Science and Disarmament: Challenges and Opportunities

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Excellencies,
Distinguished Guests,
Ladies and Gentlemen,

I am very pleased to address the EuroScience Open Forum an event which brings together scientists, policy-makers and entrepreneurs in an international setting to stimulate innovation and research across diverse disciplines.

At the Organisation for the Prohibition of Chemical Weapons, or OPCW, we have sought to follow a similar approach by closely cooperating with a large number of stakeholders of diverse origin in the implementation of the Chemical Weapons Convention.

International cooperation has been key to our mission to rid the world of chemical weapons. This cooperation goes well beyond traditional multilateral diplomacy for a very simple reason: advances in science and technology, and their impact on security, drive our work.

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The emergence of a globalised, inter-connected and inter-dependant world is both an encouraging and sometimes daunting prospect. Armed conflicts, natural disasters, economic crises can often lead us to pessimism. But we must not lose sight of human progress in general, especially in science and technology.

Chemistry in particular has had a transforming and positive influence. It has contributed immensely to raising the quality of life and explaining the deep mysteries of our existence. Its scope for bringing sustainable progress and prosperity remains unbounded.

Nonetheless whilst as a global civilisation we have reached great heights of scientific accomplishment, we have also acquired the means to self-destruct. The ability of science to invent ever more destructive weapons and technologies poses grave dangers.

One key lesson of the 20th century is that progress in law and ethics must keep pace with advancements in science and that our survival depends on upholding universal values as opposed to purely national interests.

The Charter of the United Nations codified the rules for inter-state conduct and established the principles for promoting peace and security in conditions of equality, justice and human dignity.

The right of human beings to live in conditions of peace and security is fundamental. It is also universal. When destruction threatens on a mass scale, weapons of mass destruction are the enemy. Therefore, a consensus is needed to ensure that the world could be made free from them.

We should welcome that the international community has succeeded in establishing omprehensive prohibitions on both biological and chemical weapons.

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The effort to obtain a global ban on chemical weapons took longer than nuclear and biological weapons.

But, despite this later start, the Chemical Weapons Convention has recorded unique success in the history of multilateral disarmament.

Since entering into force in 1997, it remains the only international disarmament treaty to ban an entire class of weapons of mass destruction under international verification.

And it is the only treaty that is within close reach of achieving this objective.

In my remarks here I intend to account for this success in terms of the partnerships that the Convention and OPCW, as its implementing body, have been able to cement with scientists.

In doing so, I hope to show how these partnerships have not only moved, and continue to move, science and technology away from misuse.

I will also show how they have charted new directions for science in the active service of durable international peace and security.

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Since the Organisation for Prohibition of Chemical Weapons – or OPCW – was awarded the Nobel Peace Prize last year, many people have asked me how the success of disarmament can be measured.

My response to this is that for disarmament to be truly effective, it must do more than simply remove weapons. It must ensure that they are not re-acquired.

And, to do this, it must provide strong incentives, not just disincentives.

The Chemical Weapons Convention was negotiated to encompass precisely such a comprehensive regime. A regime that spans four mutually supportive pillars. These relate to:

- the destruction of existing chemical weapons;
- prevention of new weapons from emerging;
- provision of assistance with treaty implementation and protection against chemical attacks; and
- promotion of international cooperation on peaceful uses of chemistry.

Vital groundwork to ensure such a broad scope was laid by scientists, from East and West, through the Pugwash Conferences on Science and World Affairs and the Stockholm International Peace Research Institute.

And from the outset of negotiations in the 1970s, scientists played a seminal role in laying the foundations of what was to become the Chemical Weapons Convention.

At the most fundamental level, scientists helped us create a baseline for distinguishing between malevolent and benevolent use of chemistry and related technologies. Their work determined the definition of chemical weapons and established the elements of a credible verification regime.

This work was, and continues to be, complex. Because what we are more often than not dealing with are materials and technologies that have multiple uses. They can render great benefits for human and economic development, but they can also render great harm if misused.

This work goes to the very core of what makes the Convention unique among international disarmament treaties. For it is the Convention's provisions for holding member states to their obligations through monitoring and verification activities that makes it so effective.

All member states must open their relevant chemical industrial facilities to inspection by the OPCW to ensure production for exclusively peaceful

purposes. And those few member states with chemical weapons must destroy them under OPCW verification.

But the technical aspects of verification are far from providing the complete picture.

Scientific knowledge and advice informs our work across all four pillars of the Convention. And they do so in a way that underwrites the integrity of the regime that the Convention represents.

In other words, this is not just a case of working to prevent misuse of materials and technologies.

It is about using scientific knowledge to assist our work across the range of activities we undertake – in disarmament, in non-proliferation, in assistance and protection, and in international cooperation on peaceful uses.

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In the seventeen years since the Convention entered into force, the OPCW has verified the destruction of some 83% of chemical weapons declared by eight of our 190 member states.

Three of these countries – Albania, India and another State Party requesting anonymity – have completed destruction of their stockpiles. Libya most recently did likewise, with only some component chemicals left to be eliminated, and Iraq is proceeding with a plan to destroy remnants of chemical weapons.

The two major possessor states, Russia and the United States of America, are well on track to achieving their destruction targets, in accordance with a revised decision adopted by our Member States in 2011.

And destruction of Syrian chemical weapons can get fully underway, now that the last chemicals have been removed from Syria.

What all this shows is that global zero for chemical weapons is by no means a distant prospect – it is a reality that is now within our grasp.

What this also shows is that, just as chemistry and engineering can be used to create these weapons, these disciplines are also serving to destroy them.

To this end, we have seen remarkable innovation at work in mounting tried-an-tested technology on board a US vessel, the *Cape Ray*, for

destroying the most dangerous Syrian chemicals through a process of hydrolysis– breaking down chemical agents with hot water and a caustic compound.

During the elimination of the Syrian Chemical Weapons Programme, in case of some sites which were inaccessible due to security reasons, our experts have used some innovative modern technological means to verify the removal and destruction activities.

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Science and technology also play an especially important role in guarding against the re-emergence of chemical weapons – in any guise.

In the first instance, this means maintaining an ability to detect the presence of chemical warfare agents through effective sample collection and analytical methods.

OPCW experts were recently run through their paces in this respect through the vital support they provided to the UN Investigation into Allegations of Use of Chemical Weapons in Syria. On the basis of analysis conducted at OPCW-designated laboratories of biomedical and

environmental samples, the mission's report confirmed the use of the deadly nerve agent sarin in the Damascus suburb of Ghouta last August.

This finding precipitated strong international condemnation and was a decisive factor in rallying the collective international effort to eliminate Syrian chemical weapons in the wake of Syria's decision to join the Convention.

A more complex set of non-proliferation problems relates to building capabilities to meet new and emerging challenges in the form of new types of chemicals and technologies, as well as other relevant scientific advances.

Many of you, as scientists, welcome with awe and wonder the fact that some 15,000 new chemicals are added to the chemical abstracts data base every day, and some two million gene sequences to the genetic data bases.

For their part, policy-makers are often less delighted, seeing in this flowering of knowledge potential proliferation challenges.

But scientists and policy-makers are working together – notably, through the OPCW Scientific Advisory Board – to keep abreast of these

developments, and to understand how we can better use them for fulfilling our mandates.

In this way, the independent scientific advice we source through the Board acts as an early-warning system. It allows us to recognise where new developments could have an impact on implementation of the Chemical Weapons Convention.

We cannot, of course, hope to control every new chemical – nor should we try to. Accordingly, it is imperative that our work strikes as informed a balance as possible – between prevention and promotion in relation to applications that have malevolent and beneficial uses.

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From the very earliest days of chemical warfare during the First World War, there has been a constant struggle between the application of science for offensive and defensive purposes. Within weeks of the first use of chemical weapons, rudimentary protective masks were being sent to the troops.

These days things are no different, except that the CWC provides a collaborative regime for securing assistance and protection for its Member States in response to chemical attacks.

The OPCW works very closely with its Member States to develop the capacity and expertise to manage and mitigate the use or threat of use of chemical weapons. This is achieved through a comprehensive programme of training and capacity building for first responders and other relevant agencies in States Parties. This training programme emphasises the importance of regional cooperation and the exchange of skills and expertise among practitioners.

The benefit of this approach is that the skills and capacities developed to counter a chemical weapons threat are equally applicable in dealing with industrial accidents or other disaster scenarios involving toxic chemicals.

Developing protective measures against exposure to chemical weapons is an area in which the positive application of advances in science and technology are very much in evidence.

This is the case in the life sciences, which provide opportunities for developing better medical counter-measures for those affected by

exposure to hazardous chemicals, as well as treatment for the longer-term effects of such exposure.

It is worth mentioning here also the dual-use characteristics of some of the chemical substances we are dealing with.

We know, for example, that nerve agents work by inhibiting a key enzyme that allows our organs and muscles to relax. They effectively make the body go into overdrive, with high exposure leading to death through respiratory failure.

Yet, some drugs for Alzheimer's Disease do the very same thing, using the same chemical compounds. In therapeutically effective doses, they can keep a chemical used to send messages between nerve cells working for longer. This can improve signalling to the brain, temporarily reducing symptoms of the disease.

Assistance and protection is nonetheless about more than medical counter measures.

Advances in materials science and nanotechnology have allowed us to greatly improve protective equipment, thus ensuring the health and safety

of those who are exposed to chemicals, both in response to chemical attacks as well as accidents.

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Finally, the OPCW works closely with scientists and industry around the world to promote peaceful uses of chemistry.

Under the auspices of a range of programmes, we hold workshops and exchanges designed to enhance capacity and the quality of laboratory work.

We also support internships for young scientists and engineers, provide opportunities for academics and practitioners to attend conferences, and facilitate a program to make used but usable equipment available to laboratories with an identified need.

The overwhelming focus of this work is on countries with developing economies and economies in transition.

The principle that informs this work is twofold. Firstly, that durable security must be based on equitable access to scientific knowledge and technical know-how, and secondly that all States Parties must have at least a basic capacity to implement the Convention from a scientific and

technical perspective. These are vital assets also for helping to underwrite our Member States' engagement on our common purpose, as well as their prosperity.

Scientific collaboration is especially well placed in this regard, since science knows no geographical boundaries. It is, accordingly, an excellent vehicle for enhancing dialogue and building trust between nations, as this forum is only too aware.

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In all of this, we need to remind ourselves that effective collaboration between scientists and policy-makers was never a given.

While it was not hard to make common purpose with the noble objectives of the Chemical Weapons Convention, developing habits of consultation did require us to make some adjustments.

Over the years, increased interaction between scientists and non-scientists in policy-making circles has helped scientists make their advice more widely understood among all key stakeholders, including foreign ministry officials, legal experts and customs officers who may have limited scientific knowledge.

This is vital for the simple reason that full confidence in disarmament and arms control measures can only be built on transparency and sound verification methodology closely informed by science.

At the same time, such a top-down approach from our scientific elites, working closely within and with governments, will also require bottom-up reinforcement.

We need to instil the highest ethical standards in our scientists at the very beginning of their careers, especially those with access to substances and facilities which could be misused.

To this end, the OPCW, with the cooperation of member states, will be unveiling tools and materials for awareness-raising, education and outreach purposes, some of which are already available on the OPCW website.

As I have said on past occasions, our purpose is not only to nurture more ethical scientists, but also more capable, rounded and responsible ones.

It is especially important for young scientists to develop a world view from the very beginning of their careers.

However specialised their current and future work might be, it is important that they are able to contextualise its broader purpose and applications in order to serve it responsibly.

This will be a key priority over the coming months, capitalizing on the OPCW's enhanced public profile owing to the Syria mission and award of the Nobel Peace Prize.

To help achieve this purpose, we very much rely on those among you who act as mentors for the current and emerging generation of scientists.

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My own optimism about the future of chemical disarmament – as a comprehensive, holistic enterprise – draws much inspiration from what our partnerships with science have been able to achieve.

Because the challenges we face through increased access to new advances in science and technology also conceal many opportunities.

Opportunities, which will help us further shift scientific endeavour towards an ever more active role in enhancing our security as well as our prosperity.

This means not only accommodating a more prominent role for science in multilateral disarmament and non-proliferation efforts.

It will also require scientists to make their work better understood by more people, as well as all of us to become more science-literate.

For all of us – scientists and non-scientists alike – are stakeholders in global peace and security.

And all of us must take responsibility in this vital enterprise.

Thank you for your attention.