

Future challenges in nuclear verification

This article was originally delivered as a presentation to a UK-China 'Next-Generation Dialogue' conference held in Beijing and organised by King's College London and the Renmin University of China. It considers future verification challenges affecting nuclear safeguards and non-proliferation as well as disarmament.

The topic of 'future verification challenges' can be divided into two categories: firstly, future challenges associated with nuclear safeguards and non-proliferation; and secondly, challenges associated with the future verification of nuclear disarmament. Within both of these categories it is also possible to divide challenges into those of a political nature and those that are technical.

Safeguards and non-proliferation

Beginning with safeguards and non-proliferation, and in particular reforms to the global safeguards system that the International Atomic Energy Agency (IAEA) has implemented over the past 20 years, one of the greatest challenges is achieving universal uptake of the agency's Additional Protocol. One of VERTIC's current projects is in fact to support states seeking to put the protocol in place. The protocol—the centrepiece of strengthening measures introduced in the 1990s—is now in force in 122 countries, but resistance to it in some quarters has proved problematic to ensuring its adoption everywhere.

Some countries dislike the idea of being compelled to take on an additional verification burden while progress on nuclear disarmament in nuclear-weapon-owning countries remains so slow; others simply dislike the implication that more verification is required of them to prove they are not seeking to divert material into a weapons programme. Opposition to the Additional Protocol is particularly troublesome when we consider that a number of the states opposed to it are countries with significant civil nuclear activities—and some are those of particular safeguards concern.

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Aside from this key political challenge, there are a variety of technical challenges facing safeguards and non-proliferation. Above all, perhaps, as new countries seek to develop nuclear energy the resource requirements on organisations such as the IAEA, which implement safeguards, will grow—simply because more facilities in more places will require more safeguards inspections on the ground. What is more, as nuclear facilities undergo evolutions and even revolutions in design, new safeguards approaches will need to be developed and applied.

Nuclear disarmament

Nuclear disarmament verification, for its part, is an issue that VERTIC has been heavily engaged with over recent years—in particular by seeking to confront the challenges posed by multilateral verification approaches to verifying disarmament.

It is worth reflecting on recent work programmes on this issue, such as those in Europe and the United States. One of the best known is the UK-Norway Initiative, which has been running since 2007. The UK-Norway Initiative is a technical initiative that addresses the involvement of non-nuclear-weapon states in nuclear disarmament verification. Specifically, it deals with verification of the dismantlement of nuclear warheads.

To date, the initiative has held a number of exercises, including a mock dismantlement exercise in Norway in 2009 and an exercise looking at access and security constraints held in the UK in late 2010. The initiative partners have also jointly designed and built prototype ‘information barriers’ to work on both surrogate radionuclides as well as, more recently, samples of plutonium.

Less well-known, and only announced recently, is a 13-year-old programme of cooperation between the US and the UK, which continues to this day. This has involved personnel from the UK Atomic Weapons Establishment, the UK Ministry of Defence, the US Department of Energy as well as personnel from US national labs. This collaboration, again a technical one, has looked at a range of equipment- and procedure-related issues associated with the verified dismantlement of nuclear warheads. The work has sought to better understand the nuclear weapon dismantlement process, as well as to

identify and develop technologies and procedures for protecting sensitive information and increasing confidence in the dismantlement process. Beyond a presentation at the United Nations First Committee in October last year, however, few details of the US-UK work have so far been revealed.

A verification ‘pilot project’, run by the Nuclear Threat Initiative in the US (but involving experts from around the world) has also been underway since 2012. Topics have included the role of non-nuclear-weapon states in verification, and how to verify warhead and nuclear material ‘baselines’ for disarmament. The project is set to report on its findings later this year.

The VERTIC multilateral project

In addition to this work, over the last several years VERTIC has been engaged in research to investigate multilateral approaches to disarmament verification and the potential role of intergovernmental organisations in particular. This is centred on a project whose membership includes officials and experts from five member states of the IAEA, as well as experts from intergovernmental organisations and NGOs.

The project is predominantly directed toward the role that the IAEA might be able to play in future disarmament scenarios where verification is called for. To date, the IAEA’s involvement in disarmament verification, while significant, has been far more limited than its work on safeguards implementation. A role for the agency in disarmament verification is included in the IAEA statute, however, and the agency has carried out disarmament verification—and research into disarmament verification—on a number of occasions in the past.

VERTIC’s project differs from what the UK and Norway and the UK and US have done in a number of respects, but mainly because it does not just focus on warhead dismantlement and addresses policy issues in addition to technical work. The political side of this project is in contact with and developing ways to further engage with member states of the IAEA and with the IAEA secretariat itself. Technical work is currently based around the idea of ‘modelling’ notional nuclear fuel cycles onto which multilateral verification ‘solutions’ can be applied and tested.

Political challenges of disarmament verification

All the work being done—whether it be between the UK and Norway, or between the US and the UK, or at VERTIC—is very forward-looking. That is chiefly because verified nuclear disarmament hinges greatly on the political will for disarmament itself—and on political decisions as to what should and should not be verified, and who should be involved.

Politically-speaking, countries reducing their nuclear arsenals as part of a bilateral or a multilateral process will need to address the challenge of reaching agreement with their treaty partners on what elements of an agreed disarmament process should be verified—and, crucially, how this should be done.

Bound up in this is the political question of transparency: how much do states want to reveal? And what kind of information are they willing to give away? Two kinds of transparency come to mind. The first is transparency measures that relate to the purpose of whatever arms control agreement is under consideration. In an arms control treaty, parties are generally required to provide an initial declaration on what they are going to do, in order that parties have a baseline and index against which to carry out verification activities.

For any given treaty, there will be certain pieces of information that will be required for the initial declaration. For example, a treaty requiring the verified dismantlement of 100 warheads would require state parties to be open with one another regarding certain details—to be agreed between them—about those warheads. The more information agreed upon, and provided, the greater the level of confidence in verification is likely.

But transparency measures can also be those measures that are not essential to the fulfilment of any particular treaty obligation, or necessarily tied to any particular treaty at all, but which serve as confidence-building measures and expressions of goodwill, and good intent. Beyond transparency, a further political challenge will be the need to reach agreement on who should carry out verification. Questions here will concern whether treaty partners alone should verify, or whether third-parties—who may want to be involved—should be allowed to take part; and, if so, what kind of role might they be able to play?

Technical challenges

In many ways, however, these kinds of political questions will be informed by what can be accomplished technically and by what kind of technologies are available. It is possible to sum up the basic technical challenge of disarmament verification with the following formula:

Nuclear disarmament verification is underpinned by, on the one hand, the requirement to balance states' need to protect classified and proliferative information with, on the other, verifying parties' natural inclination to obtain sufficient information about the process to be confident in its full and proper implementation.

It is, essentially, about finding the right balance between confidentiality and openness. That balance will be different in different situations and according to which parties are involved.

Technical research into how to effectively verify aspects of disarmament (how to balance the need for sensitivity against the need for openness), as well as how to involve non-nuclear-weapon states in verification processes, is likely to continue for the foreseeable future. For the products of this work to be put to use, however, is largely down to political decisions and the will of states to press ahead with turning disarmament commitments into concrete action. •

David Cliff

Researcher, VERTIC

Upcoming Events

VERTIC-VCDNP seminar on Iraq

May 2014 will see the third in the series of seminars on disarmament verification that VERTIC is coordinating with the Vienna Center for Disarmament and Non-Proliferation. The upcoming seminar will focus on the role of the IAEA in Iraq, during the post-Gulf War effort to uncover Iraqi weapons of mass destruction programmes. The seminar is being hosted by the VCDNP, in Vienna, on 26 May 2014.

VERTIC-Wilton Park conference on multilateralism

As part of its multilateral nuclear disarmament project, VERTIC is hosting a conference on disarmament issues in collaboration with Wilton Park. The meeting will be held on 9-11 June this year.



Libya destroys 'Category 1' chemical weapons

Samuel Nurdung, London

While international attention focuses on Syria's destruction of chemical weapons, early 2014 witnessed a major achievement for the Organisation for the Prohibition of Chemical Weapons (OPCW) in its role in verifying the destruction of chemical weapons in Libya.

On 4 February 2014, the Director-General of the OPCW, Ahmet Üzümcü, announced that all Category 1 chemical weapons held in Libya had been successfully destroyed, including those that were discovered in October 2011 by the Libyan National Transitional Council. Chemical weapons declared by each state party to the Chemical Weapons Convention (CWC) are divided into three categories for the purposes of destruction: Category 1 consists of chemical weapons that are based on Schedule 1 chemicals and their parts and components. Schedule 1 chemicals are toxic chemicals that have a history of being used as chemical weapons and pose a high risk to the object and purpose of the CWC. Chemical weapons based on all other chemicals belong to Category 2, while Category 3 includes unfilled munitions and devices specifically designed for use in chemical weaponry (CWC's Verification Annex Part IV (A), paragraph 16).

Libya's initial declaration to the OPCW in 2004 reported 24.7 metric tonnes of sulphur mustard in its Category 1 chemical weapons arsenal. However, *The Guardian* reported in September 2011, that units fighting for the Libyan Transitional Government discovered undeclared chemical weapons at a secret depot in the Jufra area, 435 miles (700km) south of Tripoli, during part of an offensive against Qaddafi strongholds in the remote south of the country.

Consequently, in November 2011 and February 2012, the Libyan Transitional Council submitted to the OPCW declarations of the undeclared two tonne stock of sulphur mustard, which was stored and loaded into 517 artillery shells, 45 plastic sleeves for rocket launchings and eight

500-pound bombs, according to the *New York Times*. The OPCW Secretariat subsequently verified these declarations in January and April 2012. All Category 3 munitions had been destroyed in 2004 during an early phase of the verification process.

In his remarks, Ahmet Üzümcü praised the United States, Canada and Germany for their assistance providing security and safety on site, their procurement and installation of destruction equipment and technical assistance during operations. Andrew Weber, US assistant defence secretary for nuclear, chemical and biological defence programmes, underscored that the disarmament milestone represents 'the culmination of a major international effort to eliminate weapons of mass destruction from Libya and to ensure that they never fall into the hands of terrorists'. The Libyan case reveals the positive outcomes that verification and monitoring activities can have after an initial and voluntary WMD declaration, but it also shows the challenges to the robustness of the verification system overall.

On a positive note, since 2011, Libya and the OPCW have worked effectively and quickly, including with the US, German and Canadian officials, to coordinate and lead dismantlement efforts, despite unforeseen circumstances. Yet the Libyan case also underscores limitations to verification of national declarations, such as ambivalences produced by poor, distorted or incomplete information and limited technical tools for detecting undeclared activities. It remains unclear whether the Gaddafi regime wrongly declared its stockpile intentionally or accidentally. Nonetheless, the incident highlights that verifying the completeness of declarations on chemical weapon stocks can still present significant challenges.

Having cleared all Category 1 chemical weapons, preparations will now be made to destroy Libya's remaining 850 metric tonnes of Category 2 chemicals, which are mostly industrial chemicals, by the end of 2016. The OPCW's Director-General seems confident of this based on the level of cooperation established. The complete destruction of Libya's chemical weapons would be an important milestone for the CWC in its goal of eliminating the manufacture and use of chemical weapons globally. •

Radioactive material thefts in Mexico and Georgia

Sonia Drobysz, London

In March this year, 53 States and four international organisations convened in The Hague, The Netherlands, for the third Nuclear Security Summit (NSS) to work together to reduce the threat of nuclear terrorism and to strengthen nuclear security. Two countries participating in the summit recently experienced thefts of radioactive material. On 4 December 2013, the IAEA reported that Mexico had notified it about an incident involving the theft, two days earlier, of a truck transporting a cobalt-60 source used for cancer treatment from a hospital to a radioactive waste storage centre. Mexico's national commission for nuclear safety and safeguards ('CNSNS') later informed the IAEA that Mexican law enforcement authorities had located the source, on 4 December, in a field close to where the truck had been stolen.

A federal robot was used to safely recover the source, which had been removed from its protective shielding but remained intact and undamaged. Juan Eibenschutz Hartman, director of the CNSNS, said the truck was lacking the necessary equipment to transport cobalt-60 which is, according to the IAEA's ranking of radioactive sources based on their potential to cause immediate harmful health effects, a category 1 radioactive source meaning: 'if not safely managed or securely protected would be likely to cause permanent injury to a person who handled them, or were otherwise in contact with them, for more than a few minutes.'

Not long after this incident, two individuals were arrested in Georgia after radium 226 encased in a lead container was found and seized in the basement of one of their houses. The Georgian Ministry of Internal Affairs explained on 14 December that an ongoing investigation into the crime of 'illegal handling of radioactive material with the attempt of its further realization' was being conducted by the border police operative-investigative division. No further information was given about the origin of the material or its quantity. In terms of nuclear security and nuclear terrorism, the risks associated with the thefts in Mexico and Georgia—which are not necessarily the same in each case—should not be overestimated. Mark Hibbs, a senior associate in the

nuclear policy program at the Carnegie Endowment for International Peace interviewed by the *Washington Post* about the radioactive material incident in Mexico, explained it would 'theoretically be possible' to make a dirty bomb using cobalt-60, but 'the stuff is incredibly hot. You could get a fatal dose in something like minutes if you hold it in your hand.' It would also require equipment and expertise. Furthermore, the Mexican thieves denied knowledge of the radioactive cargo and had no known intention to misuse it. In contrast, it has been reported by Global Security Newswire that the Georgian individuals allegedly tried to sell the material they were in possession of.

Though, fortunately, these two cases did not seem to pose an immediate high level threat, they nevertheless serve to highlight the importance of having adequate and comprehensive national measures in place to prevent, detect and respond to the thefts of nuclear and other radioactive material. As with other NSS participating countries, Mexico and Georgia are both parties to international legally binding texts relating to nuclear security including the 1980 Convention on the Physical Protection of Nuclear Material (CPPNM) and 2005 International Convention on the Suppression of Acts of Nuclear Terrorism (ICSANT).

Those instruments require states to adopt national implementation measures in their domestic legislation to criminalise certain acts involving nuclear and radioactive material, to enable international cooperation to prevent and counter preparations of those acts, and to ensure adequate physical protection of nuclear material.

Georgia and Mexico have also both made a political commitment to implement the non-binding IAEA Code of Conduct on the Safety and Security of Radioactive Sources, which provides a basic governance framework for radioactive sources. In the final communiqué adopted in The Hague, world leaders recognized 'the need for a strengthened and comprehensive international nuclear security architecture, consisting of legal instruments (...)' and encouraged all states to become party to the relevant conventions. They also welcomed efforts aimed at assisting states in adopting comprehensive national legislation on nuclear security. •

New publications

National Legislation Implementation Kit released

On 25 March, Vice-President Boediono of the Republic of Indonesia presented the ‘National Legislation Implementation Kit on Nuclear Security’ to the third Nuclear Security Summit held in The Hague, the Netherlands

The aim in nuclear security activities is to prevent, detect and respond to criminal or other unauthorised acts involving, or directed toward, nuclear material and radioactive material and their associated facilities. A wide ranging set of international instruments has been developed to date which states should understand, join and implement. The Kit, which is available in Arabic, English, French, Russian and Spanish on the VERTIC website, has two objectives:

- To help states develop comprehensive national legislation on nuclear security, in accordance with their own respective legal cultures and internal legal processes; and
- To provide states with references to a wide array of consolidated elements and provisions contained in relevant international legal instruments and guidance documents that together establish the global framework for nuclear security.

During the Summit, Ambassador Hasan Kleib, the Director General for Multilateral Affairs in Indonesia’s Foreign Ministry, told the *Jakarta Post* that the Kit ‘could act as a model for any country preparing national legislation on nuclear security’ and that ‘those [states] who want to prepare national legislation on nuclear security could choose elements in the model that are suitable for them.’ Indonesia confirmed in its national progress report to the Summit that they had ‘submitted the National Legislation Implementation Kit as a house gift in the 2014 Nuclear Security Summit with the objective to help states with building blocks to develop comprehensive national legislation in accordance with their own respective legal cultures and internal legal processes.’

The heads of state of 29 nations attending the summit, from all regions of the world, supported the Joint Statement on

the National Legislation Implementation Kit on Nuclear Security, which confirms that the Kit ‘provides States with references to a wide array of consolidated elements and provisions contained in relevant international legal instruments and guidance documents on nuclear security that together contribute to the global framework for nuclear security.’

In Paragraph 11 of the Hague Communiqué—the final document from the summit—the participating States ‘welcome efforts aimed at developing model legislation on nuclear security, which could provide States with building blocks to develop comprehensive national legislation in accordance with their own legal systems and internal legal processes.’

The Kit was developed over a period of two years. It was a process that involved several drafts and review and comment by a number of national governments and intergovernmental organisations. This resulted in a comprehensive and practical tool, presenting information in a clear and accessible way for states interested in strengthening their national legislation for nuclear security.

The main content of the Kit is a Model Law created by synthesizing the international security instruments and a useful description of the process for developing nuclear security legislation. The Model Law includes:

- An overview (objective, scope and a description of the Model Law’s sections);
- Definitions;

In addition, it contains provisions for:

- National regulation of nuclear security, including the establishment of a competent authority;
- Physical protection and security of nuclear and other radioactive material and nuclear facilities;
- Security of radioactive sources;
- Notification of incidents;
- Transport, import, export and transit of nuclear material and radioactive sources;
- Offences and penalties;

- Jurisdiction; and
- Criminal proceedings and international co-operation.

The Kit complements and facilitates implementation of some of the measures called for in the Joint Statement on Strengthening Nuclear Security, which was proposed by the three summit hosts: the Netherlands, Republic of Korea and the United States.

In particular, this gift calls upon its subscribing states to commit to the Nuclear Security Fundamentals (IAEA Nuclear Security Series No. 20) as well as to implement and enhance, through national regulations and other government measures, the recommendations contained in IAEA Nuclear Security Series Nos. 13 ('Nuclear Security Recommendations on Physical Protection of Nuclear Materials and Nuclear Facilities'); 14 ('Nuclear Security Recommendations on Radioactive Material and Associated Facilities' and The Code of Conduct on the Safety and Security of Radioactive Sources); and 15 ('Nuclear Security Recommendations on Nuclear and Other Radioactive Material out of Regulatory Control').

VERTIC's contribution to the Kit was made possible through the financial support of Foreign Affairs, Trade and Development Canada (Global Partnership Program) and the Foreign and Commonwealth Office of the United Kingdom (Strategic Programme Fund). Translation and publication was made possible with additional funding from the Federal Department of Foreign Affairs of Switzerland.

VERTIC's objective now is to co-operate with States using the Kit to fill in any gaps that have been identified in their legislation, using the analytical template that VERTIC has developed for this purpose.

Questions about the Kit, or about assistance with implementation of nuclear security legislation through VERTIC's National Implementation Measures (NIM) Programme, should be directed to Acting Programme Director, Scott Spence (scott.spence@vertic.org). •

VERTIC published in ESARDA Bulletin

VERTIC's David Keir, who heads the organisation's Verification and Monitoring programme, is featured in the current issue of the *ESARDA Bulletin* (No. 50) with an article on nuclear disarmament verification.

Dr Keir's article, titled 'New Approaches and New Technologies for the Verification of Nuclear Disarmament' contains a generic 'dismantlement pathway' for the process of dismantling a nuclear warhead in a verified manner, based on the scenario used by the UK-Norway Initiative field exercises in 2008 and 2009.

It considers, with regard to verifying such a process, challenges faced in particular by Non-Destructive Assay technologies—for measuring radiation—and the potential role in minimising proliferation risk of so-called information barrier devices (which have formed a key part of the UK-Norway effort).

'A variety of relevant technologies exist,' Dr Keir writes, 'many available commercially. A considerable amount of work has also been completed in the development of scientific models, and software, for the interpretation of measurements made with these instruments.'

Proliferation risks are one of the greatest obstacles, however, particularly where warhead dismantlement is concerned. As Dr Keir puts it: 'in the special case of nuclear warheads and their components, the level of detail that would be revealed by these techniques would also, if revealed to a NNWS [non-nuclear-weapon state] inspector, constitute a breach of Articles One and Two of the Non-Proliferation Treaty. The challenge remains to devise information barriers that are sufficiently well-designed to bridge this gap.'

The article is available in full via the ESARDA website. •

Verification Quotes

All nuclear material in weapons programmes must be subject one day to binding international verification. I call on all States to begin the process now to elaborate effective arrangements. Clearly the time has come to strengthen the rule of law in both disarmament and non-proliferation—Ban Ki-moon, Nuclear Security Summit, The Hague, 24 March.

In the case of Ukraine, security assurances were an essential condition for its accession to the Nuclear Non-Proliferation Treaty. However, the credibility of the assurances given to Ukraine in the Budapest Memorandum of 1994 has been seriously undermined by recent events. The implications are profound, both for regional security and the integrity of the nuclear non-proliferation regime—Ban Ki-moon, Nuclear Security Summit, The Hague, 24 March.

Let me recall that in 1994, Ukraine abandoned its nuclear weapons. We gave up one of the largest arsenals of nuclear weapons—the third largest in the world—and, under the Budapest Memorandum, the signatories guaranteed the territorial integrity, sovereignty and independence of the Ukrainian State. The way our Russian neighbours—and I believe that if we talk real talks with Russia, they could be real partners—acted undermines the entire global security and nuclear non-proliferation programme, as after these actions it would be very difficult to convince anyone in the world not to have nuclear weapons—Ukrainian Prime Minister Arseniy Yatsenyuk, at the UN Security Council, 13 March.

Kiev authorities' representative claimed that Russia allegedly violates its commitments under the Budapest Memorandum in what relates to Ukraine's sovereignty and territorial integrity. We can not accept it whatsoever. The government in Kiev, which came to power following the unconstitutional coup, essentially undermined Ukraine's unity itself by its policies, most notably towards national minorities—From the Russian statement to the Nuclear Security Summit, Hague, 25 March.

We will need to nearly double the staff resources devoted to verification in Iran... We will need to significantly increase the frequency of the verification activities which we are currently conducting—IAEA Director General Yukiya Amano addressing the media over new verification arrangements in Iran, 24 January.

There could be some benefits of having a small IAEA office space in Iran... However, far more important is to have a robust and credible verification scheme to monitor the number of centrifuge rotors stocked and produced in Iran—Olli Heinonen, former head of safeguards at the IAEA, speaks about possible verification requirements in Iran, 12 January.

In the disarmament field, we are well on the way to making chemical weapons a relic of history. Some 82 per cent of declared stocks have now been verified by the OPCW as destroyed, and it appears likely that the remainder will be whittled down to less than 1% within the next few years. And to ensure chemical industry is engaged solely in peaceful purposes, OPCW inspectors have conducted some 2,500 inspections at facilities of interest in 86 countries. At the same time, international cooperation in ridding the world of Syria's chemical weapons has shown just how determined the community of nations is to ensure no one is ever again threatened by these barbarous weapons.—Ahmet Üzümcü, Director-General of the OPCW, speaking on Libya, 4 February.

It's not inconceivable, for example, that if we get to a final arrangement with Iran whereby Iran addresses the world's concerns about its nuclear program that security assurances could be part of that package. And we don't want to discredit security assurances by how we handle them with Ukraine—Steven Pifer, ex-US ambassador to Ukraine and part of the team that negotiated the Budapest Memorandum of Assurances, 9 March 2014 .



Biosurveillance: the growth of a new initiative

Russell Moul, London

One of the lessons learned from epidemics of the recent past, such as the 2003 emergence of SARS (severe acute respiratory syndrome), is that the world's ability to manage infections is contingent upon an effective surveillance system. Without early warning of new outbreaks, it becomes difficult to coordinate effective public health responses.

Public health responses, whether to naturally-occurring outbreaks or to those caused by bioterrorist activity, use similar methods and tools. Both begin with the recognition of the event by public health systems following the detection of an outbreak through observations and intelligence, bio-detectors and laboratory operations. In both cases this is followed by the analysis and characterisation of the agents involved. Collectively, these actions make up what is often referred to as biosurveillance.

Generally speaking, a biosurveillance system contains three features: Firstly, a clinical facility or other suitable location is needed to identify and report incidents of effected and exposed individuals. Secondly, the system requires some epidemiologic capacity (that is, a means for studying the patterns, causes and effects of disease events) to identify additional cases and determine the source and mode of transmission. Thirdly, laboratories with trained specialist staff are needed to identify disease agents.

Three months ago, in January, the US Center for Disease Control and Prevention (CDC) and the US Defence Threat Reduction Agency published data concerning an ongoing research effort aimed at improving biosurveillance systems in Uganda and Vietnam. As part of this effort, a new free text messaging service was set up in Uganda to provide for quicker reporting of cases related to 'priority pathogens'. These are infections in Uganda that are most likely to present a threat at the international level. They include multidrug-resistant *Mycobacterium tuberculosis*, *Vibrio cholerae* and the Ebola virus—a cause of hemorrhagic fever. Using the

text message service, data about disease events could be quickly reported to the Uganda District Health Information System. Text message-based surveillance systems form an important part of the global initiative to improve biosurveillance. By capitalising on the growth in numbers and the reach of modern mobile phone technologies, they can even report quickly from remote rural locations.

In Vietnam, existing biosurveillance and information systems developed by the Vietnamese Ministry of Health have been enhanced using the CDC's 'Epi Info' tools. Epi Info is a software package used across the world for the rapid assessment of disease outbreaks. According to the CDC, it allows for the 'rapid creation of data collection instruments and data analysis, visualisation and reporting using epidemiological methods'. These two cases form an initial step in a larger initiative launched by the US on 13 February 2014: the Global Health Security Agenda (GHS Agenda). Working with the World Health Organization (WHO), the Food and Agriculture Organisation (FAO), and the World Organisation for Animal Health (OIE) and 26 WHO member states, this initiative aims to assist 30 countries to improve their ability to prevent, detect and respond to infectious disease.

By assisting nations to improve their biosurveillance capacities, the GHS Agenda will help provide crucial information for helping the world respond to new infections. Conceptually, this initiative will function in a similar way to the Comprehensive Test-Ban Treaty in that each state will operate as a node within an interconnected global monitoring network. Real-time information on naturally-occurring or intentionally-released pathogens will be reported between states but also to the WHO, FAO and the OIE as events take place.

This information is crucial for coordinating a global response to emerging disease. Without it, decision-makers, clinicians and public health officers are operating with little scientific evidence to lead them in their response. •

National Implementation Measures Programme

Over the past three months, the NIM programme completed three legislation surveys on the national implementation of certain international legal instruments related to nuclear security and revised two surveys on the implementation of the Biological Weapons Convention (BWC). VERTIC staff also reviewed one country's draft decree on the creation of a National Authority for the CWC and seven laws from four other countries related to Chemical, Biological, Radiological and Nuclear ('CBRN') security and risk mitigation.

In January, VERTIC participated in a workshop organised by the UK Foreign and Commonwealth Office for UK industry on the European Union's CBRN Centres of Excellence ('CoE') initiative. Legal Officer Bilqees Esmail represented the organisation at this meeting and also acted as a trainer in the e-learning phase of EU CBRN CoE Project 3 on 'Knowledge development and transfer of best practice on bio-safety/bio-security/bio-risk management.' She also participated in training courses for national experts from South East Asia and South and Eastern Europe in Como, Italy, on 26 February and 5 March.

January also saw VERTIC promoting the National Legislation Implementation Kit on Nuclear Security (developed by the organisation at the request of the Government of Indonesia), during the Nuclear Security Summit Sherpa Gift Basket Information Market on 14 January 2014, in Pattaya, Thailand; Legal Officer Sonia Drobysz presented on the Kit and explained its content and purpose. Later, in March, Indonesia presented the Kit at the Nuclear Security Summit in The Hague.

In February, Acting Programme Director Scott Spence attended the Myanmar-US-UK dialogue on non-proliferation in Yangon, Myanmar and also an event on the Fifth Biennial Meeting of States of the UN Small Arms Programme of Action sponsored by the Geneva Forum on 18 February. In London, VERTIC contributed to a training course for

Chinese officials in London organised by RUSI through lectures on nuclear security from Legal Officer Yasemin Balci, along with Programme Director David Keir. On 20 and 21 February, Bilqees Esmail represented VERTIC at the first ASEAN Microbial Biotechnology Conference in Bangkok, Thailand, where she discussed legislation and regulations in the field of biosafety and biosecurity in Southeast Asian countries. VERTIC also attended a workshop on the ratification and national implementation of the BWC on 20-21 February 2014 in Kathmandu, Nepal. Yasemin Balci presented there on the ratification process and national implementation measures for the BWC.



VERTIC at BWC workshop, Nepal

In March, Scott Spence participated in a roundtable on '10 years of UNSC Resolution 1540: Global and Regional efforts in the field of non-proliferation and disarmament of weapons of mass destruction', convened by the Geneva Centre for Security Policy and the Organization for Security and Co-operation in Europe in co-operation with the United Nations Office for Disarmament Affairs and the Caribbean Community Secretariat, with the support of the Swiss Government.

Sonia Drobysz represented VERTIC at a workshop for the exchange of regional best practices on establishing a national authority for the implementation of the BWC in Bogota, Colombia on 6-7 March. In addition, VERTIC co-organised, with the government of Malawi, a workshop on the BWC in Lilongwe, Malawi, from 18-22 March. The first part of the workshop was dedicated to awareness-

raising on the BWC and gathered officials from various ministries. During the second part of the workshop, Yasemin Balci and Bilqees Esmail assisted in the drafting of a bill addressing obligations in the BWC and biological weapons-related aspects of UNSCR 1540. Finally, from 20-23 March, VERTIC was represented by Scott Spence at the Nuclear Knowledge Summit on nuclear security in Amsterdam, The Netherlands, on 24-25 March. The NKS was held on the margins of the 2014 Nuclear Security Summit (NSS) that took place on 24-25 March in The Hague, and brought together nuclear experts and NGO participants to further the discussion on NSS issues. •

Verification and Monitoring Programme

In January 2014, VERTIC hosted the fourth workshop under its project on multilateral disarmament verification. At this meeting, which was held in Cape Town South Africa, members of the project group—from five countries and one international organization—heard updates from VERTIC staff on progress under the initiative, and provided feedback on how the project should continue to be driven forward. Meanwhile, VERTIC participated in the ‘UK-China Next Generation Dialogue’ run by King’s College London and Renmin University in Beijing. There, Researcher David Cliff presented on ‘Future Verification Challenges’ in nuclear arms control, addressing safeguards and non-proliferation as well as disarmament.

The second meeting in the series of seminars under the multilateral disarmament verification project was held in Vienna in February, in collaboration with the Vienna Center for Disarmament and Non-Proliferation. The seminar occasion focused on the work of the ‘Trilateral Initiative’ between the US, Russia and the IAEA—which from 1996-2002 investigated the what procedures might be necessary for IAEA verification of fissile material deemed surplus to defence requirements.

February also saw VERTIC Research Assistants Russell Moul and Alberto Muti in Stockholm, Sweden, to consult with the Swedish Defence Research Agency on nuclear fuel cycle modeling software. A conference on the ‘making of the global nuclear order’ in Zurich, Switzerland was attended by Senior Researcher Hassan Elbahtimy who presented on

Egypt’s role in negotiating the NPT. And VERTIC contributed to a training course for Chinese officials in London organised by RUSI through lectures from Programme Director David Keir on nuclear security and from Legal Officer Yasemin Balci.

In March, VERTIC, hosted a technical collaboration workshop with the Radioprotection and Nuclear Safety Authority (ARSN) in Dakar, Senegal, that focused on the IAEA Additional Protocol. Senior Researcher Larry MacFaul, along with Hassan Elbahtimy and Alberto Muti presented and acted as facilitators at the meeting. March also saw a conference on nuclear arms control in the Middle East in Cairo, Egypt, co-organised by the British American Security Information Council Cairo University, Egyptian Council for Foreign Affairs and VERTIC. Hassan Elbahtimy presented on regional issues at the meeting.

Throughout this first quarter of 2014, VERTIC continued its research and analysis activities under its project on multilateral nuclear disarmament verification. This included further work on developing simulated fuel cycles and scenarios that provide possible technical and diplomatic contexts for disarmament so that verification mechanisms can be tested. A compendium of research accumulated under this project is also being compiled and a report developed on capacity and organizational issues in nuclear disarmament verification. Meanwhile an article by David Keir was published in the current issue of ESARDA Bulletin. Staff also continued to carry out work under the IAEA Additional Protocol project, including completing surveys of several countries legal and technical profiles, and liaising with states on their progress towards ratifying and implementing the instrument. •



ARSN and VERTIC workshop on the Additional Protocol, Senegal

Grants and administration

Over the last quarter, VERTIC's internship programme has continued to attract capable and competitive applicants. In March, Samuel Nurdning—a recent graduate of King's College London—began assisting the Verification and Monitoring team. Crissta Wetzel, who is currently studying for a certificate in terrorism studies at St Andrew's University, also began an internship with the Verification and Monitoring programme.

At the beginning of the year, VERTIC Trustee James Arbuthnot MP, stepped down from his position on VERTIC's board. We are deeply grateful for his service on the board for more than two years and his valuable advice and guidance.

Last month, Mr Oliver Colville MP was welcomed to the board. Mr Colville has served as the Conservative Member of Parliament for Plymouth Sutton and Devonport since 2010. We very much look forward to working with him.

Regarding grants, VERTIC has benefitted from assistance from the Federal Department of Foreign Affairs Switzerland. This agreement will fund translation and publication of the National Legislation Implementation Kit on Nuclear Security, which was presented by the Republic of Indonesia to the Nuclear Security Summit during 24-25 March. •

building trust through verification

VERTIC is an independent, not-for-profit non-governmental organization. Our mission is to support the development, implementation and effectiveness of international agreements and related regional and national initiatives, with particular attention to issues of monitoring, review, legislation and verification. We conduct research, analysis and provide expert advice and information to governments and other stakeholders. We also provide support through capacity building, training, legislative assistance and cooperation.

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