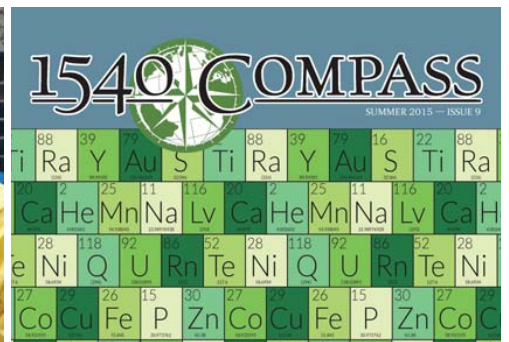
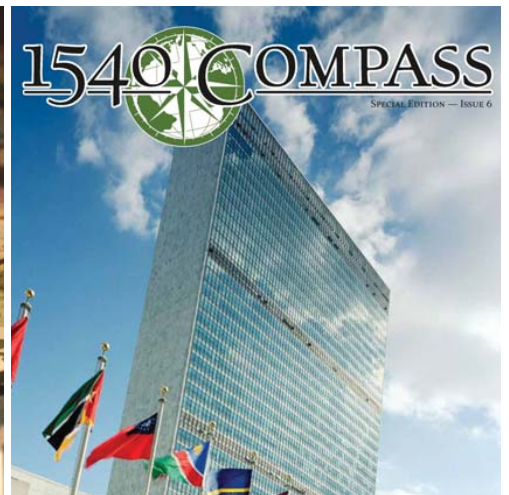
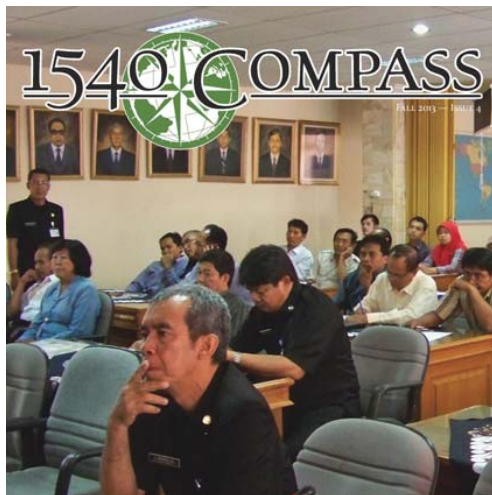
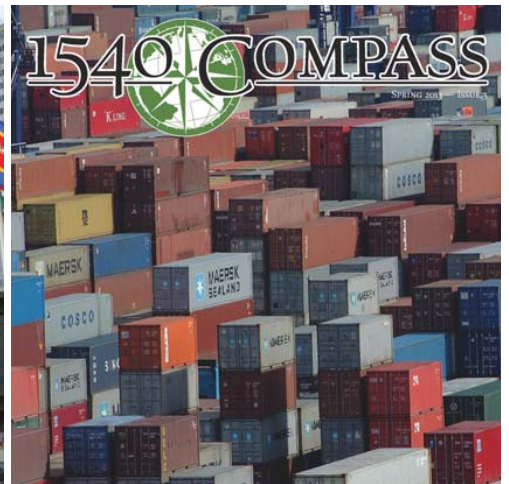
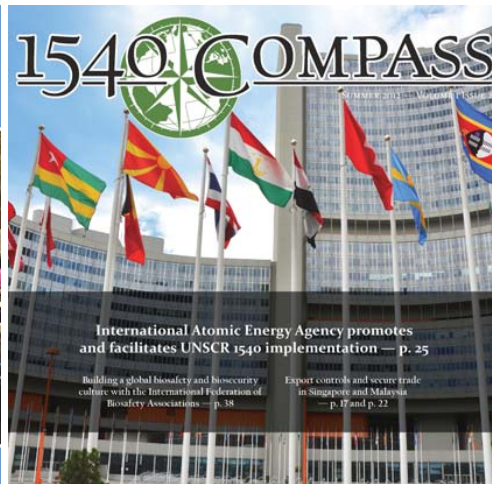
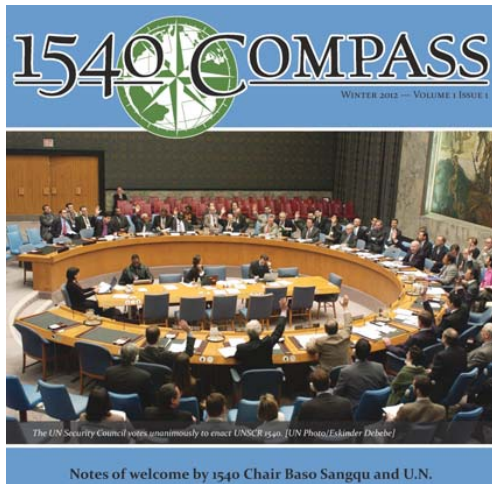


1540 COMPASS

SPRING 2016 — ISSUE 10



Implementing the UNSCR 1540 Obligations: Lessons Learned from Strengthening the U.S. Biosafety & Biosecurity Practices & Oversight System – p. 27



1540 COMPASS

<http://cits.uga.edu/1540compass>

A journal of views, comments, and ideas for effective implementation of UN Security Council Resolution 1540 to prevent WMD proliferation and terrorism by non-state actors.

Editorial Staff

Editor in Chief: Igor Khripunov
Managing Editor: Christopher Tucker
Assistant Editor: Brittany Peace
Designer: Ronda Wynveen
Consultant: James Holmes
Business Manager: Karen Cruz

Published by the Center for International Trade & Security, University of Georgia in cooperation with the United Nations Office for Disarmament Affairs and using contributions from Kazakhstan, the Republic of Korea, Norway, the United States and the European Union. The views expressed within are those of the authors and do not necessarily reflect those of the Center for International Trade & Security, United Nations or those of the donors namely Kazakhstan, the Republic of Korea, Norway, the United States and the European Union.



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The Compass welcomes letters and articles from all concerned with 1540 implementation. Articles should be 1,500-2,000 words in length and written in English. Digital photographs should be submitted in their native format, typically JPEG; scanned photographs should be saved in a lossless format like TIFF or BMP. Send submissions to compass@cits.uga.edu.

Table of Contents

From the Editor	2
Igor Khripunov	

DISCUSSION FORUM

CBRN Security and Migration Flow	3
Antonio Vulas	
UNSCR 1540 and OSCE	3
Thomas Wuchte	
Pursuit and Use of CBRN by Violent Nonstate Actors	4
Victor Asal	
Eternal Dilemma: "Nonproliferation—Competitiveness"	4
Nikolay Revenko	
Security Culture in the Medical Field.....	5
Pirunthavany Muthuvelu and Noor Syakeera Mukhelas	
Designated Laboratories for the United Nations Security General's Mechanism.....	7
Stefan Mogl and Cédric Ivernizzi	
European Commission Joint Research Center Export Control Capacity Building Initiatives: Staying Relevant for 1540 Implementation.....	8
Renaud Chatelus	

ARTICLES

Communicating Front-End Nuclear Security	10
Cindy Vestergaard	
About the Importance of Security Culture for Computer Security Effectiveness	14
Carsten Speicher	
From Asia to the World: Evolvement of ISN/JAEA as a Training Center for Nuclear Nonproliferation and Nuclear Security	18
Reina Matsuzawa	
Return on Investment of Conducting a Security Culture Self-Assessment	22
Vladimir Yankov	
Implementing the UNSCR 1540 Obligations: Lessons Learned from Strengthening the U.S. Biosafety and Biosecurity Practices and Oversight System	27
Dana Perkins	
Enhancing Biosecurity Culture: The Essential Role of Biosecurity Education	34
Tatyana Novossiolova	

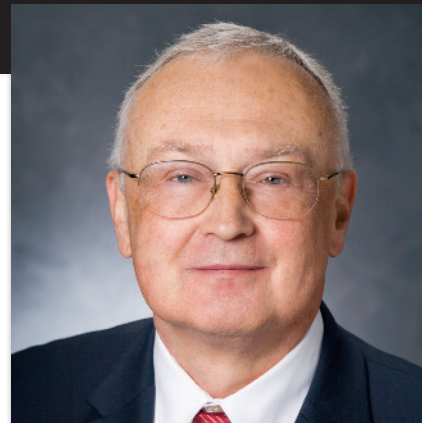
1540 EXPERTS COLUMN

A Busy and Productive Year in 2015 for the 1540 Committee and Its Group of Experts	38
Terence Taylor	

DOCUMENTS AND EVENTS

Former Experts Chart a Path for 1540 in <i>Towards the 2016 Comprehensive Review</i>	41
Joshua Darnell	
Private Sector's Key Recommendations to Regulators and the UNSCR 1540 Legislative Review Process in 2016.....	44
Michael Weiss	
List of Articles in 1540 Compass Issues from No. 1 to No. 9.....	46

From the Editor:



Welcome to Issue 10 of 1540 Compass!

This issue constitutes a landmark for this interactive forum for debating matters relating to UN Security Council resolution 1540 (2004), both internationally and nationally. About four years ago, as the Compass team discussed the concept, format, and internal procedures, skeptics among us doubted its longevity. But optimists prevailed, and the magazine is now ten issues old and counting.

Our primary objective was to develop a shared platform for all 1540 stakeholders, including decision-makers, diplomats, practitioners, the business community, academia, and the public. 1540 Compass is a unique outreach endeavor in that sense. Readers have contributed over 70 letters to our Discussion Forum, a regular feature in each issue. Contributors to the Discussion Forum describe relevant programs, share highlights of 1540-related events, and discuss problems encountered and solutions devised while putting the resolution's mandate into effect. Our corporate body of knowledge and insight into proliferation-related matters has grown markedly owing to readers' input.

At the end of this issue you will find a complete list of over 90 articles published since the magazine's founding. They cover a diverse range of topics—fittingly in view of UNSCR 1540's comprehensive nature. Writers have reviewed educational programs, international, regional, and national perspectives on weapons proliferation, individual organizations' contributions to the fight against proliferation, and much more. Compass articles represent a reservoir of innovative and thought-provoking ideas—ideas much needed to make this year's Comprehensive Review a success, and in turn to make 1540 implementation effective and sustainable.

After all, UNSCR 1540 is not an ordinary resolution; it is an emerging international institution with a mission crucial to the common good. In the coming years as over the past four years, the Compass will help nurture those principles and actions that make the resolution a solid, long-lasting bulwark against proliferation.

As always, we look forward to your contributions!

A handwritten signature in black ink, appearing to read 'Igor Khripunov', with a long horizontal flourish extending to the right.

IGOR KHRIPUNOV
EDITOR, 1540 COMPASS
CENTER FOR INTERNATIONAL TRADE & SECURITY



1540 COMPASS
DISCUSSION FORUM

Please send letters for the Discussion Forum to Editor in Chief Igor Khripunov at i.khripunov@cits.uga.edu. Letters should not exceed 500 words.

**C B R N S E C U R I T Y A N D
M I G R A T I O N F L O W**

The influx of migrants into the European Union does not stop. And it will not stop so soon. Those are the facts. And we better face it at the beginning of any story. Everything else is just plans and nice (bed) wishes, or predictions.

We have a few more facts. Most migrants come from Syria, with the majority being males between 20 and 40 years old. Syria possessed huge quantities of chemical weapons, and ISIS is currently threatening Europe with chemical and biological attacks. It is easy for terrorists to enter the European Union within the huge masses which arrive on the shores of Europe every day. It is not possible to screen every person, or his or her possessions, in a proper way.

Now we can choose what we shall do. We can turn our heads from the facts or we can face them.

Chemical, biological, radiological, and nuclear (CBRN) security issues have been hardly mentioned in regard to this migration problem. You can find few words in the media reports, and only when they refer to ISIS threats. It is hard to find anything about plans for CBRN protection or CBRN security inspection of the people coming from the areas where we know chemical weapons existed (or still do exist).

So far the migrant flow routes and reception centers have been well-established in southern and southeastern Europe. The migrants travel in a rather organized way from Greece to Germany. These organizational measures greatly improved the security situation in those countries—especially if we

compare them with the situation that prevailed prior to the organized flow routes when the migrants simply moved through those countries, walking along the roads without much organized control.

But those organizational measures, in my view, lack something. There are no CBRN inspection teams on the stages of those routes, which are located on the borders between the European countries. More and more razor wire has been placed along European borders, but no CBRN inspection teams.

We should not forget these issues, whatever will be the future course of action of the European Union regarding the arrival of the migrants in its territory. And the CBRN security agencies should be more vocal about this issue in any future operational plan. CBRN security should be a priority in Europe today.

Antonio Vulas
CROATIA

U N S C R 1 5 4 0 A N D O S C E

The 1540 Compass starts 2016 off with its tenth issue, highlighting the continued international consensus that underlines the goals outlined in UN Security Council resolution (UNSCR) 1540 and subsequent Security Council resolutions that have extended the resolution's mandate. Particularly gratifying, in December last year, I participated in the Organization for Security and Cooperation in Europe's (OSCE) launch of the Forum for Security Cooperation Informal Group of Friends on UNSCR 1540, which

will help to further implementation activities at the regional level.

Nearly five years have passed since UNSCR 1977 extended the mandate of the 1540 Committee and its Group of Experts for ten years—a somewhat unprecedented mandate extension that I continue to see as the right approach to a resolution that requires strategic implementation and the time to address the ever-changing landscape of terrorism. In my current role as Head on Antiterrorism Issues at the OSCE, in addition to helping to promote UNSCR 1540 and its mandate, I note that the Islamic State in Iraq and the Levant, also known as Daesh, the Al-Nusrah Front, and all other individuals, groups, undertakings, and entities associated with al Qaeda make it imperative to reinforce the efforts in support of UNSCR 1540 leading up to its Comprehensive Review in 2016.

UNSCR 1540 remains a key component to raise the bar of standards, as the threat of nonstate actors remains a battleground in the fight against the proliferation of weapons of mass destruction (WMD) where we must remain consistently engaged. The OSCE's launch of its Informal Group of Friends demonstrates that regional efforts, as envisioned in UNSCR 1977, remain part of an overall approach that positively makes up the work plan for the 1540 Committee and its Group of Experts, along with the support of the UN Office for Disarmament Affairs.

Thomas Wuchte
HEAD ON ANTITERRORISM ISSUES
OSCE

PURSUIT AND USE OF CBRN BY VIOLENT NONSTATE ACTORS

The use and pursuit of CBRN weapons by violent nonstate actors (VNSAs) is a serious policy conundrum. Up until now, attacks with CBRN carried out by VNSAs have usually not been terribly dangerous, but there are some notable exceptions. Nor have such attacks been very common. But the use of such weapons by VNSAs has serious potential to make a nonstate actor cataclysmically deadly.

Over the last twenty years, there has been tremendous growth in research on the pursuit and use of CBRN weapons by VNSAs, and on the factors

that make such organizations more or less likely to pursue and use such weapons. This research has been very limited, though, because a great deal of it has been focused on anecdotal evidence, the comparison of a small number of cases, or examining the general terrorism literature to draw conclusions. Very little of this research has looked at data collected on VNSAs that have both used or pursued such weapons and those that have not used or not pursued such weapons in order to control properly for the factors that make such pursuit and use more or less likely.

I hope to contribute to the 1540 Compass a paper which will discuss research done with the Big Allied and Dangerous Dataset, a dataset of terrorist organizations which we have used to identify the factors that impact the pursuit or use of CBRN weapons by VNSAs. One of our key findings is that the focus of much of the literature on religious ideology as either the primary or one of the primary factors that help to identify a VNSA as likely to pursue or use CBRN weapons is not supported when quantitative analysis across organizations is used.

Victor Asal
CO-DIRECTOR OF THE PROJECT ON VIOLENT CONFLICT
SUNY-ALBANY

ETERNAL DILEMMA: "NONPROLIFERATION— COMPETITIVENESS"

States' efforts to adopt and enforce effective measures to establish domestic controls to prevent the proliferation of nuclear, chemical, or biological weapons and their means of delivery—including by establishing appropriate controls over related materials, as provided for by UN Security Council resolution 1540—will inevitably encounter a contradiction between nonproliferation concerns and the need to raise the competitive capacity of the national industry.

On the one hand, strengthening nonproliferation regimes and national security requires tightening control over transfers of goods, equipment, and technologies that can be used to develop and manufacture mass-destruction weapons and their delivery systems, mainly ballistic missiles. On the other hand, states are interested in easing administrative



barriers, creating a favorable environment to promote high-tech exports. In this regard I would like to voice my opinion:

1. Export controls are not aimed at banning transfers but at ensuring that sensitive items sold abroad are used exclusively for their stated purpose.

2. Exporters in all countries that have established national export control systems are in the same situation: they are required to go through similar export control procedures to obtain the export licenses for sensitive items. Thus, complaint that exporters in other countries are in a better competitive position are baseless. No one has a competitive advantage in this domain.

3. Administrative problems in obtaining export licenses exist, however. Exporters must compile and submit sets of documents and then wait while the authorities study the applications and issue the licenses. Nevertheless, it is possible to ease the regulatory burden in several ways:

- First, through amendments to the checklists that are developed, as is well known, within international export control regimes. Today these lists contain only the goods and technologies that are the most sensitive from the point of view of meeting the regimes' goals. That is why many items have clearly defined technical specifications. In the course of further amendment of the lists, these specifications could be changed while items that are broadly used for civil purposes could be gradually withdrawn from control.
- Second, through shortening the time period whereby the government studies applications for export. Introducing electronic document flow and improving interagency work would accelerate the process. For example, Russia cut the time for processing applications by half in October 2014. Only 15 days are envisaged for this procedure today.
- Third, through work with exporters. Export Update conferences and regional conferences and seminars attended by thousands of representatives from the business

community are held annually in the USA. These events are aimed at raising suppliers' awareness of export control requirements and encouraging them to commit to smooth export operations. Many countries have also developed and successfully implemented corporate export control systems (internal compliance programs in the USA, in-house export control programs in Russia). Methodology guidelines were developed to render organizational and methodical assistance to Russian exporters developing and implementing such programs.

- Fourth, through providing incentives to exporters. In Russia, for instance, legal entities and individual entrepreneurs who develop in-house export control programs and obtain certificates of state accreditation are eligible for a general license.

Thus, the dilemma between nonproliferation and competitiveness is forever, but its acuteness will continue to ease through the abovementioned ways. Such approach meets the national interests of all countries who contribute to strengthening nonproliferation regimes and will promote the implementation of UNSCR 1540.

Nikolay Revenko
SENIOR RESEARCH FELLOW
FINANCIAL UNIVERSITY UNDER THE GOVERNMENT OF THE
RUSSIAN FEDERATION

SECURITY CULTURE IN THE MEDICAL FIELD

Over the last two years, *1540 Compass* has carried several articles describing efforts to assess nuclear security culture. We would like to share with readers Malaysia's initial endeavor in this domain. A similar project is currently being implemented at two Malaysian health-care facilities. The project's focus is on radioactive (RA) sources and constitutes our first-ever attempt to apply the International Atomic Energy Agency (IAEA) security-culture self-assessment draft methodology to the medical field.

Radiation safety measures are well-regulated and practiced, as facts about the deleterious effects



(genetic and deterministic) of non-controlled usage of radiation are integral to basic radiation-safety training programs. However, security controls are a recent development, as physical-security features were only installed in recent years. Most medical RA sources are Category 1, signifying a serious threat if these sources were diverted to illicit uses, and thus there is an express need to inculcate a strong security culture at these premises. It is important to introduce practical and user-friendly security self-assessment methodologies for ease of implementation.

Medical institutions are far more accessible than extremely well-secured nuclear power plants. Hospitals are open 24 hours, are very service-oriented, and will accommodate any person who enters their premises for a health check. Moreover, there will be a multitude of other people at any medical facility during visiting hours. In addition to such possible external threats, an insider threat from apathetic, disgruntled, or aggrieved staff is another problematic factor.

With this in mind, it was decided to introduce security culture at all medical institutions that handle RA sources. A National Workshop on Security Culture for Radioactive Sources at Medical Institutions was held in December 2014 to introduce:

- The concept of security culture
- The principles of physical protection systems
- RA security-culture self-assessment

Twenty-eight participants, including a pathologist, a chemist, medical physicists, medical laboratory technologists, security officers, and regulatory personnel attended this workshop. The consultants were from the Center for International Trade and Security (CITS) and the IAEA. A second workshop, held in April 2015, introduced the concept and methodologies of security-culture self-assessment for medical institutions. There were 29 participants with three IAEA consultants.

An IAEA Expert Mission on Support for Security Culture Self-Assessment Trial at Medical Institutions was held recently, in December 2015. The 19 participants were from the two medical institutions doing the pilot self-assessment survey and from the regulatory staff. The consultants were appointed by the IAEA.

The characteristics (obtained from the Model of IAEA Security Culture) used were:

- Management system: operation and maintenance, visible security policy, role and responsibility, work management, and training and qualification
- Leadership behavior: effective communication, involvement of staff, and motivation
- Personnel behavior: personal accountability, adherence to procedures, and self-assessment (new)

The indicators based on the above characteristics were adapted to suit the local conditions at the two different premises. Twenty-four to 30 survey statements were prepared and refined by the self-assessment teams.

At both institutions, the pre-pilot assessment was done after a short briefing explaining the purpose of the project to the participants. Different categories comprising medical officers, scientific officers, laboratory technologists, administrative staff, and maintenance personnel took part in the survey.

This first attempt at self-assessment found that most of the participants could not fully understand the survey statements. As they were from various disciplines, there was a great disparity in their overall comprehension. It was then decided to translate the survey questions into the national language. A pilot self-assessment with survey statements in the national language was carried out in mid-January 2016 for a larger audience, while in February 2016 another expert mission from IAEA assisted with analyzing the survey results and training staffs to conduct interviews and observations.

Staff members have shown incredible earnestness for making security culture part of their working life in addition to their vital task of patient care. Where there was apathy towards security, there is now greater vigilance. Constant motivation will ensure that security culture is maintained and security elements implemented.

Malaysia will continue with the initiative to facilitate security-culture self-assessment practices efficaciously—enhancing the security consciousness



of all staffs towards medical RA sources.

Dr. Pirunthavany Muthuvelu and Ms. Noor Syakeera
Mukhelas
MINISTRY OF HEALTH
MALAYSIA

DESIGNATED LABORATORIES FOR
THE UNITED NATIONS SECURITY
GENERAL'S MECHANISM

The United Nations has invited member states to designate analytical laboratories to support investigations of alleged uses of chemical or biological weapons in accordance with the UN Secretary-General's Mechanism (UNSGM). The UNSGM is relevant to UNSCR 1540 because such investigations of alleged use of chemical or biological weapons may be launched regardless of whether these acts were perpetrated by individuals, entities, groups, or governments. An international workshop was held from November 9-11, 2015 in Spiez and discussed the necessary steps to establish a global and functional network of analytical laboratories for biological weapons. To gain full acceptance, such a network must meet stringent requirements similar to those governing analytical laboratories for chemical weapons.

In the case of chemical weapons, a network of designated laboratories has been established by the Organization for the Prohibition of Chemical Weapons (OPCW). This network is available to Secretary General Mechanism (SGM) investigations, and in 2013 it confirmed the use of sarin nerve agent in Syria. As for biotoxins, the OPCW has begun developing a capacity for conducting analyses of environmental samples containing toxins. The number of OPCW-designated laboratories capable of undertaking such analysis remains limited, as does the range of toxins tested.

There is, today, no similar network to investigate the use of biological weapons. This is why Switzerland decided to organize a series of expert workshops to discuss the necessary steps to establish a network of designated laboratories in the field of biological weapons. The objectives of the first of three workshops were to:

- Clarify the tasks of designated laboratories in investigating alleged uses of biological weapons
- Discuss how the designated laboratories can fulfill these tasks
- Identify steps to ensure that designated laboratories meet international requirements in order to gain full scientific and political acceptance

Fifty-two participants from 15 countries (Australia, Canada, China, Denmark, Finland, France, Germany, Norway, Portugal, the Russian Federation, Singapore, Sweden, Switzerland, the United Kingdom, and the United States), the UN Office for Disarmament Affairs (UNODA), and the OPCW attended the workshop. They included arms-control and technical experts from a range of laboratories with relevant scientific competence. The findings of the workshop are summarized in a report. The document sets out next steps that the participants considered necessary for developing a trusted international laboratory network to investigate allegations of the use of biological weapons.

SGM guidelines and procedures require designated laboratories to identify and classify agents used—in environmental and clinical samples—while compiling other information that may help investigators attribute a possible release to the culprits. To date, a few dozen laboratories have been designated by UN member states. Little is known, however, about their capabilities and capacities. The laboratories submitted information as part of their designation process. But based on this information alone, member states are unable to assess whether the labs meet the high standards necessary to justify confidence in an investigation's findings.

Worldwide, many high-quality laboratories cover human, animal, and plant pathogens as well as toxins. However, some biological agents of interest in the context of biological-weapons investigations are of little interest to public health. What is missing is a dedicated network of laboratories that maintains the scientific competence necessary to analyze samples related to a possible use of biological weapons while meeting forensic and procedural requirements and withstanding the scrutiny that accompanies such an investigation.



The experience of a number of national, regional, and international networks and initiatives mentioned in the workshop report could offer a starting point. Laboratories that take part in SGM investigations cannot afford to report false positive or negative results. For this type of investigation, quality assurance and validation of methods and procedures is of utmost importance. Furthermore, laboratories must adhere to rigid administrative and reporting requirements, and demonstrate a strict chain-of-custody of samples. Advances in life sciences are expected to increase the capacity for biological analysis and create new opportunities for investigating biological incidents. Automated commercial systems, however, frequently operate as “black boxes,” rendering an assessment of results obtained difficult. This is a disadvantage in a political context.

At a fundamental level, there is the question of what the term “identification” means in the context of a biological-weapons investigation. Another important issue is how reliable and comprehensive reference data libraries on biological agents are, and how easily designated laboratories can gain access to them. A peer-to-peer network of designated laboratories carrying out confidence-building exercises would enhance mutual trust in the validity, accuracy, and traceability of reported and recorded results. Such a network must be approached step-by-step with a long-term view. The process should start with sharing information about existing capabilities and capacities and continue with a range of benefits for the laboratories, such as opportunities to collaborate and share best practices.

This process will rely considerably on the resources and expertise of UN member states and on the willingness of their laboratories to form a trusted laboratory network on a voluntary basis. Switzerland and Spiez Laboratory stand ready to provide a platform for further progress on these issues.

Stefan Mogl and Cédric Invernizzi
SPIEZ LABORATORY

EUROPEAN COMMISSION JOINT
RESEARCH CENTER EXPORT
CONTROL CAPACITY BUILDING
INITIATIVES: STAYING RELEVANT
FOR 1540 IMPLEMENTATION

After 11 years of implementing UNSC resolution 1540, many of us can testify to the variety of export control components which must be developed, maintained, and kept up to date to fulfill the resolution's requirements. Considering the complexity of the topic, we must not only do more and do it well, but we must also constantly explore new ways to do better. Some of the recent European Commission Joint Research Center (JRC) initiatives described hereafter are examples of good practices. They are creative and complementary activities designed to be part of this required constant effort to keep international trade from contributing to the proliferation of weapons of mass destruction.

In 2013, the European Union economy generated 15.4 percent of all exports worldwide and 20 percent of world R&D investment. These global figures alone outline the extent to which efficient strategic trade controls are necessary to the fulfillment of the European Union's nonproliferation commitments and strategy. Moreover, through the European Commission and some member-state programs, Europe is a major player in the global capacity-building effort. In this context, building capacity in the European Union is essential, and the Joint Research Center of the European Commission has developed activities to contribute to the constant effort required from its member states to maintain effective controls.

For several years, the Nuclear Security Unit (NSU) of the Institute for Transuranium Elements, established in Ispra, Italy, has conducted seminars and workshops for EU member states, as well as for partner and candidate countries, to discuss the best ways to tackle export control challenges. It has actively cooperated with other international programs such as the U.S. Department of Energy's International Nonproliferation Export Control Program. More recently, the NSU undertook two additional innovative, if not unique, capacity-building initiatives.

The first prominent initiative was a SimEX pilot simulation exercise designed to address issues related



to cooperation and decision processes. In March 2015, with support from the EU Commission's directorate-general for taxation and customs union and directorate-general for trade, the JRC organized a pilot three-day export control simulation exercise. It involved EU experts from different member states, playing scenarios featuring two fictitious member states' licensing and customs services.

The tabletop exercise was not a competition between two teams, but rather a challenge to compare diverse national and professional approaches to common export control challenges. Seventeen participants from 13 EU member states took part in preparations for the exercise or in the exercise itself. The exercise revolved around export control licensing and customs processes, fraud cases, and the preservation of legitimate trade. Unlike the World Customs Organization's (WCO) recent Operation COSMO, the exercise was run in a fictional environment in order to bypass sensitivity issues and focus on chosen challenges.

Despite its complexity and pilot nature, the exercise successfully achieved its five objectives: confronting member states' implementation practices; enhancing the EU network of practitioners; identifying communication and cooperation challenges; elaborating proposals for improving EU export controls; and drawing lessons learned for further EU-wide capacity-building. One full day was dedicated to debriefing after two days of simulation. Part of the value added from the exercise was to reveal or outline challenges related to details of policies, processes, and practices which may not surface in workshop discussions.

The combination of freedom of decision, a relatively realistic environment and background of legitimate trade, realistic case scenarios, and the experience brought by participants made such an achievement possible. SimEX 2015 raised interest within the European Union, but also from the WCO and international assistance programs from the European Union and the United States. Some lessons learned and simulation materials will be used in other capacity-building programs, including a JRC-led nuclear security exercise in Southeast Asia in 2016. Some participants also suggested using this type of approach to test the effects of inserting new measures into existing control processes and economic environments.

A second original initiative was the development of a collection of items that customs officials could find themselves called on to evaluate during dual-use technical assessments. The items are essentially test and production equipment, including around 10 heavy-equipment devices (e.g., machine tools, quality-control machines, chemical tanks and reactors, and nuclear installations) and more than 15 smaller components (e.g., vacuum components, protective equipment, and non-nuclear material samples). Some of these items were included in a transportable demonstration suitcase. This collection complements training kits used by other assistance programs by bringing a different dimension. Each of these items can support specific teaching points in terms of technical rating, export control violations, catch-all clause implementation, or commodity identification.

Physically confronting trainees with controlled items can multiply the efficacy of lectures and written training material. For many export control practitioners in customs, licensing, and other communities involved, this is a unique opportunity to see and touch items otherwise never or rarely encountered. They can discuss the items with technicians who use them, and put tangible reality behind abstract technical descriptions of dual-use material equipment and components. This also provides an opportunity to grasp the possible differences between specifications on paper and the actual capacities of components and equipment. The JRC's position in this regard is quite unique: at the same time it is a public organization involved in export control capacity-building and a facility where dual-use material, components, and equipment are used, often for non-sensitive activities.

As the 1540 review conference approaches, it is important to keep in mind that export control implementation was, is, and will remain a challenge. Many international capacity-building programs and activities exist, but they require constant work and adaptation to remain relevant. The JRC has an important contribution to bring to this global effort.

Renaud Chatelus
SENIOR RESEARCHER AT UNIVERSITY OF LIEGE,
SENIOR FELLOW AT UNIVERSITY OF GEORGIA, CITS,
FORMER VISITING SCIENTIST AT THE EUROPEAN
COMMISSION JOINT RESEARCH CENTER





Communicating Front-End Nuclear Security

Cindy Vestergaard,

DANISH INSTITUTE FOR INTERNATIONAL STUDIES (DIIS)

The 2005 Amendment to the Convention on Physical Protection of Nuclear Material (CPPNM), once in force, will expand cooperation between and among states regarding rapid measures to locate and recover stolen or smuggled nuclear material, mitigate any radiological consequences of sabotage, and prevent and combat related offenses. This will require more interaction between industry and governments to encourage a nuclear-security dialogue. It also will encourage greater transparency in communicating to the public and other stakeholders that the industry and its regulators have systems in place to respond to a security incident at any stage of the nuclear fuel cycle, including uranium mining, milling, and transport.

"URANIUM SECURITY"

Since the first Nuclear Security Summit of 2010, the focus has been on reducing and securing the most sensitive nuclear material, such as highly enriched uranium or separated plutonium, materials considered "direct use" for nuclear weapons. Source materials such as uranium ore concentrates (UOC), commonly referred to as "yellowcake," have generally not factored into the discussion since the quantity of uranium required to fabricate a nuclear device is so large (ten tons of uranium or approximately 35 drums of UOC)

and the materials have to go through a number of sophisticated steps such as conversion, enrichment, reconversion, and assembly before producing material suitable for use in a nuclear weapon. That said, in states beset by weak governance, there is a risk of diversion or unauthorized removal from the mine or mill, or during storage and transport by outsiders, insiders, or a combination of the two.

The insider/outsider risk has been demonstrated during a number of incidents over the years. In September 2009, two employees of the Rössing Uranium Mine in Namibia and a member of the Namibian Defense Forces were arrested trying to sell 170 kg of UOC to an undercover police agent.

In India in 2003, 225 grams of UOC were allegedly purchased from a mining employee by members of a Bangladeshi jihadist group, and in 2008 another group was caught moving an illicit stock of uranium over the border to Bangladesh, having been assisted by the son of an employee at India's Atomic Minerals Division.

A paper delivered at an IAEA Technical Meeting on Implementation of the Sustainable Best Practice in Uranium Mining and Processing in October 2008 declared that a total of 91 incidents reported between 1993 and 2007 involved illicit trafficking in natural uranium.

These incidents underscore how uranium becomes more attractive and vulnerable when it reaches



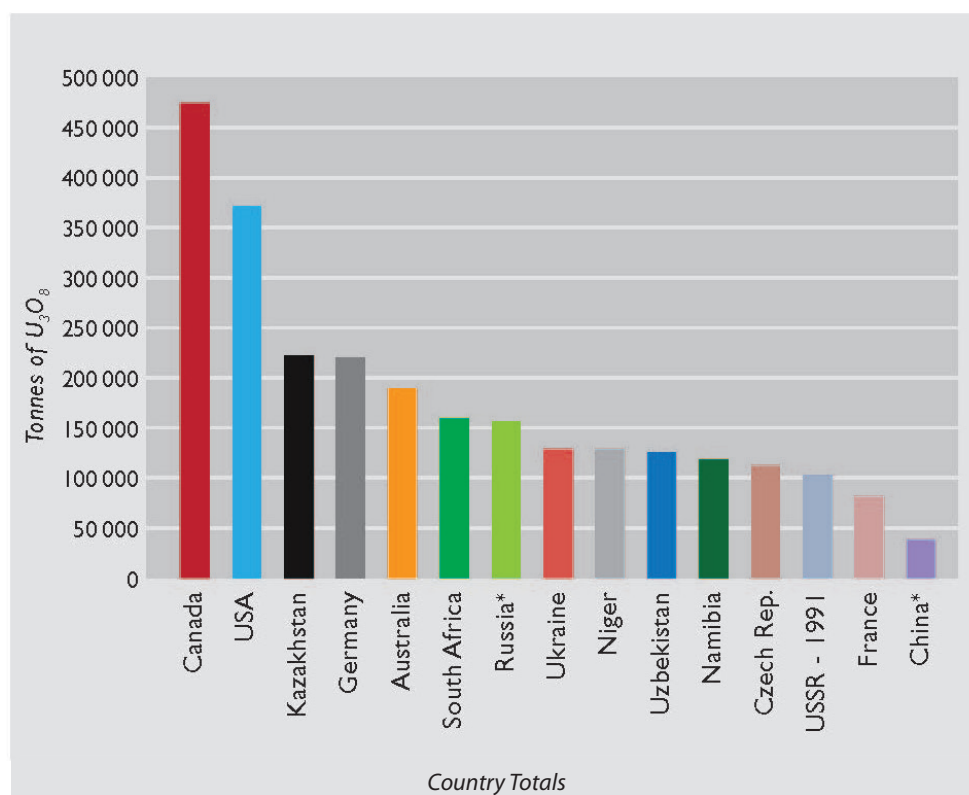
concentrated form or is further precipitated or purified, stored, and transported. They also highlight how the risk of such scenarios increases if inventory, accountancy management, and tracking procedures are poor and the facility is located in a state that has limited regulatory oversight. In such countries, mining companies normally go “beyond compliance” to install security measures to mitigate industrial sabotage and unauthorized removal or misuse of UOC. These measures need to be better communicated to neighboring countries and the public, not only to inspire confidence in a state’s regulatory systems and implementation, but also to instruct the public in how it should respond to a security event.

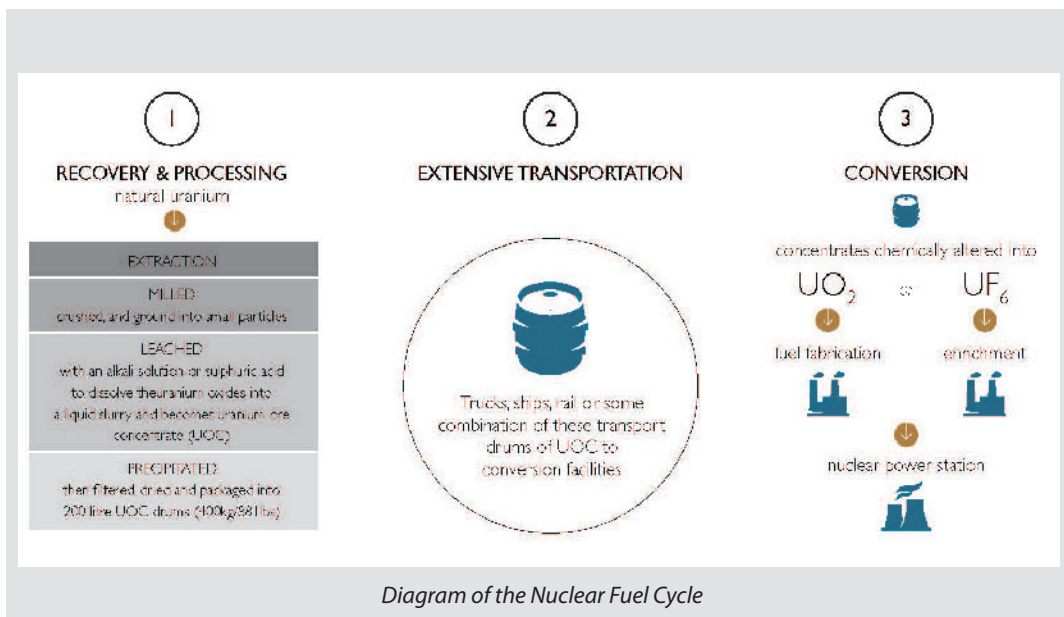
THE NUCLEAR SECURITY FRAMEWORK

The nuclear-security regime is governed by three international instruments: the 1987 Convention on the Physical Protection of Nuclear Material and its 2005 Amendment; the 2007 International Convention on the Suppression of Acts of Nuclear Terrorism (ICSANT); and UN Security Council resolution 1540 of 2004. Since 1972, the IAEA has also circulated the voluntary guidance document *Recommendations for the Physical Protection of Nuclear Material*.

The most recent revision was published in 2011 as Nuclear Security Series no. 13, “Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities” (INFCIRC/225/Rev. 5). The provisions in all these instruments apply to UOC. The CPPNM and INCIRC/225 state that natural uranium should be protected in accordance with “prudent management practice,” while ICSANT requires states to take practical measures to prevent, counter, and criminalize acts of terrorism related to nuclear materials—including UOC. UN Security Council resolution 1540 binds all UN member states to implement “appropriate” and “effective” accountancy and physical-protection measures over “materials... covered by the relevant multilateral treaties and arrangements, or included on national control lists.” However, none of these instruments describes specific measures that could be considered “appropriate,” “effective,” or “prudent.”

All of the instruments also encourage, but do not formalize, the exchange of information among states parties and international organizations. The CPPNM and ICSANT have provisions for developing guidance and for exchanging information, but their mandates and incentives are weak. UNSCR1540 does mandate regular reporting from countries on how





they prevent the spread of weapons and materials of mass destruction and their delivery systems, but compliance is uneven, as is the quality of reports. Unlike nuclear safeguards, a domain where reporting and verification build confidence in NPT compliance, nuclear security is considered a matter of national sovereignty and thus is exempt from international oversight. Consequently, a wide range of front-end security measures and practices is in place across uranium producers.

The need for states to implement, enforce, and communicate security measures is growing as the 2005 Amendment to the CPPNM inches closer to ratification, extending the convention's provisions from the protection of nuclear material during international transport to nuclear materials and facilities in domestic use, storage, and transport. The Amendment reached a milestone in July 2015 when the United States deposited its instrument of ratification, the remaining permanent member of the UN Security Council to do so. The Amendment will enter into force when two-thirds of CPPNM states parties have ratified it. As of March 1, 2016, 93 of 153, or 61 per cent of total states parties, have ratified the Amendment. Nine more ratifications are needed for it to enter into force.

"URANIUM SECURITY" AND SUSTAINABILITY

The majority of governments and uranium mining companies have security measures in place to mitigate unauthorized removal and misuse of source materials. In reaching out to all stakeholders, states and multinational companies should establish regional networks for information exchange and also invest in building interaction with the media and nongovernmental organizations. The challenge is to ensure a balanced approach between information-sharing and information security.

The rationale against transparency in nuclear security is that confidentiality is necessary to make theft, sabotage, or unauthorized access more difficult to undertake. Security also involves prevention along with deterrence, detection, and response, where the balance between sharing and restricting information may differ among them. States and regulators, for example, may be willing to share some details in confidence with the IAEA and its members that they would not share with the public, while operators may be willing to share information within their national networks or supply chains provided it is not shared with foreign operators.



A review of corporate profiles along the nuclear supply chain by researcher France Bourgouin reveals the conspicuous absence of the mention of proliferation risks in wider sustainability risk assessments and in stakeholder engagement processes. She notes that nonproliferation is mentioned in corporate governance material, but that its exclusion as a material sustainability issue creates a missed opportunity for companies to use effective sustainability practices already in place (such as reporting on ethically, socially, and environmentally responsible practices) towards building an industry-wide culture of security. Conversely, including nonproliferation would encourage the development of corporate practices for the promotion of nuclear security.

Accountability within the nuclear-security regime is dependent upon the quantity and quality of information available to build confidence that all nuclear and other radioactive materials are adequately protected to ensure effective nuclear security. UOC is a high-value commodity, and industry does take security measures to protect its product, particularly in heightened security environments. In other words, corporate attention to security strengthens the nuclear nonproliferation and nuclear-security regimes—even if companies are not presenting them in this way. Identifying and communicating performance indicators grounded in nuclear-security standards will therefore strengthen market mechanisms that reward superior sustainability performance while stimulating public and stakeholder engagement.

Companies (and governments) will have to take into account the interface with nuclear safety and safeguards, which tends to blur but can be clarified if states, operators, and the IAEA begin to share information. Such exchanges are critical to building and maintaining the confidence of states in nuclear security. They are also critical to public confidence. A major loss of popular confidence would challenge the nuclear industry as a whole while calling the role of regulators into question—not only their capacity to develop effective regulations, but also to employ and exercise oversight over skilled staffs. To this end, developing information-sharing mechanisms for front-end nuclear security will need to strike a balance between enhancing confidence and minimizing misperceptions and compromising proprietary or classified information.

CONCLUSION

The globalization of supply chains and a growing need for nuclear energy, along with an opening of uranium supply from regulated markets to states with relatively weak governance, have placed a greater responsibility on governments and multinational companies to put security measures in place at uranium mines and mills, as well as during transport. Once in force, the CPPNM Amendment will make such prudent measures mandatory. Industry governance and self-regulation are proven to be powerful tools for enhancing operational performance in a variety of domains, including environmental protection, occupational and public safety, and health. Including nuclear security as a sustainable material issue will emphasize how nuclear security is most effective when it is comprehensive, covering the state, industry, and other stakeholders across the entire nuclear fuel cycle.



About the Importance of Security Culture for Computer Security Effectiveness

Carsten Speicher,
MINISTRY OF ENVIRONMENT, CLIMATE PROTECTION, AND
ENERGY SECTOR
BADEN-WÜRTTEMBERG, STUTTGART, GERMANY

Media regularly report on cyberattacks carried out by more or less organized cyber criminals, or by people whose motivations usually remain unclear. While technical defense is important, it has limited effect if it is undermined by employees who do not follow security policies, either because they find them inconvenient, do not know them in detail, or do not understand why they are necessary. The best security technology is not sufficient if employees do not understand their roles and responsibilities for safeguarding sensitive data and protecting company resources. The commitment of any employee is essential for an effective cyber defense. This means a critical part of any cyber strategy has to pay attention to the human aspects of the organization. Without knowing the current state of the security culture and describing the desired state, any attempt to improve it will fail.

COMPUTER SECURITY AND NUCLEAR SECURITY CULTURE, TWO SEPERATE WORLDS... REALLY?

Can computer security be assessed without taking the security culture into account? Computer security experts brilliantly summarized the intricate situation years ago:

The enemy is everywhere and it is complacency. With the security “industry” well into its second decade, we have a highly evolved enemy. This enemy has neither a face nor a voice, neither a dossier nor a tangible background; it doesn’t even have a name. The only way we know it exists is by measuring our progress, or lack thereof. The new enemy is complacency.... We have become complacent—just as we did before

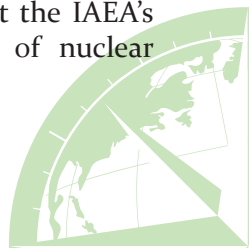
September 11th, 2001.... We only react. We do not pro-act. We do not prevent until something happens. And then it’s too late. Far too late.... But we must deal with the complacency that comes from “nothing happening.” But what happens to the human psyche when “nothing happens”? We believe we are invincible. That nothing can happen to us. We forget our vulnerability and frailty. We forget that “bad stuff” can happen. Until the next catastrophe....¹

The goal therefore must consist of developing, maintaining, and promoting a positive security culture that must be anchored in employees’ attitudes and beliefs. This should be evident in staff’s behavior, but it remains unseen—or rather, it is invisibly implemented in the conscience and beliefs of employees.

The staff’s behavior, however, is supported by the actions of leaders, and therefore it has to be ensured that security is “owned” and lived by all employees, not just by a few experts, e.g., in computer security functions. The main goal is to encourage people to view security not as something restrictive or an obstacle but as something that enables the organization to work in its entirety.

It is therefore not enough to introduce new procedures, rules, or even special equipment when deficient values, orientations, definitions, and goals remain in place. Any part of the workforce may fall victim to social engineering by inside or outside attackers, or may be misused as an involuntary “source of information” to support an outsider’s cyberattack. A highly developed and living security culture enables a person to appropriately respond to such familiar and unfamiliar security threats.

As adversary capabilities change and threat scenarios constantly evolve, a security system must be able to evolve rapidly as well. One should adapt the IAEA’s generic model for the self-assessment of nuclear



security culture² to computer security. To nurture an effective security culture, it is mandatory to evaluate the cultural basics that are anchored within the organization, as well as within the individuals who comprise the workforce. As the IAEA generic model does not contain any restriction to any nuclear technology, this concept can be applied to computer security in similar fashion.

The technology and the protagonists may vary. However, the actors are humans who may be characterized, for example by their motives. Those who attack computer systems can be generally categorized into four main groups:

1. Individual hackers (mainly motivated to show what they are able to do)
2. Activists or hacktivists (focused on raising the profile of an ideology or political viewpoint, e.g., by creating fear or disruption)
3. Organized criminals (focused on financial gain, e.g., through phishing to sell stolen companies' secrets)
4. Governmental "actors" (focused on improving their geopolitical, global, or financial position)

It may be impossible to detain these in every case, but they can be at least detected swiftly and delayed. A threat emanating from cyber criminals can be described as a combination of the actor's capability, its intent, and, last but not least, the opportunity given to them to plan and perform the deed (Figure 1).

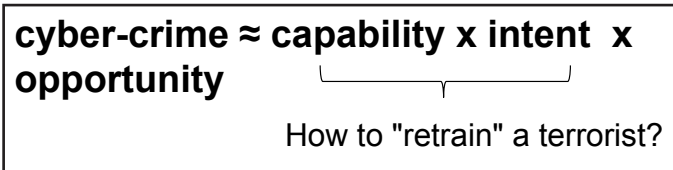


Figure 1.

The Essential "Ingredients" for a Cyber Crime

The operator will do well not to be naïve or careless, thinking that there is no real threat or falling into a kind of fatalism ("whatever may happen, will happen," the anthem of carelessness). Maybe it is not possible to retrain terrorists, but it is possible to spoil the opportunity for them. What should be taken into account to reduce the probability of a successful cyberattack? First let us take a look at the reasons for breaches into computer security. According to the German Federal Office for Information Security, the most frequent reasons for these breaches can be summarized as follows (emphasis added by the author):

- No *applied* patches
- Available security tools not *activated*
- Vain, trivial, or predictable *passwords*
- Nonexistent or partial network security and *surveillance*
- External network access *granted*
- No *checking* for external media (USB sticks, etc.)
- No encryption for mobile devices
- No *documentation* for updating or changing procedures
- No *training* for users
- Unclear *responsibilities*
- Security concepts *inconsistent* or incomplete
- Infection of ICS components via office computers
- *Social engineering*
- *Human errors* and sabotage
- Intrusion via external interfaces

It is obvious that *most of these* are caused or at least exacerbated by a negative human factor. However, potential positive impacts of the human factor—thanks to awareness, vigilance, training, loyalty, and so forth—should not be neglected. Before starting to improve the security culture, consequently, it is indispensable to evaluate the current state of the security culture, positive and negative aspects alike.

One may think that it would help just to set improvement measures into action without knowing the state of the security culture, as improvement is always considered as something positive. However, the security culture in practice is founded on people's basic assumptions, such as the belief that a credible threat exists and that therefore security is important for the company to operate. "Operation" connotes safe and secure operation, something indispensable

to the survival of the company. Although the IAEA strongly recommends and the nuclear community accepts the need to “develop, foster and maintain a robust security culture,” the challenge lies in doing it practically.

Security seems to be the unknown and therefore secret task of specialists who know what to do—or at least are supposed to know what to do—without involving the whole workforce. Much information—for instance, about the design basis threat and detailed security measures—is set forth in classified documents. Not everybody has access to these documents, and those without access do not feel responsible for security. So long as security remains a “mysterious field” entrusted to experts, major parts of the staff will remain ill-prepared to respond to security-related issues.

Even when the staff is familiar with security issues, however, a kind of complacency may take hold over time. The root causes of complacency have been extensively explained before, but they should not be assigned to single members of the workforce. Indeed, complacency may even be “promoted” by the top management, which may view security as a more or less fruitless investment without any clear benefit for the firm. If so, middle management will more or less accept this attitude, and more junior members of the workforce will internalize it as well if nothing else is actively demanded from them.

In other words, leadership by example is simply missing at times. The contributing factors for complacency range from the scarcity of resources, which may affect the whole organization, to the failures of management, which may put low priority on security-related events. If we agree that personal behavior is crucial to a positive security culture, it becomes obvious that the leadership behavior and well-established management systems are contributing factors.

HOW TO FIND OUT WHETHER SECURITY CULTURE IS “ROBUST”

As mentioned before, just stating the need for, ordering, or calling for improvement measures may lead an institution into another famous management trap called “blind actionism.” Blind actionism means acting for action’s sake, without understanding the

context or how an action will fulfill its goals. Senior leadership cannot simply change subordinates’ attitude toward security by ordering them to embrace “appropriate” behavior. People need to understand how “security friendly” behavior will profit the company as well as themselves.

High priority should therefore go to moves that strengthen the overall organizational culture in areas like internal communication and human-resource management. A systematic approach starts with deciding to carry out a self-assessment, to drafting a plan, to executing and evaluating the plan’s results. The process should have an ironclad schedule, lest the leadership be caught in a never-ending story which consists of optimizing the loops of a theoretical procedure without producing practical results. The self-assessment campaign indeed requires tools for optimization, but optimization cannot replace the initial data acquisition itself. For characterizing the state of the security culture, the leadership much to select certain indicators to measure—many of them found in IAEA NST 026, referenced previously.

The collection of indicators, however, is not a closed list. New indicators can be easily derived for any field where security culture needs upgrading, including computer security. Having identified concrete indicators to gauge, one can derive a survey statement to distribute with the organization. The methodology to do so is well-described in IAEA NST 026. The layout of the questionnaire form can be adapted to each particular national culture to avoid prejudice. When drafting the self-assessment form, the leadership should work from a clear and appropriate set of “framework conditions” that are communicated to the survey respondents as well. For our pilot project in Germany, we defined the following set of framework conditions:

- The self-assessment should be accepted by the staff representatives.
- The self-assessment should be actively promoted by leaders and managers.
- *Anonymity must be guaranteed* to those being surveyed.
- Participation of the staff has to be *voluntary*.



- *No one should be punished* as a consequence of the results.
- Participation from 5-10 percent of the staff should be sought for the pilot project.
- Personnel from the organization as well as external advisers should be involved.
- Security-related as well as “non-security-related” personnel should take part, drawn from all levels of the management hierarchy.
- The same questionnaire should be used for any people being surveyed.
- The time needed to fill out the questionnaire should not exceed 30 minutes.

Apart from the framework conditions, the rules for evaluating the results should be set and written.

CHALLENGES FOR THE FUTURE

The data-collection and -evaluation method and its processes must be regularly checked and modified when necessary. Doing so provides an excellent chance to apply the “Deming circle”—plan, do, check, act (PDCA)—continuously improving this management tool (Figure 2).

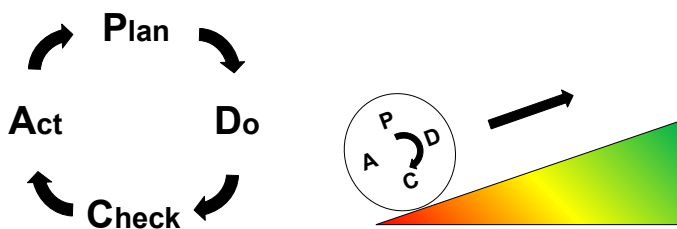


Figure 2. *The Deming Circle Is Not a Vicious One*

It should however been mentioned here that the optimization circle is not something static that rotates around its own center, but rather something to “lift up” the quality of the management tool with each “rotation.” The PDCA circle implies that results are carefully analyzed and that optimization measures are derived. However, we are talking about an optimization tool and not an effort to find gaps in security systems. Keep in mind that a self-assessment of security culture is never able to replace any single

security measure. Rather, it is a useful supplement to support the security system.

Firm leaders in many fields can apply the methodology presented here. It could be adapted to bolster the security of radioactive sources, in both medical and non-destructive-testing uses. It could help safeguard the transportation of nuclear fuel. And, in general, it applies to any field whose endeavors could have critical effects on humans or nature. The methodology is not restricted to areas involving nuclear or radioactive sources at all, so it can be adapted to other disciplines such as biotechnology or the chemical industry with manageable effort. And, of course, it can and should be incorporated into computer security.

1 Stuart McClure et al., *Hacking Exposed 6: Network Security, Secrets & Solutions* (New York: McGraw-Hill, 2009).

2 International Atomic Energy Agency, *NST 026, Self-Assessment of Nuclear Security Culture in Facilities and Activities* (Vienna: IAEA, 2015).

From Asia to the World: Evolution of ISCN/JAEA as a Training Center for Nuclear Nonproliferation and Nuclear Security

Reina Matsuzawa,
INTEGRATED SUPPORT CENTER FOR NUCLEAR
NONPROLIFERATION AND NUCLEAR SECURITY
JAPAN

CAPACITY BUILDING FUNCTION AND COURSE TARGETS

A single country cannot bring about a world free from the threat of nuclear proliferation and nuclear terrorism. Worldwide efforts and collaboration are essential for the ultimate goal of world security. As a player in the international society, each country can contribute to the world efforts in various ways. Support to human-resource development activities is one powerful way.

The Integrated Support Center for Nuclear Nonproliferation and Nuclear Security (ISCN) was established as a means for Japan to commit to Asian efforts to build subject-matter expertise for developing and implementing national regimes on nuclear nonproliferation and nuclear security. Given the fact that the international society has not amassed long practices on nuclear security, a relatively new concept, the government of Japan, together with other countries, recognized the vital importance of human-resource development in this area. At the 2010 Nuclear Security Summit, Japanese delegates announced that Japan was instituting a training center. The training center was launched under a research institute, the Japan Atomic Energy Agency (JAEA), in December 2010.

In the first five years of the endeavor, the Center has increased its training capacity and enlarged its modes of offering support. ISCN could be a good example for other countries that want to establish and implement training centers or centers of excellence (COE) in order to contribute to the world's efforts on behalf of nuclear nonproliferation and nuclear security.

The training division of the Center provides seminars, workshops, and training courses in three areas as shown below. There are also three levels of supporting activities, including international and regional level, bilateral level, and domestic level.

- **International Nonproliferation Framework Course:** Aims at promoting the importance and basics of nuclear nonproliferation and nuclear security to relevant stakeholders. Focus is on fostering a culture hospitable to security.
- **Safeguards and SSAC Course:** Aims at endorsing development and implementation of national regimes in the fields of nuclear nonproliferation and security. Topics vary from the basics of safeguards, to the IAEA Additional Protocol, to the State System of Accounting for and Control of Nuclear Material (SSAC), to inspection techniques.
- **Nuclear Security Course:** Provides an opportunity to share knowledge and practices on developing and implementing national nuclear-security regimes. Emphasis is on physical protection of nuclear material and facilities and related topics.

Regional countries in Asia are the major targets of ISCN capacity-building support activities. First of all, the Asian region has numbers of emerging countries planning to establish nuclear power plants and research reactors, as well as to expand the use of nuclear and radioactive materials for medical and industrial purposes. They should gain domestic



competence to implement appropriate measures against nuclear proliferation and malicious use of nuclear and other radioactive material. Focusing on regional targets gives other benefits as well. By utilizing existing regional cooperation frameworks, the Center is able to efficiently reach high-level stakeholders to cultivate understanding on these subjects. Several regional courses have been conducted through the Association of Southeast Asian Nations (ASEAN) Center for Energy, Forum for Nuclear Cooperation in Asia, and Asia-Pacific Safeguards Network.

The environmental and political similarity among countries in the region also allows effective learning from one another by sharing experiences, challenges, and possible solutions. In addition, active and continuous information exchanges among participants can be expected, utilizing human networks built in the courses and opportunities in other regional activities.

Domestic stakeholders, however, have also become important partners and training targets for ISCN. The more the Center gains knowledge and skills to offer professional training courses, the more the responsibility to utilize its capacity for domestic efforts has increased. ISCN shares information about international trends and practices. Also, the knowledge and skills shared by the domestic stakeholders have helped ISCN experts deepen their practical understanding of the subjects and incorporate new knowledge into the course materials.

Since the Center's establishment, a total of 93 courses have been offered to 2,569 participants from 72 countries (as of November 29, 2015). This number contains the information on the courses categorized in the Center's three main subjects. There are additional courses that do not fall into these categories. Among these, 1,615 participants came from international and regional countries beyond Japan.

NEEDS-ORIENTED COURSE DESIGN

One of the most important policies of ISCN is to develop and tailor training courses based on the needs of target audiences and countries. Needs-oriented



course designs enable the Center to effectively utilize its limited resources while maximizing the success of the courses.

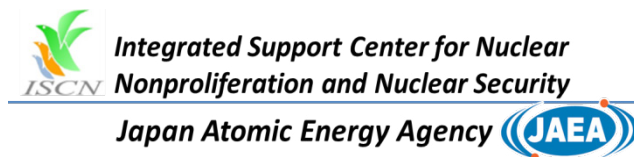
Based on this policy, the Center sent needs survey missions to the regional countries in Asia during the preparation period preceding its establishment. Also, it has continuously conducted needs surveys of approximately three targeted countries per fiscal year. The interests of the target audiences are considered when ISCN determines its activity plans and modifies

existing training curricula. Feedback forms filled out by the course participants assist such activities, as well. Bilateral cooperation activities in particular directly reflect each

partner country's needs.

JOINT OUTREACH AND COLLABORATION WITH RELEVANT ORGANIZATIONS

All needs, however, cannot be answered by ISCN itself. No single training center has expertise in every topic, and all centers have only limited resources. One of the keys of success for a training center is to accumulate strength in focused areas or topics. At the same time, the Center has found opportunities to collaborate with other training centers and relevant organizations in order to respond to target countries' needs. ISCN has carried out joint outreach activities with its partner agencies, utilizing its professional network.



In practice, for example, ISCN has a strong partnership with the U.S. Department of Energy (DOE)/ National Nuclear Security Administration (NNSA)/ Sandia National Laboratories (SNL) in the areas of physical protection and nuclear security. In the early stages of ISCN's development, support from DOE/NNSA/SNL concentrated more on capacity-building within the Center. After several years of such activities, the expertise gained by ISCN has let the Center form an equal cooperation relationship with SNL in certain levels of training courses in the center's focus areas.

Recent ventures in 2015 include holding a Seminar on Nuclear Security in Vietnam, implementing a newly developed curriculum designed for future operators of nuclear power plants, and convening a National Workshop on Evaluation of Nuclear Security Plan in Turkey. Existing SNL curriculum was modified based on each country's needs and applied during these events. In addition, when the Center received a request from Lithuania for a training course on nuclear security across borders, although the area was not the one with its proficiency, the Center staff recognized the importance of the training course and coordinated with relevant organizations to devise topical training. The training course was successfully implemented in 2013 in cooperation with the Lithuania Nuclear Security Center of Excellence, the European Commission Joint Research Center, and the U.S. DOE/NNSA.

Professional networks at the domestic, regional, and international levels cannot be built in one day. Thus, a COE should actively commit to expert meetings, continuously communicate, and cultivate cooperative relationships with relevant organizations. Such human networking is crucial for realizing joint outreach activities, as well as for exchanging information that helps build capacity within a center itself. Also, a training center may conduct constant analysis of its strength and limitations in order to effectively and efficiently correspond with the needs of target audiences.

HARMONIZATION WITH REGIONAL COES

Given the fact that Asia has three COEs with similar focus areas, harmonization and coordination are necessary for effective outreach to regional target audiences. Regional collaboration has additional roles compared to domestic and international collaboration. First, by coordinating course schedules in order not to hold courses on similar topics around the same time, centers can allow regional countries to maximize training opportunities by sending appropriate personnel while avoiding a continuous shortage of hands back in their offices. Second, having undergone one course where key learning concepts were presented consistently in the training materials, course participants would not be confused by attending a second course where expert opinions inconsistent with the first were presented. There of course exist different expert opinions on detailed topical areas, but inconsistency in main principles and concepts should be avoided. Moreover,

by understanding the strengths of each center, the three COEs can complement one another in their efforts to enhance nuclear nonproliferation and nuclear security in the region.

ISCN, together with the International Nuclear Nonproliferation and Security Academy of the Republic of Korea and the State Nuclear Security Technology Center of China, has committed to coordination activity through Asia Regional Network meetings, held since 2012 in conjunction with the International Network for Nuclear Security Training and Support Centers led by the International Atomic Energy Agency.

TEACHING METHOD AND TRAINING TOOLS

How a training course can be helpful for the participants depends on how the designed course is taught in addition to its initial design based on needs.

"human networking is crucial for realizing joint outreach activities, as well as for exchanging information that helps build capacity within a center itself."





Effective learning can be supported by well-thought-out teaching methods using training tools.

Learning from other organizations such as SNL and the IAEA, ISCN has applied various teaching methods, including lectures, in-class discussion, group exercises and discussion, case-study analysis, and practical hands-on exercises. The combination of teaching methods is determined based on the objectives and contents of a course, aiming to help participants deepen their understanding of the topic and gain knowledge and skills to put the concepts and ideas they learn into practice in their daily jobs. Active interactions among lecturers and participants are required for implementing every course style while facilitating sharing of information and experiences.

As for practical and hands-on exercises, in addition to the continuous upgrade of in-class exercise materials, ISCN has enthusiastically developed training tools such as the Physical Protection Exercise Field and Virtual Reality (VR) System. The Exercise Field enables participants to actually observe and test physical-protection equipment such as sensors, entry-control systems, and cameras. The VR System allows them to walk through a 3D virtual nuclear facility to get an overall image of how physical protection is implemented without the bother of going to a real facility with sensitive security precautions. These tools are continuously upgraded to reflect the training needs from target audiences for nuclear security courses. In addition, some within ISCN have proposed utilizing the VR System for safeguards

training purposes, and project meetings have been held to examine this new idea. The Center never stops improving itself, maximizing the use of its resources.

MOVING FORWARD

With its five years of accumulated experience, ISCN is further progressing with its activities. One such activity is collaboration with training centers in Indonesia, assisting with their initial implementation and development of training capacity. This is a new mode of support for ISCN. Utilizing its experience with being supported by partner organizations during its initial development, the Center has now come into the position of helping develop new training centers.

It also should be noted that ISCN does not just invite experts but also dispatches experts to other organizations' initiatives. ISCN experts have given lectures and participated in expert meetings on developing international guidelines. Capacity-building among its own experts is vital to maintaining and improving the quality of its activities.

“People” is the foundation of any kind of national activity. Thus, human-resource development support is a most urgent and effective way to promote norms and practices. ISCN continues contributing to regional and world efforts to enhance nuclear nonproliferation and nuclear security together with international, regional, and domestic partners.



Return on Investment of Conducting a Security Culture Self-Assessment

Vladimir Yankov,
KOZLODUY NUCLEAR POWER PLANT
BULGARIA

In 2014, the Kozloduy Nuclear Power Plant (NPP), Bulgaria, conducted the second self-assessment in the world of nuclear security using the IAEA methodology—the first among nuclear power plants. The methodology remained in draft form at the time. The first self-assessment ever was conducted by the Indonesian National Nuclear Energy Agency (BATAN) in 2013, concentrating on the three nuclear research reactors that operate in Indonesia. Both trials were carried out in coordination with the IAEA Office of Nuclear Security and the Center for International Trade and Security at the University of Georgia, USA.

These two self-assessments show that there are some differences between conducting self-assessment in research reactors and nuclear power plants. BATAN initiated its pilot project in the autumn of 2012, had finished it by March 2013, and involved the majority of the personnel working at research reactors in the self-assessment process. They also managed to gather teams composed of 41 persons in total. In this process, the self-assessment teams surveyed 624 employees and interviewed 128. All participants gathered at one time to fill out the survey forms and after that to conduct the interviews.

Kozloduy NPP is the only nuclear power plant in Bulgaria and the main electricity-generating plant, providing more than one-third of the country's total annual electrical output. More than 3,700 people work at the company, which makes it one of the major employers in Bulgaria. There are two operational units, four undergoing decommissioning, and one in the design phase. This engineering diversity creates an organizational culture with quite diverse subcultures, making it a challenge to assess the plant's overall security culture.

The self-assessment at Kozloduy NPP covered just 15 percent of the personnel employed there, because it is difficult to engage the majority of the staff at a working, labor-intensive nuclear power plant at the same time.

For this reason, and to ensure employees calmly and correctly filled out the survey forms, Kozloduy NPP's self-assessment team distributed the questionnaires among the personnel involved and collected them one week later.

Kozloduy NPP chose to use its own experts to conduct the self-assessment. It is very important to have experts with different backgrounds on the self-assessment team. In the best-case scenario, the organization should assign a team to work exclusively on the self-assessment during the period when it is conducted. The self-assessment team at Kozloduy NPP included five security experts and three experts who had previously been involved in self-assessing nuclear safety culture at Kozloduy NPP, along with a sociologist, a psychologist, and a human-factor expert. All of them are employees of the company, and it was difficult to gather them together for the purposes of the self-assessment activities because of their daily obligations, and because these experts belong to different structures within the organization. This doubled the time needed to complete the self-assessment compared to the Indonesian team. At Kozloduy NPP, the appraisal was conducted from October 2013 to November 2014, consuming a full year for the whole process. Sufficient human, time, and financial resources clearly must be allocated prior to conducting a self-assessment.

Talking about financial resources, let's see whether the return-on-investment (ROI) ratio can be defined for conducting nuclear-security self-assessments, and whether this is a cost-effective activity.

Return on investment is a typical benefit ratio. This simplified classical financial approach estimates the return on investment by comparing the monetary value of the investment to the monetary value of the profit gained from this investment. To calculate the return on investment, the profit from an investment is divided by the cost of the investment, and the result is expressed as a percentage or a ratio.

$$\text{ROI} = \frac{\text{Profit from investment} - \text{Cost of investment}}{\text{Cost of investment}}$$



The value of activities related to security is difficult to estimate. Security is not generally an investment that results in a profit. Security is more about reducing risk to the firm's assets, or, in other words, the profit can be expressed by measuring how much loss is avoided due to the security investment. The return-on-security-investment (ROSI) ratio is given below:

$$\text{ROSI} = \frac{\text{Loss reduction} - \text{Cost of investment}}{\text{Cost of investment}}$$

If we have to formulate the return-on-investment ratio for nuclear security, we have to include reducing the risk of impact on the population and environment. Since there is no cost figure for the population and environment, it is not easy to define reliable criteria for the return on investment in these circumstances. In general the criterion for defining the level of nuclear security is avoidance of unacceptable radiological consequences. In this case, the return-on-nuclear-security-investment (RONSI) ratio will depend on how much the risk for unacceptable radiological consequences is reduced:

$$\text{RONSI} = \frac{\text{Reduction of risk for unacceptable radiological consequences} - \text{Cost of investment}}{\text{Cost of investment}}$$

Formulating a return-on-investment ratio for the nuclear-security self-assessment is even a bigger challenge because the culture reflects non-quantifiable beliefs, attitudes, and values. Its effects are long-term and often combined with other factors, which makes estimating them quite variable. Conducting a nuclear-security-culture self-assessment and implementing an action plan afterward is intended to enhance nuclear security culture, and therefore security. Furthermore, the investment in nuclear security culture ensures through the human factor that security systems will be as effective as they should be—and that the investment in them will be returned. In that case, the return-on-nuclear-security-culture-investment ratio will represent how much the security culture is enhanced due to the investment and will add a value to the investment in security systems:

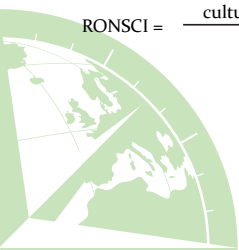
$$\text{RONSCI} = \frac{\text{Enhancement of security culture} + \text{Investment in security systems} - \text{Cost of nuclear security culture investment}}{\text{Cost of nuclear security culture investment}}$$

A brief overview of the self-assessment conducted at Kozloduy NPP will give an idea about whether the return justified the investment. The preparation of the self-assessment trial started with preparatory meetings to discuss the use and implementation of the IAEA methodology on Self-Assessment of Nuclear Security Culture at Kozloduy NPP. Held from October 3-4, 2013, the meetings took place at the Bulgarian Nuclear Regulatory Agency and Kozloduy NPP. The purpose of the meetings was to brief the Bulgarian Nuclear Regulatory Agency and the management of the Kozloduy NPP on assessing nuclear security culture, and to draft a timeframe for the self-assessment trial.

After that, a national workshop to prepare the nuclear-security-culture self-assessment team was organized from January 27-31, 2014, at Kozloduy NPP's training center. The workshop was attended by the whole self-assessment team along with IAEA-selected advisory experts, namely Mr. Fumitaka Watanabe of the IAEA, Dr. Igor Khripunov of CITS, and Mr. Khairul Khairul of BATAN. The topics covered during the workshop were activities and data-collection tools to be used during the self-assessment, including surveys, interviews, documents review, observation, analysis, and action-plan development. Such training of the self-assessment team is essential to the proper conduct of the appraisal.

The self-assessment itself included a survey, interviews, a documents review, observation, and analysis of the data gathered, followed by development of an action plan. A survey form was distributed among 600 employees, 20 others were interviewed, all documents related to security were reviewed, and activities related to security were observed. When all data were collected, analysis was conducted and an action plan was developed.

As summary of the cost of the whole self-assessment, some experts were engaged for the time needed to conduct the self-assessment, including several meetings and a workshop, and to distribute printed survey forms to all surveyed employees. The table below represents all expenses of Kozloduy NPP to conduct the self-assessment:



Expense		Price issue	Cost for KNPP
Meetings and Trainings	Initial meeting at Bulgarian Nuclear Regulatory Agency		Approx. 200* euros
	Initial meeting at Kozloduy NPP		Approx. 100 euros
	Training workshop at Kozloduy NPP's distant training center		Approx. 2000** euros
Experts	Kozloduy NPP employees	11 experts	Approx. 2000 man- hours***
	External experts	None	None
IAEA selected advisors	3	Covered by IAEA	None
Package of 500 sheets of paper	5	5 euro	25 euros
Total:			Less than 2500 euros

* - This price includes mainly the transportation of participants from/to KNPP and Bulgarian Nuclear Regulatory Agency

** - This price includes the transportation of participants from/to KNPP and its distant training center, and their daily expenses.

*** - Due to the fact that the experts engaged in the self-assessment combined this activity with their regular obligations, it is assumed that this did not require any investment.

As is shown, the major outlay for conducting the self-assessment came from holding the training workshop at a distant training center. Although it is very useful to break away from the work environment, this cost could drop significantly if the organization decided to conduct it on-site.

Because Kozloduy NPP used its own experts to conduct the self-assessment and managed to combine this activity with their regular obligations, the salaries for these experts are not taken into account in estimating the cost of the self-assessment. If an organization conducting a self-assessment decides to use external experts, their monthly salaries for the duration of the self-assessment should be counted in the total amount. In this case, the self-assessment

would not take more than one month, because the self-assessment team would focus exclusively on the self-assessment and the training workshop—if any—would be cheaper because external experts will presumably be well-prepared.

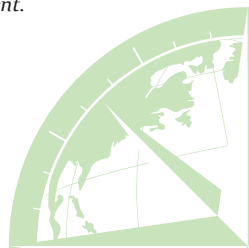
The table below represents a hypothetical summary of the expenses of an organization to conduct a self-assessment using external experts. It is assumed that the organization hires up to ten experts to conduct it, which is more than enough for an average organization, but the point is to represent the upper limit of the possible expenses. Each organization can decide what its needs are and how much it can and wants to invest in self-assessment.

Expense	Number	Price issue	Total cost for the organization
Training workshop	Optional	Vary	Up to 10000* euros
Experts	up to 10	Approx. 5000** euro/month	up to 50000*** euros
Package of 500 sheets of paper	Depends on the number of the participants	5 euro	Up to 100 euros
Total:			up to 60000 euros

* - This would include rent for a training room, training materials, salaries for instructors and daily expenses of the participants.

** - This would depend on the average salaries in the country conducted and the need of covering transport and/or daily expenses.

*** - This cost is estimated for a one-month self-assessment.





Using external experts would be much more expensive, but the self-assessment would be conducted more quickly and more professionally. This should not rule out involving the site's own staff in the process. Indeed, combining internal and external experts is the optimal solution with regard to cost-effectiveness and efficient conduct of the event. The organization should also consider inviting sociologists and psychologists if it has none on staff, as Kozloduy NPP has. Based on Kozloduy NPP's experience, such experts are very helpful for conducting the survey and the interviews. Additionally, professional interviewers could be invited for the interviews or for training the self-assessment team. It is very beneficial for the first self-assessment, furthermore, if the site has previously conducted safety-culture self-assessments and can draw experts engaged in that effort into the security-culture self-assessment.

The organization can reduce the cost of conducting the self-assessment as low as the price of printer paper. In this case, it should use its own experts to conduct the self-assessment. They can prepare themselves using the IAEA Implementing Guide on *Nuclear Security Culture* and the IAEA Technical Guidance on *Self-Assessment of Nuclear Security Culture in Facilities and Activities That use Nuclear and/or Radioactive Material*. Carefully selected experts with different backgrounds and who are well-motivated can conduct an excellent and efficient self-assessment.

Good planning of the self-assessment will avoid interference between this assignment and their regular duties within the organization. Additionally, a request to the IAEA to support the initiative with advisors can be sent.

While the cost of conducting a self-assessment is quite easy to calculate, it is not so simple to measure how much the security culture will be improved because of it. It is reasonably certain that the process will bring about improvement, and this can be verified by conducting a second self-assessment. Until then, the benefits identified from this one can be analyzed to find signs of improvement.

In the first place, in addition to estimating the strong and weak sides of the current security culture, the self-assessment is a good opportunity to introduce security culture to management and personnel as a part of the overall organizational culture. Some believe management should undertake a process for improving the security culture first and convene a self-assessment after that. Trying to improve without knowing the strong and weak areas, however, is like a shooting in the dark. It is like firing a lot of shots in the hope that some of them reach the target. Starting with a self-assessment, by contrast, helps focus effort on improving known weaknesses and maintaining known strengths. This will make the effort much more effective. Having identified areas in need of



improvement, Kozloduy NPP managed to develop an action plan which better reflected its needs for enhancing security culture.

There has been a continuous process in Kozloduy NPP for enhancing safety culture since 2011. The plant recently finished its second self-assessment after introducing a three-year action plan for improving the nuclear safety culture. The security-culture self-assessment raised the importance of security culture to that of safety culture. The analysis from the self-assessment was presented to the Kozloduy NPP's management, and by reasoned argument and visual presentation of areas needing improvement, the team convinced management to pay more attention to security matters.

Due to the self-assessment, new responsibilities related to security culture were assigned to certain members of the plant's Security Division. These responsibilities include talking informally with personnel and observing their daily activities. It became known that some employees have paid attention to topics raised during the self-assessment, and began to take more interest in security topics related to their responsibilities. A very clear example is the security measures instituted following the 2015 terror attacks in Paris. Most personnel showed that they understood the need for additional security measures, and that security is a shared responsibility.

As noted before, it is very beneficial for the first self-assessment if the site previously has conducted safety culture self-assessments, and if experts who took part in the safety review take part in the security-culture self-assessment. This not only helped Kozloduy execute its self-assessment more efficiently, also encouraged the safety and security experts involved to work more closely in their daily duties and to understand one another better. Since safety and security have a common objective—protection of the population and environment—but employ different methods to achieve it, there should be an interface between safety and security to solve conflicts raised by different methods and perspectives. The close connection among experts involved in Kozloduy's security-culture assessment started establishing such an interface at the plant.

In conclusion, it can be said that self-assessment not only reveals the level of security culture and helps identify areas for improvement, but also directly improves the security culture and therefore security. Comparing the trivial cost of conducting a self-assessment to the benefits, it appears that very low price of conducting such a review garners many benefits in terms of reducing risk. This is a low-cost enterprise with very beneficial results for security—and actually, through the human factor, ensures that the site's investment on security hardware will be returned.

It should be noted that conducting self-assessments constantly or at short notice does little to improve security culture. More likely, it will fatigue the personnel, encouraging apathy and irresponsibility. Other assessments such as safety-culture self-assessments and assessments of esprit de corps at the site should be taken into account in planning a security-culture self-assessment, avoiding interference between the assessments. Even more, if the same experts are engaged in different assessments that are conducted simultaneously, the resulting overload could degrade all of the teams' performance. A self-assessment followed by a two- or three-year action plan should be optimal.

Kozloduy NPP adopted a two-year action plan and regular self-assessments, helping the leadership track the effectiveness of the action plans and provide guidance for the next action plans. Well-planned, periodic self-assessments will not only furnish an idea of the current state of the security culture but also directly improve it—resulting in better security for the site, the populace, and the environment.



Implementing the UNSCR 1540 Obligations: Lessons Learned from Strengthening the U.S. Biosafety and Biosecurity Practices and Oversight System

Dana Perkins,
FORMER MEMBER OF THE UN SECURITY COUNCIL 1540
COMMITTEE GROUP OF EXPERTS

The threat- and risk-assessment process is not a means to an end but a continual process that should inform UNSCR 1540 national implementation measures and integrate into the overall lifecycle of national implementation action plans. Ideally, a national approach to UNSCR 1540 implementation should be broad and nimble enough to account for and adapt to changes in circumstances, helping keep biological materials, equipment, and technology safe and secure while also dealing effectively with unknown biological risks and threats of the future.

Such a comprehensive approach is intrinsic to a threat- or risk-governance framework that is considered when developing national implementation action plans. The current overhaul of biosafety, biosecurity, and biocontainment practices and the associated oversight framework in the United States raises several questions about UNSCR 1540 implementation and planning processes. It also lends credence to the opinion that while a UNSCR 1540 national implementation action plan may be developed or updated as a reactive response to specific events, ideally it should represent a proactive stance in a rapidly changing global environment.

A string of laboratory incidents prompted the White House National Security Council and Office of Science and Technology Policy to send a joint memo to all federal departments and agencies involved in life-sciences research on August 18, 2014, urging them to take immediate and longer-term steps aimed at addressing the incidents' underlying causes and strengthening overall biosafety and biosecurity at federal facilities. The White House memorandum called for the establishment of parallel federal and

non-federal reviews that would result in specific recommendations to strengthen the government's biosafety and biosecurity practices and the oversight system for federally funded activities.

Through the Federal Experts Security Advisory Panel (FESAP), the U.S. government conducted a comprehensive federal review and provided specific recommendations to strengthen the government's biosafety and biosecurity practices and oversight system for federally funded activities, consistent with the public health and security benefits of such work.

In parallel, the National Science and Technology Council established a Fast Track Action Committee on the Select Agent Regulations (FTAC-SAR) to seek broader input from stakeholders into how the Select Agent Regulations (SAR) have impacted science, technology, and national security in the United States. Such input has been sought by convening two listening sessions of SAR stakeholders to elicit individual views to inform and support the process. Furthermore, the FTAC published a Request for Public Comment in the Federal Register to collect additional input from interested individuals and organizations throughout the United States and globally. Based on the stakeholders' feedback, the FTAC developed recommendations focused on ways to improve the regulatory process and address perceived gaps in the SAR in the future.

In a letter dated October 21, 2013 from the permanent representative of the United States of America to the United Nations addressed to the chairman of the 1540 Committee¹, the United States reported that "for the first time that it has measures in place to implement all of its obligations under Security Council resolution 1540 (2004)." By an unfortunate coincidence, several biosafety and biosecurity lapses at federal laboratories (involving anthrax bacteria, variola, Ebola, and highly pathogenic avian influenza H5N1 viruses) were discovered and

highly publicized shortly after the U.S. submission of its national report to the Security Council.

Looking holistically at national UNSCR 1540 implementation in the biological area, one may question how effective or appropriate were the measures in place. A more-to-the-point observation would be that the mostly outdated 2007 U.S. national implementation action plan is hardly a reference to consult in order to learn how a threat- or risk-governance approach informs the current and future implementation of UNSCR 1540.

For instance, the word “terrorism” is not mentioned in the U.S. plan. None of the recent laboratory incidents involved malevolent acquisition or use of biological agents, but isn’t the combination of lessons learned from the 2001 anthrax attacks (the FBI closed the case in 2010) and these recent events a good opportunity to update the 2007 UNSCR 1540 national implementation action plan? The FESAP and FTAC-SAR recommendations are set to be implemented, so a path forward in improving the regulatory and oversight biosafety and biosecurity system in the United States is in sight.

As a reminder, UN Security Council resolution 1540 obligates all states to: (1) refrain from providing any form of support to nonstate actors that attempt to develop, acquire, manufacture, possess, transport, transfer, or use nuclear, chemical, or biological weapons or their means of delivery; (2) adopt and enforce appropriate, effective laws prohibiting activities involving the proliferation of such weapons and their means of delivery to nonstate actors, in particular for terrorist purposes, as well as any attempts to engage in such activities or assist or finance them; and (3) implement and enforce appropriate controls over related materials [5] in order to: account for and secure items in production, use, storage, or transport; physically protect them; detect, deter, prevent, and combat the illicit trafficking and brokering through effective border controls and law-enforcement efforts; control exports, transits, transshipments, and re-



Security Council Considers Non-Proliferation of Weapons of Mass Destruction, 22 December 2015, United Nations, New York, UN Photo # 658525. Samantha Power, United States Permanent Representative to the UN and President of the Security Council for December, chaired the meeting. United States encouraged the upcoming UNSCR 1540 comprehensive review to generate recommendations inter alia in “closing the persistent gaps in implementation in biosecurity”

exports along with the provision of funds and services related to such exports and transshipments that would contribute to proliferation; and penalize violations.

Table 1 lists FESAP and FTAC-SAR recommendations as they relate to specific operative paragraphs (OP) of UNSCR 1540. Most recommendations seem related to OP 3 (a) and (b) with regard to accounting, securing, and physically protecting biological-warfare (BW)-related materials (Fig. 1) and include actions, regulatory changes, and guidance to improve biosafety and biosecurity, measures to increase material accountability and oversight, strengthen the culture of responsibility and security-awareness education, and optimize inspection processes and incident reporting.

With regard to OP 3 (c), the FTAC recommended providing better training and guidance for customs inspectors. The recommendations related to transparency and public understanding fall under OP 8 (d). Also, under OP 9 and OP 10 is an FTAC recommendation for international engagement to explore harmonization of pathogen security standards and ensure understanding of the rationale for, and implementation of, the SAR-equivalent standards by partner foreign governments. FESAP also provides recommendations to develop and maintain a robust,



federally-supported program of applied biosafety research to create additional evidence-based practices and technologies, and to update existing practices and operations. It identifies an approach to determine the appropriate number of high-containment U.S. laboratories required to possess, use, or transfer select biological agents and toxins.

Of note, the Center for Disease Control and Prevention (CDC), Division of Select Agents and Toxins (DSAT), which is one arm of the Federal Select Agent Program (the other being the Animal and Plant Health Inspection Service (APHIS)/Agriculture Select Agent Services), also underwent a 90-day internal review to improve the CDC's implementation of the Federal Select Agent Program (which oversees the possession,

use, and transfer of select biological agents and toxins that have the potential to pose a severe threat to human, animal, or plant health or to animal or plant products)². The ten actionable recommendations provided by the Internal Review Workgroup are complementary to those of FESAP and FTAC and relate to inspections [the first seven recommendations relevant to OP 3 (a) and (b)], incident reporting [two recommendations also relevant to OP 3 (a) and (b)], and one recommendation related to transparency [relevant to OP 8 (d)]. (See Figure 1 and Table 1.)

Arguably, the recommendation for strengthening an organizational culture that emphasizes biosafety, biosecurity, and responsible conduct in the life sciences seems most challenging with regard to

Figure 1. Number of FESAP and FTAC-SAR Recommendations Related to Specific Operative Paragraphs (OP) of UNSCR 1540

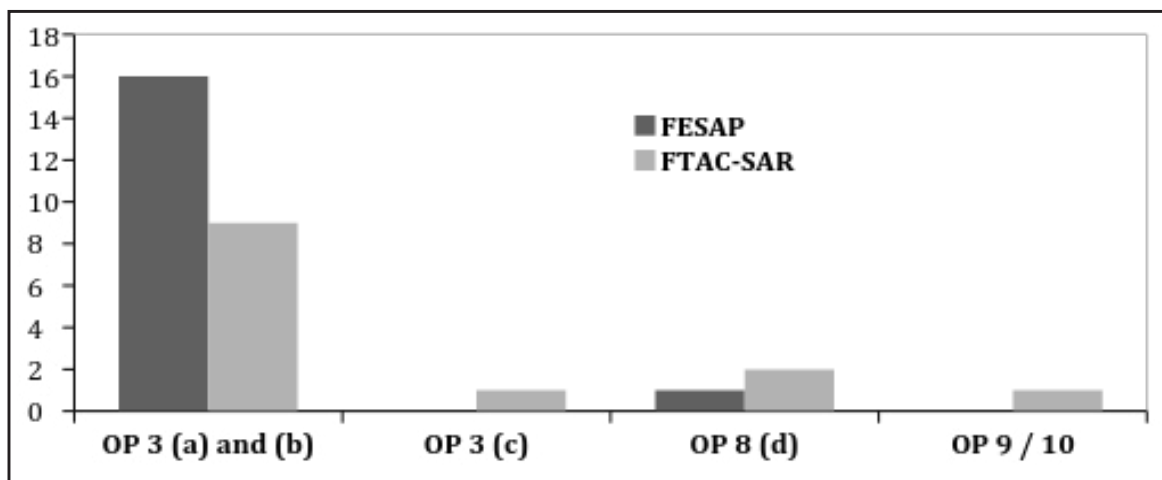


Table 1. FESAP and FTAC-SAR Recommendations for Optimizing Biosafety and Biosecurity in the United States and Their Suggested Correlation with Operative Paragraphs (OP) of UNSCR 1540

UNSCR 1540 OP 3 (a) and (b):

...[UN Security Council] *Decides also* that all States shall take and enforce effective measures to establish domestic controls to prevent the proliferation ...biological weapons and their means of delivery, including by establishing appropriate controls over related materials and to this end shall:

- (a) Develop and maintain appropriate effective measures to account for and secure such items in production, use, storage or transport;
- (b) Develop and maintain appropriate effective physical protection measures...

Identification of Actions and Any Regulatory Changes and Guidance to Improve Biosafety and Biosecurity

FESAP 1.8: Increase awareness of existing material accountability best practices, and support the establishment of material accountability procedures where none currently exist.

FESAP 2.1: Add a specific requirement for the documentation of the drills and exercises required in sections 11 (Security), 12 (Biosafety), and 14 (Incident Response) of the current SAR.

FESAP 2.2: Add a specific requirement to section 15 (Training) to include how a trainee can access the U.S. Department of Health and Human Services (HHS) and U.S. Department of Agriculture (USDA) Office of the Inspector General (OIG) Hotline to anonymously report a safety or security concern.

FESAP 2.3: Optimize guidance to address integration of the Responsible Official (RO) with entity's biosafety and biosecurity oversight committee(s).

FESAP 2.4: Modify guidance documents to recommend that the composition of the local oversight committee(s) represent the breadth of stakeholders involved in developing and implementing institutional biosafety and biocontainment programs.

FESAP 2.5: Improve guidance regarding working stocks and inventory control.

FESAP 2.6: Improve guidance for biosafety plans

FESAP 2.7: Amend guidance documents to suggest that entities consider establishing policies on maximum work hours for high containment workers.

FESAP 2.8: Support U.S. Occupational Safety and Health Administration (OSHA) Infectious Diseases Standard.

FTAC 1: Regulation Interpretations: The FTAC recommends developing a formal mechanism for accepting requests for, issuing, publicizing, and holding consistently to interpretations of the SAR

FTAC 4: Individual-based Security Risk Assessments: The FTAC recommends that in the absence of specific information indicating otherwise, individuals who have been granted access to select agents or toxin at one BSAT institution be able to move to another BSAT institution without having to wait for a new Security Risk Assessment.

FTAC 5: Emergency Situations: The FTAC recommends development of a mechanism to expedite approvals or to relax Federal Select Agent Program (FSAP) requirements in response to time-urgent emergency situations.

Material Accountability

FESAP 1.8: Increase awareness of existing material accountability best practices, and support the establishment of material accountability procedures where none currently exist.

FESAP 2.5: Improve guidance regarding working stocks and inventory control.

FTAC 6: Inventory Control Requirements: The FTAC recommends retaining requirements to maintain inventories of samples containing biological select agents and toxins, but ensuring that requests to quantitatively characterize biological agents do not occur.



Oversight

FESAP 1.2: Require that all research institutions, in which human, plant, and/or animal infectious agents and toxins research is conducted, have an appropriate organizational and governance structure to ensure compliance with biosafety, biocontainment, and laboratory biosecurity regulations and guidelines.

FESAP 1.3: Require that an appropriately constituted and qualified review entity validate local policies, laboratory protocols, and mitigation plans involving the inactivation, sterilization, or decontamination of biohazardous materials at research institutions.

FTAC 11: Peer Advisory Mechanism: The FTAC recommends creating an expert panel or Federal Advisory Committee to serve as an external vetting group that could share best practices or make recommendations to the Federal Select Agent Program (FSAP).

Culture of Responsibility / Security Awareness Education

FESAP 1.1: Create and strengthen a culture that emphasizes biosafety, laboratory biosecurity, and responsible conduct in the life sciences. This culture of responsibility should be characterized by individual and institutional compliance with biosafety and laboratory biosecurity regulations, guidelines, standards, policies and procedures, and enhanced by effective training in biorisk management.

FESAP 1.4: Support the development and implementation of security awareness education programs/curriculum that: underscore personal responsibility for safeguarding potentially hazardous biological agents; share information about security breaches that have occurred involving infectious or toxic materials; emphasize the need for self and peer reporting; discuss material protection strategies; and explain exploitation of life sciences research.

Inspection Processes

FTAC 7: Consistency of Inspections: The FTAC recommends development of an approach to improve the consistency of the inspection process across inspectors, inspected sites, and different agencies.

FTAC 8: Improve Customer Service in Communicating with Regulated Entities: The FTAC recommends improving communication before and after site inspections and the timeliness of inspection reports.

FTAC 9: Categorize Inspection Findings: The FTAC recommends developing a system to categorize findings on inspection reports.

FTAC 10: Appeals Process: The FTAC recommends expanding the appeals process for institutions to adjudicate disputed findings in inspection reports.

Incident Reporting

FESAP 1.7: Establish a new voluntary, anonymous, non-punitive incident-reporting system for research laboratories that would ensure the protection of sensitive and private information, as necessary.



UNSCR 1540 OP 3 (c):

...[UN Security Council] *Decides also* that all States shall take and enforce effective measures to establish domestic controls to prevent the proliferation ...biological weapons and their means of delivery, including by establishing appropriate controls over related materials and to this end shall...

(c) Develop and maintain appropriate effective border controls and law enforcement efforts to detect, deter, prevent and combat, including through international cooperation when necessary, the illicit trafficking and brokering in such items in accordance with their national legal authorities and legislation and consistent with international law;

FTAC 13: Guidance for Customs Inspectors: The FTAC recommends providing better training and guidance for customs inspectors.

UNSCR 1540 OP 8 (d):

[UN Security Council] *Calls upon* all States:

(d) To develop appropriate ways to work with and inform industry and the public regarding their obligations under such laws;

Transparency and Public Understanding

FESAP 1.5: Develop and implement strategies to ensure effective communication and awareness of biosafety, biocontainment, and biosecurity.

FTAC 2: Public Release of information: The FTAC recommends that information about biological select agents and toxins (BSAT) research, including laboratory incidents, should be periodically provided to the public; and, Federal BSAT laboratories should adopt, to the maximum extent feasible, a policy of transparency regarding both the agents used and laboratory incidents

FTAC 3: Sharing Best Practices: The FTAC recommends members of the regulated community establish a mechanism for sharing best practices

UNSCR 1540 OP 9 / 10:

9. [UN Security Council] *Calls upon* all States to promote dialogue and cooperation on non-proliferation so as to address the threat posed by proliferation of ... biological weapons, and their means of delivery;

10. Further to counter that threat, [UN Security Council] *calls upon* all States, in accordance with their national legal authorities and legislation and consistent with international law, to take cooperative action to prevent illicit trafficking in ... biological weapons, their means of delivery, and related materials;

FTAC 12: International Engagement: The FTAC recommends international engagement to explore harmonization of pathogen security standards and ensure understanding of the rationale for, and implementation of, the SAR-equivalent standards by partner foreign governments.



practical implementation. A culture of responsibility (safety or security culture or risk-management culture, by any other name) is defined as a body of beliefs, attitudes, and patterns of behavior that can contribute to effective biorisk management by supporting biosafety and reinforcing complementary security procedures, rules, and practices as well as facilitating relevant professional standards and ethics.

Many associate this concept with the sign Albert Einstein reportedly had in his office that said: “Not everything that counts can be counted, and not everything that can be counted counts.” How do we use metrics and measures for determining the baseline and progress in strengthening culture? A set of cultural characteristics and associated indicators is needed, along with safety and security self-assessment tools to help organizations effectively manage biological risks and threats. For this purpose, the methodology developed by the University of Georgia Center for International Trade and Security can be easily adjusted to the safety and security needs of individual biomedical organizations³.

When put into action, the FESAP and FTAC-SAR recommendations will strengthen the biosafety and biosecurity oversight and regulatory system and, implicitly, UNSCR 1540 implementation. This sweeping review by a broad range of stakeholders provides an opportunity to consider updating the 2007 U.S. national implementation action plan for UNSCR 1540 and also to share with the 1540 Committee best practices from the review process undertaken by FESAP and FTAC.

Implementing these recommendations will also strengthen U.S. implementation of the Global Health Security Agenda (GHSA) Biosafety and Biosecurity Action Package. As a reminder, the five-year target of GHSA involves assuring that

a whole-of-government national biosafety and biosecurity system is in place, ensuring that especially dangerous pathogens are identified, held, secured and monitored in a minimal number of facilities according to best practices; biological risk management training and educational outreach are conducted to promote a shared culture of responsibility, reduce dual use risks, mitigate biological proliferation and deliberate use threats, and ensure safe transfer of biological agents; and country-specific biosafety and biosecurity

legislation, laboratory licensing, and pathogen control measures are in place as appropriate.⁴

A new U.S. national implementation action plan for UNSCR 1540 may also identify synergies between UNSCR 1540 and GHSA as a best practice for states seeking to accelerate their capacity to prevent, detect, and respond to biological threats.

Last but not least, on December 22, 2015, at a UN Security Council Briefing on the 1540 Committee on Nonproliferation of Weapons of Mass Destruction, Ambassador Samantha Power noted that the United States encouraged the upcoming UNSCR 1540 second comprehensive review to generate recommendations for “closing the persistent gaps in implementation in biosecurity,” among other things⁵. Sharing experiences and lessons learned from the FESAP and FTAC-SAR process at the comprehensive review will perhaps aid other states seeking to enhance their system of biosafety and biosecurity oversight and practices.

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- 1 Letter dated October 21, 2013 from the Permanent Representative of the United States of America to the United Nations addressed to the Chairman of the 1540 Committee, http://www.un.org/en/ga/search/view_doc.asp?symbol=S/AC.44-2013/17.
 - 2 CDC 90 Day Internal Review of the Division of Select Agents and Toxins, <http://www.cdc.gov/phpr/dsat/documents/full-report.pdf>.
 - 3 Igor Khripunov, “Biorisk Management Culture,” *1540 Compass* 9 (2015): p.49, <http://cits.uga.edu/uploads/1540compass/1540PDFs/Compass9Magazine.pdf>.
 - 4 Global Health Security Agenda (GHSA) Biosafety and Biosecurity Action Package, http://www.cdc.gov/globalhealth/security/actionpackages/biosafety_and_biosecurity.htm.
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Enhancing Biosecurity Culture: The Essential Role of Biosecurity Education

Tatyana Novosiolova, PhD,
UNIVERSITY OF BRADFORD, UNITED KINGDOM

PROMOTING SECURITY CULTURE

Security culture, as defined by the International Atomic Energy Agency, is the assembly of characteristics, attitudes, and behavior of individuals, organizations, and institutions that serves as a means to support and enhance security. Scientist engagement is a critical component of the development, promotion, and maintenance of security culture against the spread of weapons of mass destruction. Scientists have a crucial role to play in the development, articulation, and implementation of policies designed to prevent the proliferation of WMD-related materials and knowledge. It is of paramount importance that they contribute their expertise and actively participate in fostering a web of preventive measures which helps reconcile the benefits of scientific progress with security concerns.

Efforts to engage scientists working in sensitive fields as a way of curtailing the spread of WMD date back at least to the end of the Cold War. Initially conceived as programs for redirection of former weapons scientists into civilian practice, over the past decade those initiatives have been vigorously transformed and adapted to the changing international landscape, and to novel security concerns arising from the synergistic interplay between the forces of globalization and rapid scientific and technological advancement.

In particular, there is a growing appreciation of the need to link efforts to promote security culture with activities related to the national implementation of respective international treaty obligations in the area of WMD nonproliferation. Unfortunately, as noted in the 2002 UN Secretary General Report:¹

5. Education and training remain important but underutilized tools for promoting peace, disarmament and non-proliferation.

The report then went on to underscore that

10. A global disarmament and non-proliferation culture cannot be accomplished easily or quickly....Member States, international organizations, academics and NGOs are essential actors in this long-term effort. Its success will depend on a partnership that includes each of these communities and the provision of adequate financial resources....

13. Member States, in cooperation with the United Nations and relevant international organizations, are encouraged to sponsor training, fellowships, and awareness programmes, on as wide a geographical basis as possible, for researchers, engineers, scientists and other academics in areas of particular relevance, but not limited to treaties and agreements on weapons of mass destruction and their means of delivery.

Against this backdrop, it is barely surprising that all three international regimes against the spread of WMD—whether nuclear, chemical, or biological—have laid significant emphasis on the value of education and outreach activities as a way of impressing upon scientists the ethical, social, and legal implications of their work and thus fostering a culture of responsibility and security worldwide.

FOSTERING BIOSECURITY CULTURE IN THE LIFE SCIENCES: A NEED FOR EDUCATION

The rapid advancement of modern biotechnology offers tremendous prospects for human betterment by promoting health and food security and helping respond to environmental challenges. Yet along with these considerable benefits, the progress of the life sciences over the past few decades has raised significant security concerns, not least because of its potential to facilitate the development of novel, highly sophisticated biological weapons. Given the rapid pace of scientific and technological advancement, the integration of the life sciences with related disciplines and the increasing diffusion of life-sciences research



capacity, both internationally and outside traditional research institutions, states have confronted substantial obstacles to devising effective policies and governance mechanisms to ensure that the life sciences are not misused for hostile purposes².

Parties to the Biological and Toxin Weapons Convention (BTWC) have frequently acknowledged the need to enhance awareness of the potential security risks posed by the ongoing development of biotechnology among life scientists. For instance, at the Seventh Review Conference of the BTWC in 2011, the parties to the accord, when discussing the national implementation of the Convention, agreed that:

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

(b) encourage the consideration of development of appropriate arrangements to promote awareness among relevant professionals in the private and public sectors and throughout relevant scientific and administrative activities and;

(c) promote amongst those working in the biological sciences awareness of the obligations of States Parties under the Convention, as well as relevant national legislation and guidelines;

(d) promote the development of training and education programmes for those granted access to biological agents and toxins relevant to the Convention and for those with the knowledge or capacity to modify such agents and toxins;

(e) encourage the promotion of a culture of responsibility amongst relevant national professionals and the voluntary development, adoption and promulgation of codes of conduct³....

Similarly, other internationally mandated, legally binding regulatory regimes such as UN Security Council Resolution 1540, also called upon states to:

Develop and maintain appropriate effective measures to account for and secure [items that

may facilitate the development of biological weapons and/or their means of delivery] in production, use, storage or transport

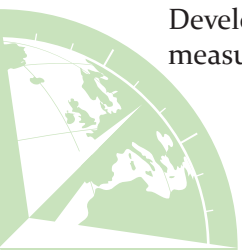
Develop and maintain appropriate effective physical protection measures

Develop appropriate ways to work with and inform the industry and the public regarding their obligations under [international and domestic] laws

SUSTAINABLE BIOSECURITY EDUCATION

The University of Bradford has been preparing a *Guide to Biological Security Issues* jointly funded by Canada's Global Partnership Program and the U.K. Global Partnership Program⁴. The guide was completed in December 2015 and officially launched at the BWC Meeting of States Parties on December 14-18, 2015 in Geneva, Switzerland. The guide is freely available online. It comprises 21 chapters covering a wide range of issues relevant to biological security and disarmament, including the evolution of the international biological-weapons prohibition regime and the implications of developments in science and technology for the regime; the role of international and national scientific organizations in promoting biosecurity; and the need for dialogue between the law-enforcement community and the life-sciences community that nurtures a broader, multi-stakeholder approach to biosecurity. The guide further contains examples of how several BTWC parties, such as Denmark, Jordan, South Africa, and Canada, implement biosecurity on the national level. In order to facilitate the dissemination of training content, the guide is currently being translated into Arabic and Ukrainian.

The guide combines biosecurity content with an innovative and effective training methodology. To this end, it is accompanied by a handbook which offers a set of team-based learning exercises designed for each thematic chapter to help learners understand biosecurity, and to contribute to the sustainable training of life scientists by helping them acquire practical, action-oriented skills and capacities. Team-Based Learning is a novel and special form of active learning during which the focus shifts from



memorizing concepts to having teams apply the concepts being taught. A series of team-based learning biosecurity seminars was held between November 2012 and October 2015, bringing together diverse audiences in different regions of the world. The series demonstrated the effectiveness and efficiency of this format at engaging life scientists at various stages of their careers with biosecurity.

The Ukrainian Biosafety Association and the Palladin Institute of Biochemistry of the National Academy of Sciences in Ukraine⁵ are jointly implementing a project titled P633, "Education and Awareness-Raising in Ukraine." The project is funded by the U.K. Global Partnership Program and seeks to develop a nationwide network to deliver education in biosafety, biosecurity, and dual-use goods and substances. To this end, a series of training workshops and awareness-raising seminars has been conducted in major university centers around Ukraine, engaging lecturers and students with biosecurity and surveying the education needs of life scientists in the area of biosafety and biosecurity.

To maximize the effectiveness of the seminars and promote engagement, the project harnesses active-learning methods to demonstrate how biosafety, biosecurity, and bioethics could be taught in various educational contexts. To facilitate data-sharing and the exchange of ideas, furthermore, an e-library with relevant educational resources has been compiled, featuring a forum. The e-library is an open-access tool available at the project website comprising materials, documents, and other resources in English and Ukrainian. Reports of activities conducted within the framework of the project are also available there. The data collected as a result of the project will then be used to develop methodological recommendations for implementing compulsory biosafety and biosecurity curricula in Ukraine, to be submitted for consideration to the Ministry of Science and Education of Ukraine.

"in order to address the pervasive lack of awareness of biosecurity and dual-use issues among those engaged in the life sciences, efforts to promote biosecurity education need to be state-supported, comprehensive, and all-inclusive."

CONCLUSION

Some progress has been made in the area of biosecurity education, but for the most part, efforts to reach out to life scientists and engage them with the broader implications of their work have remained ad hoc and sporadic, limited to particular countries or regions and largely dependent on the enthusiasm and energy of a given institution. By contrast, other fields of security education, such as nuclear-security education and chemical-security education, have received considerable institutional support over the past few years at the international level.

Since its creation in 2010, for example, the International Nuclear Security Education Network has made significant progress in developing education resources, engaging institutions and individuals in awareness-raising activities, and broadly promoting the need for fostering capacity in nuclear security. Similarly, the Executive Council of the Organization for the Prohibition of Chemical Weapons recently approved a decision recommending "the establishment of an Advisory Board on Education and Outreach."⁶

The development of the Hague Ethical Guidelines constitutes another important milestone in the process of engaging those engaged in the chemical sciences with the security aspects of their work. The Hague Guidelines were issued in September 2015.⁷ They now provide a useful framework for debating ethical issues related to chemical disarmament and nonproliferation, and as such could serve as core elements for the development of ethical codes.⁸

It is evident, therefore, that in order to address the pervasive lack of awareness of biosecurity and dual-use issues among those engaged in the life sciences, efforts to promote biosecurity education need to be state-supported, comprehensive, and all-inclusive.



They need to be based on a systematic, long-term strategy and underpinned by internationally agreed standards and adequate financial support. The two initiatives described in the preceding section are important, as they constitute examples of the crucial role that states can play in supporting biosecurity education internationally, and of the long-term commitment to biosecurity education required to ensure that biosecurity is embedded in the training of those engaged in the life sciences throughout their careers.

To this end, the upcoming Eighth Review Conference of the BTWC in 2016 presents an excellent opportunity to institutionalize biosecurity education through long-term strategic planning, international coordination and cooperation, and the identification of clear milestones and metrics for evaluating progress and assessing effectiveness. In this way the norm of ignorance of biosecurity will be replaced by a norm of biosecurity awareness that is essential to fostering a culture of responsibility and security in the life sciences and thereby strengthening the international prohibition of biological weapons.

Education, of course, is a necessary but insufficient condition for the development of biosecurity culture. Broader engagement among all relevant stakeholders in the life sciences is critical to sustaining such a culture. To this end, the development of indicators and milestones for assessing the quality and state of biosecurity culture could be of tremendous value in assisting those engaged in the life sciences with fulfilling their responsibilities with regard to biosecurity.

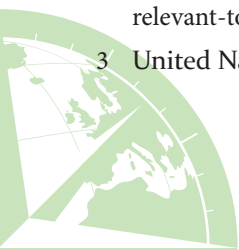
States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, Geneva, December 5-22, 2011, *Final Declaration in Final Document*, BWC/CONF.VII/7, January 13, 2012, <<http://www.unog.ch>>.

- 4 The Guide to Biological Security Issues and How to Address Them, *Preventing Biological Threats: What You Can Do* and the accompanying *Biological Security Education Handbook: The Power of Team-Based Learning* are freely available at <<http://www.bradford.ac.uk/social-sciences/peace-studies/research/publications-and-projects/guide-to-biological-security-issues/>>.
- 5 Special thanks to Professor Serhiy Komisarenko, Dr Galina Gergalova, and Dr Iaroslava Maksymovych for the insights and relevant information about the project that they are currently implementing in Ukraine
- 6 OPCW Executive Council, *Decision: Establishment of an Advisory Board on Education and Outreach*, EC-80/DEC.5, October 2015, The Hague, the Netherlands, <<https://www.opcw.org/?id=2555>> (accessed October 30, 2015).
- 7 The full text of the Hague Ethical Guidelines is available at <<https://www.opcw.org/special-sections/science-technology/the-hague-ethical-guidelines/>> (accessed October 30, 2015).
- 8 For background information on the Hague Ethical Guidelines, see <<https://www.opcw.org/special-sections/science-technology/the-hague-ethical-guidelines/background-information/>> (accessed October 30, 2015).

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2 National Research Council, *Life Sciences and Related Fields: Trends Relevant to the Biological Weapons Convention*, 2011, The National Academies Press, Washington DC, USA, <<http://www.nap.edu/catalog/13130/life-sciences-and-related-fields-trends-relevant-to-the-biological>> (accessed March 15, 2016).

3 United Nations, Seventh Review Conference of the





A Busy and Productive Year in 2015 for the 1540 Committee and Its Group of Experts

Terence Taylor,
COORDINATOR, UNSCR 1540 GROUP OF EXPERTS

The views expressed in this article are those of the author only and do not necessarily reflect those of the United Nations or the 1540 Committee.

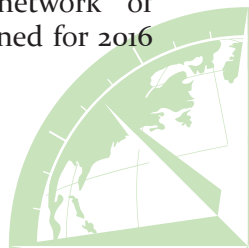
The importance of effective implementation of resolution 1540 (2004) is heightened by the relentless increase in extreme violence being perpetrated by terrorists in various parts of the world. This means that UN member states must be ever more vigilant in preventing the catastrophic use of weapons of mass destruction as terrorists and their supporters seek ever more violent means of attack. Resolution 1540 is the central component in the architecture of the global nonproliferation regime. As the chair of the 1540 Committee, Ambassador Román Oyarzun Marchese, said in a briefing to the Security Council, “...the cost of investment now in effective implementation of resolution 1540 (2004) will undoubtedly save far higher costs later—not only in financial terms, but also in humanitarian, political, social, and material terms.”

The 1540 Committee and its supporting Group of Experts had a very busy time in 2015. The Committee completed its revision of the record of implementation measures of all 193 member states over the past two years. The revised matrices are now on the

Committee’s website. The 1540 Committee places high value on direct interaction with states, seeing it as a key element in the effort to promote more widespread and effective implementation of obligations imposed under resolution 1540.

Over ninety percent of states have reported to the 1540 Committee on the measures they have taken to implement the resolution. While this is impressive, it still leaves 17 states that have yet to submit reports detailing the measures they have taken to implement the resolution. Initial reports were forthcoming from states last year as a direct result of the 1540 Committee visits by invitation. These direct interactions also led to an increase in the number of voluntary national implementation action plans, in which states set out their plans for more effective implementation of the resolution.

An innovation last year was the introduction of a training course for national 1540 Points of Contact. The inaugural course was hosted by China last September for states in the Asia-Pacific region. It successfully promoted participants’ understanding of states’ obligations under the resolution. Participants then carried the message back to their governments and will keep in contact with one another and the Committee, constituting a “living network” of contacts. More training courses are planned for 2016 in Asia, Europe and Latin America.



With regard to assistance, the Committee recognizes that the system needs to be made more responsive and prompt. With this in mind, the Committee has put in place a regional approach, enlisting the help of regional organizations to promote more efficiency to the benefit of requesting states. As an exemplar of this approach, the African Union is hosting a “Review and Assistance Conference” in Addis Ababa in April 2016 for all African states. For Latin America and the Caribbean, financial support offered by Canada will enable the Committee to provide a responsive regional approach there.

In 2015, the Committee and its supporting Group of Experts intensified their collaboration with international organizations at the global and regional levels, and with other relevant entities within the UN family. The Committee is collaborating more closely with the IAEA, particularly in important overlapping areas such as the IAEA’s work on Integrated Nuclear Security Support Plans and the 1540 voluntary national implementation action plans.

In the chemical and biological areas, the Committee has continued its cooperation with the Organization for the Prohibition of Chemical Weapons and the Biological Weapons Convention Implementation Support Unit, benefitting from their representatives’ participating in regional 1540 events such as one in the Middle East in Amman, Jordan, last June. Committee members and its supporting Group of Experts participated in the BWC Meetings of Experts last August and in the Meeting of States Parties in December.

Support from regional organizations for our outreach to member states has also been enhanced. As already indicated, the African Union is playing an important role in this regard and will continue to do so, having committed through a resolution to give support to 1540 implementation. Also in Africa, and for the first time, the Committee interacted with the Intergovernmental Authority for Development that has been pursuing 1540 implementation among its member states in East Africa and the Horn of Africa.

The Organization for Security and Cooperation in Europe sets a good example through, among other things, supporting the appointment of, and engagement with, 1540 Points of Contact among its participating states. The OSCE has been particularly

supportive in promoting effective implementation in Central Asian states. The Committee’s regional connections in the Americas are being strengthened through a plan to support the establishment of a 1540 project officer at the Organization for American States.

The Committee has met with chairs and members of the Missile Technology Control Regime (MTCR) and the Nuclear Suppliers Group (NSG). The MTCR invited the Committee to participate in its March 2016 technical outreach meeting. The chair of the NSG gave a briefing to the participants in the 1540 Points of Contact training course in China. The Committee is moving much more in the direction of practical engagement with these entities.

Within the UN family, the Committee has continued to benefit from participation in joint visits to states with the Counter-Terrorism Executive Directorate. This activity has enhanced the Committee’s opportunities for the direct engagement with states that it considers to be of particular value.

With regard to the Committee’s work on transparency and outreach, particular efforts have been made to engage key elements of civil society, namely industry, academia, and parliamentarians. Industry should be a key partner to governments in the implementation of resolution 1540. Last November, Germany hosted the fourth in an annual series of seminars to engage representatives of industry from around the world, a series known as the “Wiesbaden Process.” This seminar was designed specifically to make a contribution to the Committee’s comprehensive review and to chart a way forward for continued engagement with industry. On the latter point, one of the important outcomes was an idea to take a regional approach to engaging industry. To this end, the Republic of Korea has announced that it will host a regional event in the spirit of the Wiesbaden Process. It will convene the event in Seoul in September 2016.

The Committee recognizes the importance of engaging with parliamentarians who must develop and pass legislation essential to 1540 implementation. To this end an agreement was made with the Inter-Parliamentary Union (IPU), via UNODA, to promote 1540 implementation among its membership. A product of this relationship was a meeting convened by the IPU in February 2016 in Cote d’Ivoire dedicated





to resolution 1540 implementation that was attended by 72 parliamentarians from 18 legislatures. It was a truly innovative event.

In 2016, much of the Committee's attention will be focused on the comprehensive review of 1540 implementation that the Security Council has mandated be completed before December 2016. Modalities for the conduct of the review have been agreed to by the Committee, and a work plan has been developed and is being implemented. The review will look back over the past five years of experience with implementation, assessing progress so far and looking forward to recommend any changes needed to make implementation more effective and sustainable in the future.

Looking ahead, the Committee's plans include an international consultation with academia in April 2016. This event will involve leading academics from around the world, seeking their ideas about how to implement the resolution effectively. Discussions will unfold not just from the perspective of governments, but from that of academia itself—particularly those sectors active in the life sciences, which themselves have to meet obligations under resolution 1540.

In June 2016, the Committee plans to carry out an extensive consultation with member states and civil society. The event will be conducted in New York. The Committee is intent on conducting a genuine consultation at which the Committee will put forward its findings so far and seek input from the participants that can be taken into account while preparing the report of the comprehensive review, which is due three months later.

For the Committee, then, a challenging year lies ahead in 2016. Not only must it conduct its comprehensive review, but it must also maintain the momentum of its outreach to states, international organizations, and civil society in its unceasing effort to promote effective implementation of resolution 1540.





Former Experts Chart a Path for 1540 in *Towards the 2016 Comprehensive Review*

Joshua L. Darnell,
UNIVERSITY OF GEORGIA, USA

The views expressed in this article are those of the author only and do not necessarily reflect those of the United Nations or the 1540 Committee.

Operative paragraph 3 of UN Security Council resolution 1977 (2011) states that the UNSCR 1540 Committee should conduct a comprehensive review of implementation progress at five-year intervals, and that the first of these reviews should be completed prior to December 2016. With that deadline perched on the not-too-distant horizon, the South Africa-based Institute for Security Studies (ISS) convened in Cape Town, South Africa, on May 28, 2015, a meeting of professionals with established expertise in UN Security Council resolution 1540 and the field of WMD nonproliferation. The purpose of the meeting was to provide insights that would focus and enrich deliberations during the upcoming review session.

As former members of the 1540 Group of Experts, each of the participants had previously served the Committee, helping it better implement UNSCR 1540's mandate. Invitees were asked to prepare papers prior to the meeting, each of which would carry its author's assessment of the Committee's progress to date and, more importantly, provide suggestions for next steps toward effective implementation.

ISS compiled these reports into ISS Monograph 191, titled *Towards the 2016 Comprehensive Review: Former Experts Assess UNSC 1540* (the full text of which can be found at <<https://www.issafrica.org/uploads/Mono191.pdf>>). Dr. Berhanykun Andemicael of Eritrea, Dr. Volker Beck of Germany, Dr. Olivia Bosch of the United Kingdom, Ana Maria Cerini of Argentina, Dr. Richard T. Cupitt of the United States, Brad Howlett of Australia, Nicolas Kasprzyk of France, Kai Kessler of Germany, Roque Monteleone-Neto of Brazil, Senan Muhi of Iraq, Patrice Palanque of France, Dana Perkins of the United States, and Dr. Venkatasubbiah Siddhartha of India, and other experts, participated in the meeting or authored reports for the compilation.

Taken on the whole, the many suggestions brought forward in this volume communicate a need for a better-developed CBRN security culture among private industry and higher education, a more formal role for civil-society organizations in the implementation process, and a means for the 1540 Committee to better share effective practices among concerned parties at the state level.

The day-to-day labor of managing WMD materials in accordance with UNSCR 1540 is carried out not by the Committee or its experts, but by members of the industrial sectors who deal with such materials as a matter of professional course. As such, several of the expert suggestions in *Towards the 2016 Comprehensive*

Review are geared towards fostering a stronger CBRN security culture among the ranks of WMD-relevant private entities. In this context, CBRN security culture would be defined as institutionalized attitudes and practices leading to secure and conscientious handling of nuclear, chemical, and biological technologies and materials—and, by extension, adherence to the guidelines of UNSCR 1540.

This publication mentions the United Nations' annual Industry Conference on Security Council Resolution 1540, informally known as the Weisbaden Conference in reference to its host city, as an option for how this may be achieved. The Weisbaden Conference provides an avenue for cooperation and shared expertise among private industry, government employees, and civil society elements concerned with UNSCR 1540 implementation. It also provides a means for representatives of private industry to air concerns, particularly in cases where those representatives may feel that unclear regulatory legislation has impaired their ability to conduct business. Continued participation from the private sector will arm executives and mid-level managers with the tools and understanding required to operate within compliance with UNSCR 1540's mandate, while ensuring that the 1540 Committee treats the needs of private industry as a priority.

Some authors featured in the monograph suggest that the 1540 Committee should use Wiesbaden or similar regional conferences to devise better incentives for the private sector to comply with UNSCR 1540 implementation. For instance, the conference agenda might include topics that are relevant to the bottom-line interests of private firms, or perhaps provide organized networking opportunities that benefit individual participants. Strengthening CBRN security culture in the halls of private enterprise is very much a two-way street. Leaders of industry must do their part to encourage participation from within their

own ranks, but organizers working on behalf of the Committee must be attentive to that which drives interest from the private sector.

States, of course, can also facilitate the growth of their own CBRN security cultures by organizing Wiesbaden-style conferences within their own borders, tailored to the particular characteristics of their own private sectors. The text also suggests that undergraduate curricula (often developed under guidance by state agencies) be geared towards acculturating students of policy and politics to the world of CBRN security and sensitive-material management. Roque Monteleone-Neto identifies a program at the Federal University in Sao Paulo, Brazil, as a successful example.

"the future of UNSCR 1540 is inextricably linked to the growth of CBRN security culture, and...culture can only grow by way of tailored, considerate engagement among private industry, higher education, and the proponents acting on behalf of the 1540 Committee."

The role that civil-society organizations (CSOs) play in promoting UNSCR 1540 implementation is discussed several times and by various authors throughout the text. Civil-society organizations occupy the space between the private realm and the realm of governance, and are well-positioned to assist in a variety of implementation tasks. As Dana Perkins notes in her report, however, the Security Council's WMD-related engagement with CSOs has been mostly limited to a one-way information flow from the 1540 Committee. Thus,

several authors featured in the ISS monograph suggest ways of expanding and formalizing that relationship.

As noted in the text, there is a wellspring of legislative knowledge that many CSOs can bring to bear, and such expertise could be used to assist states in constructing cleaner, clearer legislation pertaining to WMD nonproliferation. Similarly, CSOs can serve as purveyors of effective practices for managing CBRN materials, working in conjunction with state and private entities to ensure that such practices are in place before mistakes are made. Guaranteeing steady access to that expertise means formalizing the relationship between the Committee and the CSOs that have previously served at the periphery of the 1540



mandate. Steps towards formalization could include actions as simple as adding contact information for approved CSOs to the 1540 Committee's website, where interested parties might easily find it. Over time, formal acknowledgement by the Committee might allow CSOs to aggregate and increase their capacity to monitor compliance while assisting in implementation.

This publication conveys a few suggestions that could be beneficial to the outreach operations of the 1540 Committee itself, particularly in regard to how the Committee communicates with relevant members of the public and private sectors. To a large degree, these suggestions center on easing the transmission of effective practices from the Committee to interested parties. Effective practices pave the way for efficient, pain-free implementation of UNSCR 1540, sparing governments and businesses alike from repeating mistakes made by others in the past. Several suggestions made in the ISS monograph point toward an improved online presence for the Committee's collective knowledge of effective practices. Such a presence would enable prospective implementers of 1540 to search a database for the practices most relevant to their needs.

Just as several authors suggested that the 1540 Committee tailor its implementation strategies to the needs of the private sector, it is also suggested in the text that the Committee tailor its approach to the policy priorities. These priorities vary, of course, from region to region, depending on where a stakeholder views itself in the chain of global security. The International Atomic Energy Agency and the Organization for the Prohibition of Chemical Weapons are two organizations that have demonstrated success in couching their legislative guidance to align with a given state's pressing security interests (such as conventional counterterrorism or small-arms trafficking). Learning from the approaches taken by the IAEA and the OPCW, the 1540 Committee might find increased cooperation from states attempting to reconcile WMD nonproliferation with their most urgent security demands.

Towards the 2016 Comprehensive Review showcases only a portion of the rich experience that the former members of the Group of Experts collectively bring to bear. The many suggestions made therein, varying in content and specificity, are too numerous to list here.

Through them, however, three grand ideas emerge to inform the deliberations of the upcoming 2016 comprehensive review. First, the future of UNSCR 1540 is inextricably linked to the growth of CBRN security culture, and that culture can only grow by way of tailored, considerate engagement among private industry, higher education, and the proponents acting on behalf of the 1540 Committee. Second, civil-society organizations stand ready to extend the capacity of the Committee to facilitate and monitor implementation, but the relationship between CSOs and the Committee must become better structured. Finally, the Committee itself must take steps to maximize accessibility for parties interested in learning effective practices of implementation, either via online content or through some other means.



Private Sector's Key Recommendations to Regulators and the UNSCR 1540 Legislative Review Process in 2016

Michael Weiss,
PROJECT MANAGER
FEDERAL OFFICE FOR ECONOMIC AFFAIRS AND EXPORT
CONTROL (BAFA), GERMANY

The views expressed in this article are those of the author and do not necessarily represent the position of BAFA.

Two thousand sixteen marks the year when a comprehensive review of the status of implementation of UN Security Council resolution 1540 (2004) will be conducted by the 1540 Committee. As set out in UNSCR 1977 (2011), such a review will be held every five years to see whether recommendations for adjustments are necessary. These proposals will be included in a report that will then be submitted to the Security Council. All of these actions will happen before the end of 2016. In light of the UNSCR 1540 comprehensive review at hand, the framework of a well-established 1540 Industry Outreach Conference, the so-called Wiesbaden Process, was used as a preparatory forum where private-sector representatives were given the opportunity to contribute suggestions to the 1540 Committee.

Facilitating future-oriented discussions between private-sector representatives from various global players throughout different industry sectors, on the one hand, and government regulators, on the other, has been the main goal of the Wiesbaden Process from its start in 2012. This report will focus on some of the highlights of the discussions that took place at the recent conference, especially with regard to the question of how a future public-private-partnership could be enhanced and made more efficient.

One integral part of this dialogue has been discussing key recommendations for regulators from the viewpoint of industry. The fourth conference, held on November 19-20, 2015 in Germany, focused especially on key recommendations in three main areas: refinement of legislation according to business's

needs, proactive involvement by industry, and the role of possible rewards. The conference was organized by the German government in cooperation with UNODA using financial support from the governments of the Republic of Korea, the United States, and the European Union.

First of all, it was said that a global supply chain necessarily calls for common and harmonized rules. Regulatory frameworks need to eliminate all conflicting and contradictory regulations, as well as undefined terms that can lead to misinterpretation and bear the risk of penalization. There was a clear call from industry to regulators to establish a truly level playing field where harmonization and simplification of regulations and control lists takes place and thus creates more enterprise-friendly conditions. Legislation and its implementation should thus be not only risk-based but also appropriate. It was emphasized that global business operations in different jurisdictions have great difficulties when dealing, for example, with 15 different control lists in 15 different countries.

A refinement of legislation according to business's needs has to take place, since business and administration need good, coherent, and workable provisions that are easy to understand while also providing a reasonable level of control. Successful business operations require clear, standardized, and harmonized international legislation, particularly export control lists that facilitate compliance without hampering business procedures. "Keep it simple" was a commonly used catch-phrase brought forward by many industry representatives attending the 2015 conference and all previous conferences in the Wiesbaden series.

Finding a middle way between overregulation and diminished nonproliferation-related security is an undertaking of utmost importance. In this respect, business is also in need of good administration—for



example, quick, reliable, and transparent application rules—as part of a harmonized approach that can be adopted on a global scale. Legislation and information need to be published and needs to be easily accessible, ideally in different languages. Legislators should avoid unconsolidated publications and provide consolidated versions of legislation instead. This is especially the case when it comes to sanctions lists. Information provided to economic operators should be actionable, not questionable.

Furthermore, regulations related to export control (or strategic trade management, which seems to be the more common phrase nowadays) should reflect and consider the reality of business models, systems, and operations. There is a need for a clear assignment of responsibilities to each actor involved in the “security chain,” and this is the case for export control authorities, trade industry, financial institutions, and other sectors as well. Only if such responsibilities are assigned clearly and legal certainty is established can a high degree of effective implementation take place.

Ongoing, active involvement by industry was named a second recurring main theme in the discussion of public-private partnerships, and not exclusively when it comes to the issue of nonproliferation. A regular dialogue and mutual exchange of information with government authorities, such as provided under the Wiesbaden Process framework, is key to discussing current developments in legislation and practice. Such consultation mechanisms between governments and various industry sectors need to be strengthened, especially when it comes to developing new regulations.

For these regulations to be strong and applicable, industry should be allowed to comment on new concepts in legislation and be involved in test runs at a very early stage, preferably before its implementation. Practical mechanisms to involve industry that were mentioned at the 2015 conference ranged from participation in expert hearings by industry representatives, to the ability to provide written submissions as position papers, to participation in conferences and seminars. On the other end of the spectrum, industry wants to be steadily informed about upcoming changes in all areas of strategic trade management. These are some basic cornerstones of a trustful public-private partnership.

Last but not least, rewards are one widespread topic and claim from industry. Compliance was said to be a reward in itself (“to keep your business clean”), but governments were encouraged by industry representatives to set up rewards to fight illicit procurement of proliferation-related goods or substances. The authorities, furthermore, were encouraged to acknowledge industry’s voluntary compliance initiatives and measures, such as setting up codes of conduct, and to praise industry for such accomplishments once in awhile—especially in the form of concrete measures.

These are just some of the main recommendations from the industry side that will remain approximately at the heart of public-private discussions for a while. As far as the plan for the UNSCR 1540 comprehensive review goes, by September 1, 2016 the first draft of the report on the comprehensive review will be ready for consideration by the 1540 Committee. By the end of October, the report on the legislative review will be ready for submission to the UN Security Council. Afterward, the year 2017 will show whether past outreach activities and cooperation between regulators and industry sectors will bear fruit when it comes to the renewal of UNSCR 1540.

One thing is for sure: discussion to find common ground between smooth business operations and effective WMD proliferation prevention will go on, far beyond the legislative review process.



List of Articles in 1540 Compass Issues from No. 1 to No. 9

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*Compiled by Samuel Schaffer, University of Georgia, USA





The 1540 Compass
Center for International Trade & Security
120 Holmes/Hunter Academic Building
Athens, GA 30602
USA



Holmes/Hunter Academic Building, University of Georgia

The 1540 Compass is a publication of the Center for International Trade & Security at the University of Georgia

The Center for International Trade & Security's mission is to mitigate the global spread of nuclear, biological, and chemical weapons. The Center carries out this mission by researching the dynamics of arms trade control, training government and industry representatives to implement policies that limit the spread of these weapons, and educating students in the discipline of nonproliferation and international security. With offices on the University of Georgia campus and in the U.S. capital, CITS bridges the worlds of research and policy, bringing the best of each to the other.

706-542-2985

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Contact the Compass:

<http://cits.uga.edu/publications/compass>

Editor in Chief: Igor Khripunov
i.khripunov@cits.uga.edu

Managing Editor: Christopher Tucker
c.tucker@cits.uga.edu