couple of lessons to the social responsibility of chemists and the ethical dilemmas with which they are confronted. By choosing the theme of 'chemical weapons' I wanted to stimulate thinking about social responsibility among my students, and thus to encourage them in their personal development.**


I decided to organise the project for students over sixteen, so for late adolescents and young adults. Younger students are often too focussed on themselves and on their peer groups.

I started cautiously (in 1980), with only one lesson about the basic chemistry of a few types of chemical weapons and a few historical facts. Inspired by the unexpected enthusiasm of the students, I gradually extended the number of my lessons, eventually to about 12 lessons. With the help of colleagues from different disciplines (chemistry, biology, history, law, ethics, literature, arts, and music) I approached the theme from various angles. In the final lessons I invited my pupils to express their thoughts and feelings in a creative way, for example by means of a poem, a picture, or a photo.

**My experiences**

In order to involve pupils actively, the lessons had to be interactive and varied from the beginning. For this reason, I started by inviting the students (in groups of 3 or 4) to brainstorm about the subject in order to raise their own (initial) questions. These questions did not necessarily have to address chemical aspects of the theme.

This theme cannot be viewed from a single angle. Students need to examine the ethical dilemmas of chemists, historical backgrounds, international politics, and so on. My students could study educational handouts I had compiled, sometimes with the help of colleagues from other disciplines, such as literature, arts, and music. Their help played an important part in expressing 'the (in)human factor' in this theme. I conclude that the multi-disciplinary approach helped to:

- Raise many questions about chemistry and ethics;
- stimulate critical thinking;
- show students the need for careful discussion and cooperation;
- broaden and deepen their general knowledge and abilities;
- demonstrate the complexity of the ethical dilemmas with which chemists are confronted; and
- enable students to express their feelings and thoughts in a creative manner.

Whether the moral values of the students were actually raised by this project remains of course a matter of conjecture. But I hope and trust that the lessons helped to do so.

*Chrétien Schouteten worked as a chemistry teacher in the Netherlands from 1976 to 2009. He developed a range of educational material on the subject of chemistry and ethics, and shared his experiences in publications and workshops. In 2010, he wrote a moving play entitled "The Chemist", about the tragic life of Fritz Haber and his family. In 2012, Eric Vander Borght (OPCW Media & Public Affairs Branch) produced the film "Fires, Episode 1: A Teacher's Mission" about Schouteten's work.*

*Schouteten has also written a lesson plan and student handout to accompany the film when used in the classroom. The film is available at www.thefiresproject.com and the lesson plan will also be available soon at the same address. With financial support from the United Kingdom, the film (originally in English) has been subtitled into the other official OPCW languages (Arabic, Chinese, French, Russian and Spanish).*

## Suggestions for Lessons

### Chemistry

Topics:

- Definition and types of chemical weapons. The differences with biological weapons.
- Short introduction to toxicology (i.e. MAC, LD50, LCt50, structure and properties).
- Dual use of substances.
- Synthesis, analysis, protection, treatment, and destruction of chemical weapons.
- The life of Fritz Haber (1868-1934). This famous German chemist invented the synthesis of ammonia (Nobel Prize for Chemistry, 1918). He was also the 'father' of German chemical warfare during the First World War (1914-1918). Was he a benefactor of mankind as well as a war criminal?

Guest lecture by a police officer and a demonstration of the use of CS gas.

### Biology

Let the student read and analyse an article from a magazine for physicians on The Working and Effects of Nerve Gases, Preventive Health Measures and the Treatment of Casualties.

### History and Law

Topics:

- The use of chemical weapons in the past.
- Halabja (1988), Tokyo (1995) and Syria (2013).
- The development of international laws.
- The Chemical Weapons Convention (CWC) and the Organisation for the Prohibition of Chemical Weapons (OPCW).

Classroom role-play about an imaginary country considering the production of chemical weapons.

### Ethics

Topics:

- The scientific freedom of chemists: What can be studied? What can be published?
- The responsibility of chemists for the application of their inventions.
- Ethical dilemmas of chemists (in times of war, terrorist threats etc.).
- Under what conditions is it acceptable for chemists to work for military purposes?
- The social responsibility of chemists.
- Chemistry for peace.
- Do chemists need a moral code?

### Literature and Arts

Classroom discussion, drama, role-playing, creative writing etc in response to:

- Poems on the atrocities of the First World War (for instance, Dulce et Decorum Est and Anthem for Doomed Youth, the famous poems by Wilfred Owen, or Counter Attack and Other Poems by Siegfried Sassoon. Useful anthologies of war poems are: The Penguin Book of First World War Poetry (1996), Minds at War. Poetry and Experience of the First World War (ed. David Roberts; Saxon Books, 1996), and the most recent one, We Are The Dead. Poems and Paintings from the Great War 1914 – 1918. (Red Horse Press 2012).
- The novel All Quiet on the Western Front (Im Westen nichts Neues) by Erich Maria Remarque
- The novel Under Fire (Le Feu) by Henri Barbusse.
- A selection of political cartoons from the First World War.
- Fifty-one etchings called The War (Der Krieg), including Storm Troopers Advancing Under Gas (Sturmtruppen rücken im Gas vor), by Otto Dix. The cycle of prints was modelled after Goya's famous The Disasters of War.
- The painting Gassed by John Singer Sargent.
- The drawings of Christ with Gas Mask (Christus mit der Gasmaske) by Georg Grosz.

# An Example from Pakistan: SASSI University

By Maria Sultan

**The South Asian Strategic Stability Institute (SASSI) University is a degree-awarding institution dedicated to promoting peace and stability in South Asia. Its work is focused on strategic stability in the South Asian region, and thus on the emergent nuclear relationship which is at the heart of that stability.**

The Institute takes a multi-disciplinary approach aimed at bringing together various streams of thought from across the social and natural sciences, policy-makers as well as the academia. It aims to make a leading contribution to regional and international academic and policy-orientated research discourses about the South Asian security.

The primary thrust of the work carried out by the Institute revolves around the nuclear questions and debates relating to non-proliferation and disarmament, with a particular focus on finding ways and means to enhance capacity building within and outside the region.

However, the Institute's remit goes beyond nuclear stability to include the wider issues of chemical and biological weapons, conventional force balance, civil-military relations, social and political stability, religious extremism, and the disputed territory of Kashmir, which inform the nature of security and stability in the South Asian security complex, and thus impact on the nuclear relationship. In addition, the Institute hopes to expand its research on issues such as energy politics in the South and South West Asian region.

SASSI has been granted the status of a degree-awarding university pursuant to Act No. VI of 2013, approved by the National Assembly of Pakistan on 13 March 2013. The aim, purpose and objectives of the university are to promote and disseminate knowledge, training, research and development in the fields of social science, natural sciences and emerging technologies. With this aim, the SASSI University plans to launch its premier programmes, as follows:

- Bs in International Security
- Bs and Ms in Peace and Conflict Studies
- Bsc and Msc in Aviation Sciences
- Bsc and Msc in Mineral Sciences
- Bs and Ms in Media Studies
- Bs and Ms in Counter-terrorism and Intelligence Studies.
- Bsc and MSc in Nuclear Power Policy
- Training modules and certificate courses in Arms Control And Disarmament
    - Chemical Weapons Convention (CWC)
    - Comprehensive Test-Ban-Treaty (CTBT)

The programmes are developed with the aim to equip the country's youth with techniques and skill sets of international standards, and the knowledge base necessary for the future leaders and as a vanguard of Pakistan's advancement within the international community as a 21st-century state.

The programmes will also include multiple courses and independent training modules and certificate courses in arms control and disarmament. These programs will include training courses on the Chemical Weapons Convention

(CWC), which aim to inform, advocate and educate the participants on CWC implementation and related issues. It will lead to the effective implementation of the CWC and serve as a stabilizing factor for peace.

The SASSI University aims to organize a two-week intensive course on the Comprehensive Test-Ban-Treaty (CTBT) to be held in Islamabad (Pakistan). The central theme behind this endeavour is to increase the awareness and stimulate understanding of the Treaty in order to promote its entry into force and universalization.

The Peace and Conflict Studies programme aims to familiarize students with the manner in which peace and conflict-resolution skills are developed for local, national and international crisis situations. It aims to develop among the students the ability to apply an inter-disciplinary approach to the study of state-related problems and suggest viable solutions for crisis management.

The SASSI University's Nuclear Power Policy degree programme is a cross-disciplinary approach designed to educate and train students so that they can contribute as nuclear power policy experts and professionals in the field of nuclear technology for peaceful purposes. The ultimate goal of the programme is to promote policy-making to develop governmental infrastructure, nuclear regulators to conduct regulatory activities, and policy experts to deal with nuclear power policy matters.

In addition, other faculties are also being developed which include Bsc and Msc degrees in Aviation Sciences, Bsc and Msc degrees in Mineral Sciences, Bsc and Msc degrees in Media Studies, Bsc and MSc degrees in Counter-terrorism and Intelligence Studies.

## New Publications

**International Chemical Review**

The International Chemical Review (ICWR) is due to be published to highlight the success, the challenges and the emerging context for the CWC and its effectiveness as a stabilizer of international peace. The ICWR aims to inform civil society, policy experts and academia about the CWC, focusing on areas related to the CWC, which would directly support the Convention's objectives and will help in CWC implementation and achievement of universality.

The edition will also review the risk posed by various microorganisms, as biological weapons need to be evaluated, the historical development and use of biological agents, and the role of the Biological and Toxin Weapons Convention in eliminating such weapons.

The primary focus will be to increase awareness in technical experts, the media, and international organizations about the achievements by Pakistani scientists and engineers in the nuclear industry during the last five decades, and about open markets for new trade and investments by mainstreaming the benefits of CWC.

**Pique International Defense Review**

SASSI University in collaboration with Pique has launched the first volume of "Pique International Defense Review" in November 2013. The magazine aims to enhance awareness among the general population regarding Pakistan's defence capabilities, and military strength and constraints in the security complex. The publication is a compilation of articles written by prominent defence scholars and experts. The magazine focuses on regional and international events. In addition SASSI University has regular publications such as SASSI Research Reports, Research Papers, Policy Briefs and Technical Briefs.

# Facilitating and supporting synergy and collaboration between international organisations

By Elena Sokova and Daniel Feakes

**In recent years, several international organisations working on disarmament and non-proliferation issues have undertaken significant education and outreach activities. Some of these are described in the subsequent articles in this section. Last month, for the first time, more than two dozen relevant international organisations and other key stakeholders gathered together in order to capture the experiences and lessons learned.**

The International Workshop on Disarmament and Non-Proliferation Education and Capacity Development was held in Vienna on 14 and 15 November 2013 at the Vienna Center for Disarmament and Non-Proliferation (VCDNP). The event was co-organized by the VCDNP and the OPCW, with the support of and in partnership with the Foreign and Commonwealth Office of the United Kingdom, the Federal Ministry for European and International Affairs of Austria, the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), the Permanent Mission of Norway to the International Organizations in Vienna, and the Carnegie Corporation of New York.

The workshop in Vienna brought together practitioners in the field of disarmament and non-proliferation education, particularly from international organizations, as well as experts from selected leading academic centres and professional networks. This broad range of professionals shared experiences and best practices—particularly with regard to specific tools and methods—and explored potential collaboration and synergies between international organizations and other key stakeholders in the areas of disarmament and non-proliferation education and training, awareness-raising, and outreach.

In his keynote speech, Dr. Lassina Zerbo, Executive Secretary of the CTBTO, emphasized the universal importance of disarmament and non-proliferation, arguing that all members of the global community must be engaged in such initiatives. Dr. Zerbo asserted that disarmament and non-proliferation education issues should be taught as part of the global framework, not independent of it, and that international organizations, non-governmental organizations (NGOs), and academia must work together through integrated and synergistic training and capacity building.

Opening remarks were also given by Mr. Attila Zimonyi, Director of Strategy and Policy at the OPCW and by Mr. Cornel Feruta, Chief Coordinator in the International Atomic Energy Agency Director General's Office for Coordination. Participating organizations and experts then provided brief overviews of the relevant work being done by their respective organizations. The workshop also featured several panels, providing more in-depth information about the work of the participating organizations as well as detailed information on specific tools, methods and practices. Active discussions followed the panels, including information on organization's programmes, how the programmes are implemented, and rationales for selecting methods or tools.

**Key issues**

Participants underlined that disarmament and non-proliferation education and training efforts should be tailored to different types of audiences (such as for age, profession, educational background, country and region), as well as different levels of technical expertise, generations and learning preferences, and even technical capabilities.

The audiences of the educational programmes presented at the workshop varied widely, including primary and high school students and teachers, university undergraduate and graduate students and faculty, professionals, trainers, scientists, journalists, lawmakers, and diplomats.

The importance of framing the issues of disarmament and non-proliferation to maximize interest and acceptance was discussed, including suggestions of framing them as either a component of human or environmental security, or of responsible conduct of science. By framing the issue as one of responsible conduct of science, education and training could reach broader audiences of scientists, as well as be included earlier in a student's curriculum.

Many participants asserted that education on responsible conduct of science should be taught in every university science course, to ensure that scientists understand the potential dual-use nature of their work.

It was also noted that many artificial barriers exist regarding disarmament and non-proliferation education between the main chemical, biological, and nuclear regimes.

Currently there are few educational resources developed or available for educators and trainers to holistically cover

all disarmament and non-proliferation issues. Participants specifically spoke of the challenge to overcome the invisible "silos" that exist, separating chemical-, biological-, and nuclear-focused organizations, including international organizations.

Identifying a set of core competencies or functional competencies common to these three areas could be a first step. Participants commended the important role of partnerships between national and international scientific organizations, national academies of sciences, and international organizations, particularly in chemical and biological weapons disarmament and non-proliferation education. Examples include the OPCW's partnership with the International Union of Pure and Applied Chemistry (IUPAC), and the relationship of the Biological Weapons Convention and the Biosecurity Working Group of The Global Network of Science Academies (IAP).

Programme and message sustainability pose challenges. Many of the attendees expressed concern that educational initiatives, to be truly successful, must be continuing in order to have a long-term impact. Both the need to pursue engagement with former course participants, and the need to institutionalize programmes were discussed, including better use of the train-the-trainer approach, as well as networking opportunities among and between existing student/faculty networks. Participants pointed to the success in creating sustained education through the Model United Nations format as an example that could be followed.

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. These include online delivery of content and courses, active learning techniques, immersive training, and simulations. Many participants were eager to learn more about the tools and methods already employed by other disarmament and non-proliferation education programmes, with the hope that increased sharing in such tools would preclude the need to "reinvent the wheel".

**Workshop recommendations**

In response to the many challenges and solutions discussed, participants made numerous recommendations for next steps to improve disarmament and non-proliferation education and training in the following three domains:

- Improvement and increase of contacts and communication among relevant organizations, including international organizations, non-governmental organizations, and academia;
- Increased project cooperation to maximize efficiencies, decrease duplication of efforts, and avoid gaps;
- Raising the profile of disarmament and non-proliferation education.

For additional information and a full report of the workshop, readers can visit http://www.vcdnp.org/131125_np_education_workshop_report.htm.

*Ms. Sokova is the Executive Director of the Vienna Center for Disarmament and Non-Proliferation. Prior to coming to Vienna, she was the Assistant Director of the James Martin Center for Nonproliferation Studies (CNS) at the Monterey Institute of International Studies. Her primary research interests are focused on international non-proliferation and nuclear security mechanisms, nuclear materials management, nuclear fuel cycle, trafficking in nuclear and radioactive materials, international nuclear safeguards, and non-proliferation education and training. She has published in the Bulletin of Atomic Scientists, the Nonproliferation Review, the International Herald Tribune and other periodicals.*

## 2002 United Nations Study on Disarmament and Non-Proliferation Education

Education and training are fundamental to continuing global progress on disarmament and non-proliferation, as pointed out in the United Nations Study on Disarmament and Non-Proliferation Education (A/57/124). According to this study, "[t]he 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."

Although progress has been made in the implementation of the 34 recommendations to "promote education and training in disarmament and non-proliferation at all levels of formal and informal education" contained in the 2002 United Nations study, workshop participants pointed out that several recommendations have not been implemented at all, while many have considerable room for further progress. All recommendations of the study continue to remain relevant. More information, resources and teaching materials can be found at www.un.org/disarmament/education.

# Outreach Through Education for the Entry Into Force of the Comprehensive Nuclear-Test-Ban Treaty

By Jean du Preez

**"I know that I know nothing". One of the most famous quotations of Socrates recognises the importance of knowledge, education, and self-awareness. Wisdom is being conscious of what the mind can achieve, and accepting doubts as a challenge, rather than a limitation.**

Countering the current threats to the international security environment must be seen as a challenge to be met, rather than as a limitation of humankind's ability to act. In meeting these challenges, education is the best tool that the international community has available to spread the principles of peace and prosperity. Therefore, outreach through education can contribute to a broader consensus around the Comprehensive Nuclear-Test-Ban Treaty (CTBT), and promote its entry into force and universality. Enhancing understanding of the Treaty's underlying value, its contribution to international peace and security, and the civil and scientific benefits of its verification regime, stimulates progress towards its entry into force and universalisation.


**Participants in the 2013 CTBT Diplomacy and Public Policy Course simulating a CTBTO Executive Council deliberation on an on-site inspection request**

### A technical treaty with a political purpose

The CTBT prohibits nuclear tests by anyone anywhere, and is underpinned by a science-based verification regime. The Treaty's International Monitoring System and International Data Centre collect and analyse data that is distributed to all 183 States Signatories in a truly democratic and non-discriminatory way. With the CTBT, all States can verify the absence of nuclear testing. Yet, 17 years after its opening for signature, the Treaty has not entered into force.

The Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organization promotes the remaining ratifications, in particular by the eight Annex II States that need to join the Treaty in order for it to become international law. In this context, education and training are essential tools. Over the years, the Preparatory Commission has used both "deep" and "broad" training to instruct thousands of individuals, thereby developing capacity in all aspects of the Treaty and its verification system. The deep training approach, also referred to as capacity building, consists of focused and intensive technical training for individuals from States Signatories, working directly with the assets and infrastructure that comprise the Treaty's verification system. Broad education and outreach, launched in 2010 in the context of the Capacity Development Initiative (CDI), engage a wider spectrum of stakeholders, including diplomats, academia, think tanks, journalists, and other members of civil society, on the legal, political and technical underpinnings of the Treaty and its multilaterally established verification system.

### New educational techniques

Multidisciplinary courses and immersive teaching methods are the key characteristics of the Commission's educational activities. The Commission has organised tailor-made courses, calling on in-house expertise, as well as internationally-renowned guest lecturers and panellists. Pursuing a multi-track approach, the Commission has offered CTBT policy and science courses, as well as training for UN Disarmament Fellows, enrolling almost 2,500 participants and issuing almost 1,000 certificates of successful completion since 2010.

All lecture courses are supported by a comprehensive e-learning platform, which hosts open online modules, live-streaming, video archives, quizzes, discussion forums, a peer-assessed assignment mechanism, and additional resources. The platform serves as a one stop shop for all CTBT-related information, and establishes a network of current and future CTBT experts. For more information see www.ctbto.org/specials/ctbto-education-resources.

In an effort to reach out to a larger audience, participants can take part in the courses virtually, through the e-learning platform, without having to travel to Vienna. By using distance and blended learning methodologies, the Commission has embraced the myriad of tools available in the information age. Currently, the platform hosts

CTBT Tutorials available in all official UN languages, plus Portuguese, as well as interactive, self-paced online modules covering the basics of the Treaty and its verification regime. The Commission also has a presence on iTunes U (University), with over 350 files available for download. (See www.ctbto.org/itunesu)

The Commission also offers interactive simulations as a part of the learning experience. For instance, participants of the 2013 Diplomacy and Public Policy Course, and the 2013 UN Disarmament Fellows Course were involved in a simulation replicating the Executive Council decision-making process on an on-site inspection request submitted by a Member State. This hands-on experience makes the CTBT verification system more understandable and allows the participants to put theoretical knowledge into practice.

To make this outreach through training sustainable in the long run, the Commission works together with universities, and non-governmental and international organizations to develop and promote CTBT education beyond the live lecture courses, and empower academic institutions to help build capacity in their own countries and regions. Universities are encouraged to develop their own CTBT courses or to incorporate CTBT themes into pre-existing courses, supported by CDI e-learning and resources.

**Promoting the CTBT through education**

The Commission is committed to investing in the human infrastructure of its Member States through the involvement of broader communities in its education and training activities, thereby strengthening the international consensus around the Treaty, raising awareness about the Commission's work and laying the groundwork for the Treaty's entry into force and universalisation. It is noteworthy that participants from five of the top ten most represented countries come from the non-ratifying Annex 2 States: China, India, Iran, Pakistan, and the United States of America, while nearly half of registered participants were from developing countries. Looking at 2014 and beyond, the Commission will continue its outreach through education in an integrated capacity-building approach by exploring synergies with other international organizations, and streamlining training activities.

*Jean du Preez is Chief of External Relations, Protocol and International Cooperation at the Comprehensive Nuclear-Test-Ban Treaty Organisation (Preparatory Commission) in Vienna. He is a former professor for non-proliferation studies at the Monterey Institute of International Studies where he also directed the Nuclear Non-Proliferation and Arms Control Project at the Institute's James Martin Center for Nonproliferation Studies. Before joining the Monterey Institute in 2002, Mr du Preez was a South African diplomat for 17 years, during which time he dealt with disarmament, non-proliferation and arms control matters and also served on the South African Council for the Non-Proliferation of Weapons of Mass Destruction.*

# Networking for Nuclear Security: The International Nuclear Security Education Network

By Jason Harris

**One of the biggest challenges presented by the global nuclear energy revival is maintaining effective security wherever nuclear or other radioactive material is in use, storage, and/or transport, and of associated facilities, especially in countries/regions with a heightened security risk. Achieving this goal will require adequate infrastructure, the correct equipment, sufficient resources, and – most importantly – trained and motivated personnel at all levels.**

This need for human resource development in nuclear security was underlined at several International Atomic Energy Agency (IAEA) General Conferences and Board of Governors' Meetings. Successive IAEA Nuclear Security Plans, the most recent of which was agreed by the Board of Governors in September 2013, give high priority to assisting States in establishing educational programmes in nuclear security, in order to ensure the sustainability of nuclear security improvements. The current Nuclear Security Plan covering 2014-2017, emphasises the importance of considering existing capacities at international, regional, and national levels when designing nuclear security academic programmes.

The International Nuclear Security Education Network (INSEN) was established in 2010, during an IAEA workshop, by a group of experts from academia, international organizations, and professional nuclear material management associations. INSEN is defined as a partnership between the IAEA, educational and research institutions, and competent authorities.

The INSEN mission is to promote excellence in nuclear security education in pursuit of the identified need for highly qualified nuclear security professionals. INSEN's objectives are to promote among universities and other educational institutions worldwide, the recently-

developed IAEA Nuclear Security Series No 12 (NSS-12) – Educational Programme in Nuclear Security. This sets out a model for a Nuclear Security Master of Science curriculum by (1) assisting in the development of comprehensive and up-to-date educational materials; (2) assisting in the development of faculty members in the area of nuclear security; and (3) promoting nuclear education and professional careers in nuclear security as a means of attracting the best and the brightest into the discipline. The work required to accomplish these objectives is performed by three separate working groups (WGs) established within INSEN.

**Participants at a "Train-the-Trainers Workshop on Nuclear Security", held in Kenitra, Morocco in May, 2013 which was organized by Professors Jason Harris and Oum Keltoum Hakam, INSEN members (Chair and Working Group Vice-Chair, respectively), and sponsored by the US Department of State Partnership for Nuclear Security. It was attended by over 100 individuals representing government, industry, NGOs, and academia. More than half of the participants were students from northern African universities.**

In a period of only three years, INSEN members have completed a number of course materials and textbooks to be used in conjunction with the Master of Science Programme in Nuclear Security as outlined in NSS-12. Textbooks have been completed or are under review for the following courses: NS-1: Introduction to nuclear security; NS-3: Nuclear energy, nuclear fuel cycle, and nuclear applications; NS-4: Methods and instruments for nuclear and other radioactive material measurement; NS-8: Physical protection technologies and equipment; NS-9: Security of nuclear and other radioactive material in transport; and NS-22: IT/Cyber security. In addition, teaching material has been developed for these and other courses.

In conjunction with the development of course material, university faculty and leadership level practitioners have been participating in a number of INSEN sponsored courses. Since 2011, four courses on the "Introduction to Nuclear Security" have been delivered at King's College London. Three "International Schools on Nuclear Security" have been held in Trieste, Italy and two "Schools on IT/Cybersecurity" have been held in Germany (Institute for Security and Safety (ISS) at Brandenburg University of Applied Sciences). With the support of the IAEA, the European Commission, and the US Department of State, other courses have also been offered in such places as South Africa, the United Kingdom, and Morocco. INSEN members have presented nuclear security education topics at dozens of conferences and meetings throughout the world.

The culmination of activities by all the working groups has led to the development of a European M.Sc. in Nuclear Security. The programme is administered by Delft University of Technology in the Netherlands, with support from five other universities: the University of Oslo, the Technical University of Vienna, the Brandenburg University of Applied Sciences, the National Centre of Scientific Research "Demokritos" in Greece, and the Dalton Nuclear Institute at the University of Manchester. The Masters in Nuclear Security aims at delivering nuclear security managers capable of finding synergy in thinking between hazard-risks, security methodology, and corporate governance at strategic and tactical organisational level. The programme commenced in April 2013 and will run for almost two years.

Currently there are 90 members of INSEN, representing 76 institutions (mainly universities) from 38 IAEA member states, 10 international organisations, and 4 observers. In the near future, the goals of INSEN include finishing additional textbooks and educational materials, completing additional professional development courses, aligning more closely with initiatives in nuclear security training, and increasing the membership, especially in areas with little current participation.

For more information about INSEN, please contact the IAEA at nsnstraining@iaea.org.

*Dr. Jason T. Harris is currently Associate Professor at Idaho State University (ISU) in the Department of Nuclear Engineering and Health Physics and holds a joint appointment with the Idaho National Laboratory. He is also the Chair of the IAEA International Nuclear Security Education Network (INSEN). He also serves on the advisory board for the European MSc in Nuclear Security and the Mountain West Nuclear Science and Education Consortium (focusing on nuclear non-proliferation and security studies) and is a mentor and consultant for the US Department of State Partnership for Nuclear Security (PNS).*

# Education and Outreach Activities within the Biological Weapons Convention

By Jamie Revill

**Following the collapse of the negotiations to strengthen the Biological Weapons Convention (BWC) in 2001, States Parties to the Convention have embarked upon an exploration of alternative means and methods of enhancing the Convention and reinforcing the norm against biological weapons.**

These intersessional process meetings have proved unexpectedly fruitful in looking at a number of new and novel issue areas, but particularly in stimulating discussion, common understanding and, to a lesser extent, effective action regarding previously unexplored – or at least underexplored – issues of awareness raising, codes of conduct, education, and outreach.

Such topics have, in one form or another, appeared on successive intersessional process agendas, beginning with the discussion on codes of conduct for scientists in 2005.[1] Whilst markedly different to the more traditional focus of biological disarmament diplomacy, such discussions have nonetheless proved useful in light of the changing context in which the BWC is situated.

Indeed, changes in the capacity and geography of life science research, combined with the implications of the evolving security environment, necessitate that biological disarmament diplomacy expand its focus from being primarily concerned with preventing the emergence of major offensive state biological weapons programmes, to incorporating consideration of the more complex challenge of managing dual use research across the globe.

Such a process of management requires a number of different actions at a number of different levels: "from the international to the individual".[2] However, one essential element of this process is outreach and building relations with those in the life science community, as well as informing those working within the life sciences of the biosecurity related concerns of the security community, and the legal and normative measures that underpin the prohibition on biological weapons.

Communities of practice are rarely homogenous or monolithic, and caricaturing scientist and security actors as such is can be counter-productive. Nonetheless, there are some generalizable differences in the priorities and interests of these actors. In this regard, outreach serves to build constructive relations between two different communities of practice focused on two different issue areas, those of science and security. As with most relationships, it takes time and effort to make progress. Nonetheless, building relations in times of relative stability ensures a valuable 'deep water anchor' in science and security relations during times of turbulence.

There are a number of examples of outreach initiatives that have taken various forms, from 'biosecurity caravans' to biology for peace brochures,[3] but perhaps the most remarkable is the work of the FBI in acting as a matchmaker between academia and security, and bringing these two collectives of actors together.[4] This approach, which has built on lessons learned in the past, has the added advantage of establishing a more sustainable relationship between the two communities through which to address emerging issues related to dual use, but also other legal or criminal issues that could arise in relation to life science research.

Education, as Brian Rappert has noted, serves several possible functions;[5] however, key amongst its objectives is providing scientists with the capacity to recognize – and respond in a more informed manner – to dual use challenges. A number of initiatives have been undertaken to this end and these have largely focused on academics, particularly students working in the life sciences, as part of an effort to build a sustainable biosecurity culture in the future. For example, there have been a number of regional or national surveys of the academic curricula that provide an indicator of the extent of, and attitudes to, biosecurity and dual use issues in academia.[6] Additionally, there have also been several national efforts to develop and deliver biosecurity educational materials for university students;[7] including in some cases through train-the-trainer programmes or distance learning initiatives intended to build capacity in this area.[8]

Consistent with the no-one-size-fits-all approach to the implementation of the BWC, the content and delivery of dual use education programmes need to be tailored to suit the linguistic and cultural context in which they are being delivered. Moreover, education need not solely consist of more lectures or 'death by PowerPoint', but rather should be the institutionalisation of ethical deliberation in the life sciences.[9] As such there are a number of more 'active learning' techniques that could perhaps more effectively stimulate thinking around issues of dual use. For example, the US National Academies of Science have conducted a series of training exercises in the Middle East and North Africa region that have employed active learning techniques, such as 'role play exercises'[10] that force individuals to operate in the shoes of other actors and explore the perspectives of other communities.

Whilst there has, thus, been some progress in relation

to education and outreach within the BWC, a number of challenges remain. Many in the life science community have different priorities and speak a different language to counterparts working on security issues. It is also possible that they operate on the basis of different types of evidence, placing great weight on the empirical than the speculative, which is a factor that perhaps makes it difficult to appreciate the concerns of the security community.

Moreover, the idea that one needs to be 'educated', alongside concerns over the implications for freedom of research, understandably generates a degree of sensitivity amongst those within the scientific community. Such sensitivities suggest that future activities should seek to 'incentivise and engage the scientific community as part of the solution, not as part of the problem'[11], and make professional training in safety, security, and ethics an embedded part of both the academic curriculum and the professional training of scientists. Achieving this will not provide a silver bullet to deal with the challenge of dual use biology, but it could provide a better foundation for reinforcing the regime against biological weapons, and build a platform for constructive engagement in the future.

*James Revill is a Research Fellow at SPRU. Over the course of completing his PhD prior to joining the Harvard Sussex Program he worked as a consultant to the United Nations Institute for Disarmament Research and completed research fellowships with the Landau Network Centro Volta in Italy and the Bradford Disarmament Research Centre in the UK. Revill's research interests focus on the evolution of the biological weapons treaty regime and the 'Inter-sessional Process'; compliance within the regime; the interplay between science and security; and awareness raising efforts amongst life scientists. He has published widely on these issues and together with colleagues at Bradford he developed an educational module to assist in efforts to build education and awareness.*

## Notes

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