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Promoting Excellence and Demonstrated Competence for Nuclear Security Training

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Abstract

The international community has spent considerable time, money, and effort attempting to establish a series of national and regional Centres of Excellence (COEs), also known as Nuclear Security Training and Support Centres (NSSCs). These Centres tend to have a wide variety of objectives, structures, and methods of delivery. Unsurprisingly, no internationally accepted standard exists on how they should operate. The IAEA has produced some excellent guidance (TECDOC 1734), but by virtue of its role cannot provide standards for benchmarking success. Against this backdrop, the World Institute for Nuclear Security (WINS) launched the WINS Academy, an initiative to provide practitioners with opportunities to earn certification in Nuclear Security Management. Underpinning the program is certification in accordance with the ISO 9001 and ISO 29990 quality management standards. Those standards provide an internationally recognized external benchmark of quality; demonstrate credibility, competence and professionalism; and give potential employers and others in the industry an objective measurement of participants' knowledge. WINS recommends that NSSCs follow a similar model, in which their participants receive an evaluation leading to qualification or certification, and using professional standards developed by a recognized, respected certifying body rather than developing their own ad hoc arrangements, which are ultimately unsustainable. With the end of the Nuclear Security Summit (NSS) process, sustainability is the key consideration for many nuclear security training centres; WINS has sought political and industry commitments to sustain security training programs, and these efforts were recognized at the 2016 NSS in a Joint Statement on Certified Training for Nuclear Security Management.

I. Introduction

Centres of Excellence (COEs) for professional development are not new; they exist in a wide variety of industries and serve many different professions and stakeholders. They may be owned and operated by

international organizations, State organizations, academic institutions, or the private sector. In recent years there has been a particular focus on COEs for nuclear security; this has in part been encouraged by the Nuclear Security Summit (NSS) process and the desire of some States to demonstrate an enhanced training capability. The International Atomic Energy Agency (IAEA) and States are increasingly referring to these entities as Nuclear Security Training and Support Centres (NSSCs, a term more descriptive of their function and less presumptuous regarding their relative *excellence*).

Many Centres have been formed as a result of commitments made during the U.S.-initiated NSS process, which ended in March 2016. There are legitimate concerns that the potential reduction in high-level political support will mark the beginning of the end for Centres that have not yet carved out a well-defined role with broad stakeholder support [1]. In this light, several organizations have attempted to suggest best practices for the Centres. The IAEA, in particular, has taken a leading role by establishing the International Network for NSSCs, which is a technical network helping coordinate efforts among the various Centres. The Network has been well received and currently involves a large body of representatives from 56 Member States who meet biannually in Vienna to discuss progress and exchange ideas [2].

Based on information contained in the Nuclear Security Information Portal (NUSEC), discussions held at the IAEA, and visits to facilities, many of the Centres are being established to provide security-awareness training courses[3]. Some Centres also focus on technical support for nuclear security, whereas others focus on training and research relating to nuclear security, safety, safeguards, and other related disciplines. The more advanced centres include impressive physical facilities for guard-force training and technical capabilities for both research and demonstration purposes. Some Centres include chemical, biological, radiological, and nuclear (CBRN) objectives. Clearly, no standard format for an NSSC exists. Many have relied on external funding and support to become established and operational, and some may not survive without continued external support.

Given that many Centres have received considerable funding, the question therefore becomes: will they be sustainable and do they teach the right things? In the opinion of the World Institute for Nuclear Security (WINS), there is a danger of missed opportunity because many training programs in nuclear security fail to build professional capacity within stakeholder groups. Often, the emphasis seems to be on “doing something” rather than on taking the time to consider objectives and longer-term needs before deciding on a course of action.

Addressing this concern, this paper provides an example of how WINS has developed its training program in nuclear security, with an overview of accomplishments to date, how WINS evaluates the successes or failures of the program, how to maintain quality and develop training standards through using ISO quality management systems, and steps to take for international commitments in support of nuclear security training. Any training centre will benefit from applying similar systematic approaches based on ISO.

II. The WINS Academy

As the NSSC network developed, WINS began a project, called the WINS Academy, to provide practitioners with professional development in nuclear security management. The idea was to develop an international certification program for nuclear security, similar to the certification programs that exist for a variety of professions such as IT security, aviation security, and maritime shipping security. First proposed at the March 2012 Nuclear Industry Summit in Seoul, WINS launched the program at the March 2014 Nuclear Industry Summit (NIS) in Amsterdam.

Since the launch in 2014, WINS has drafted ten comprehensive training modules that comprise a complete program curriculum. Each module has been developed in collaboration with subject matter experts and has been based on:

- Experience gained by being the world's first practitioner-based nuclear security organization. WINS currently has nearly 3,500 members in about 120 countries who give us continuous feedback about what is important to their professions.
- The development of 36 Best Practice Guides (to date) on nuclear security topics of relevance to practitioners.
- Over 70 practitioner workshops and events held around the world on nuclear security issues relevant to practitioners.

In total the program has developed around 1,750 pages of training material, all drafted by subject matter experts, technically edited, and peer reviewed.

The target audience for the modules is a multi-disciplinary group including board members, executive managers, security directors, scientists/technicians/engineers, offsite incident responders, regulators, and other professionals with management responsibilities for nuclear and radioactive source security (Figure 1). All participants begin with a core Foundation Module that sets out security as a fundamental aspect of risk management and corporate reputation, as well as a strategic, operational activity that needs to be implemented organization-wide. Participants then choose one elective module according to their interests, needs, and background. After completing both modules, they have the opportunity to take proctored exams; if they pass, they are certified by WINS as a *Certified Nuclear Security Professional (CNSP)*.



Figure 1. WINS Academy Completed Curriculum.

III. Methodology for Assessing Results

The purpose of providing training to nuclear security professionals is not only to improve their skills and knowledge base, but also to demonstrate that these improved skills and knowledge actually lead to improved decision making and increase the effectiveness of an organization's nuclear security program.

Nuclear security training programs represent a significant investment and should support organizational goals and strategic objectives. Therefore, it is important to validate their quality and impact in order to guide future development.

Unfortunately, reliable, effective measures for evaluating the impact that nuclear security training has on organizational behavior have lagged behind the growth in training [4]. This is why it is now critical to find effective, repeatable ways for organizations to measure return on investment. An example of a model that has been found especially effective in this regard is called the Kirkpatrick Model. (Its most recent version is now called the *New World Kirkpatrick Model*) [5].

The Kirkpatrick Model is one of the most widely used approaches to evaluating training results. Its objective is to help organizations determine the extent to which participants can apply their training to their work in a way that demonstrably increases organizational performance. The Model consists of four levels:

1. *Reaction*: The degree to which participants react favorably to the training.
2. *Learning*: The degree to which participants acquire the intended knowledge, skills, attitudes, confidence, and commitment based on their participation in a training event.
3. *Behavior*: The degree to which participants apply, back on the job, what they learned during training.
4. *Results*: The degree to which targeted outcomes occur as a result of the training event and subsequent reinforcement.

A. Level 1: Reaction

From what WINS has seen, much of the training carried out by current NSSCs/COEs involves neither structured evaluation nor certification. If it were to be assessed, it would probably achieve Level 1 on the Kirkpatrick scale.

In many respects, level 1 evaluation involves *awareness training* since at this level no attempt is made to establish whether participants actually learn anything from a course. WINS evaluates at level 1 by collecting participants' feedback to capture immediate reaction and evaluate their degree of satisfaction. An example of feedback is included below for illustration.

"The WINS Academy nuclear security Foundation Module and the Executive Management Module provided me with a thorough and accessible overview of the critical aspects of nuclear security that are important to many who interface with nuclear technology. The course syllabus was very clear, very well structured and well resourced. There were also plenty of opportunities to consider deeply the consequences of different options available to nuclear professionals and executives when it comes to maintaining the security of their activities and facilities. I would happily recommend the WINS Academy Program to other professionals in the nuclear industry."

— Simon Gillett, EDK, United Kingdom

Surveys also provide a means to evaluate the reaction of participants immediately after they have completed the learning event. Each WINS Academy module includes a post-course survey and post-exam survey to measure participant satisfaction. WINS reviews the feedback collected to identify corrective actions and to improve the learning experience. For example, based on participant post-course feedback, WINS has developed professionally designed and published hard copies of all its training materials, along

with an update to a new, modern eLearning platform. WINS has also begun revising all modules, taking into account participant feedback.

B. Level 2: Learning

Level 2 of the Kirkpatrick Model assesses the depth of learning that occurs as a result of the training. To do so, it often uses tests before and/or after training. Assessment at this level moves the evaluation beyond learner satisfaction to the degree to which participants actually improve their competence (knowledge, skills, and/or attitudes). Measurement is fairly simple because most activities and interactions undertaken during a learning program are also measurements of learning. Examples include formal and informal testing, team assessment, and self-assessment.

The use of proctored knowledge examination is a common approach for many professional training programs, and this method has been adopted by WINS. In order to ensure that the most reliable testing measures are used in assessing candidates, WINS partners with Pearson VUE, the world's largest provider of computer-based testing for information technology, and for academic, government, and professional testing programs. Through this partnership, WINS Academy exams can be taken in over 5,100 Pearson-accredited test centers in 180 countries.

In two years, WINS has delivered 475 exams, out of which 374 have been passed, which corresponds to an average pass rate of 78.7%. This is in line with standards for typical professional certification exams, which vary widely but typically range between 70-80% pass rates, with some lower and some higher (for example, pass rates on certain medical exams may range from 85-95%) [6].

WINS continually collects data on the exams and will be revising the exams based on psychometric data to ensure they are valid, reliable, and fair. Standards for Educational and Psychological Testing (SEPT) describes validity as the most fundamental consideration in developing and evaluating exams [7]. Validity relies on answers to several questions:

- Does the exam measure what it is intended to measure?
- Are the interpretations drawn from the exam scores appropriate and justifiable?
- Is the exam free of bias?
- Is there fair treatment with regard to test procedures and scoring?
- Does the test achieve equivalent results regardless of race or ethnicity?
- Are there equitable opportunities to learn the material covered by the test?

To answer these questions, WINS structures all its Academy certification modules around a core set of learning objectives and assessment criteria. Content is written to these learning objectives, and exam questions are cross-referenced to both the content and the objectives to ensure that exams are asking relevant and appropriate questions. Furthermore, testing experts at Pearson systematically review all questions to ensure they are clear, reliable, and fair. In addition, each Pearson-accredited test center has a strict set of procedures, including global identity-based management, automated and integrated check-in processing, ID verification, digital signature, photo capture, and proctored monitoring. These procedures prevent the possibility of impersonators taking exams on behalf of registered participants and damaging the integrity of the examination program.

C. Levels 3 and 4: Behavior and Results

Levels 3 and 4 of the Kirkpatrick Model measure the change that has occurred in learners' behavior as a result of the training. The goal is to ascertain whether learners are using their newly acquired skills, knowledge, and attitudes in their everyday environment. Consequently, this level represents a better assessment of a program's effectiveness. Level 4 correlates directly to behavior change by measuring the

impact of the training and reinforcement methods on organizational results. Frequently thought of as *the bottom line*, this final level measures the success of the training program and can be expressed in business terms such as increased productivity, improved quality, decreased costs, and higher profits.

To measure these levels of evaluation, in October 2015, WINS created the WINS Academy Alumni, an interactive platform dedicated to bolstering the professional development of participants who have passed their certification examinations. The overall objectives of the WINS Academy Alumni Network are to stay engaged with graduates of the Academy program, provide them with additional opportunities for professional development, measure their continuing development, and secure their feedback to help continuously improve the Academy program.

WINS is still in the early stages of collecting data to conduct this level of evaluation. A first step in this direction has been to launch quarterly feedback surveys for CNSPs that aim to measure the value and implementation of the certification training. The first such survey was released in Q4 2015 and asked participants to evaluate the Value of Certification. Additional surveys were released in Q1 and Q2 2016. Some of the preliminary results include the following: (Results are expressed as a percentage of the respondents.)

- 96.6% believe they will benefit from an annual WINS Academy Career Report.
- 94.6% state that Certification has had a positive impact on their professional image/reputation.
- 94.6% will undertake another professional development program in the 12 months that follow their WINS Certification.

In addition, when asked why they have pursued certification through the WINS Academy, respondents answered:

- 91.9% to improve their professional profile.
- 83.8% to enhance their professional reputation with colleagues, employers, or customers.
- 83.8% to have an accurate measure of their knowledge.
- 64.9% to improve their CV/resume.

Moreover, more than half of the CNSPs indicate that one of the benefits they gained from the certification is they are able to do their job more efficiently. A large number also indicate that they have taken on management responsibilities as a result of their certification. Almost half of CNSPs also indicate that the benefit they experienced after having achieved the certification was immediate.

These results are evolving as additional Academy participants become CNSPs and will be reported in full in a Career Report at the end of 2016. In the meantime, WINS continues to develop new tools and metrics to use the Alumni Network to evaluate the impact of the Academy training on participants.

IV. Ensuring and Maintaining Program Quality

The WINS Academy and all the various NSSCs are engaged in *professional training*, as distinct from *university education*, which requires an entirely different approach to quality assurance. Universities typically achieve a recognized standard through national-level accreditation for their activities; however, such an approach may not be appropriate for the vast majority of COEs.

So how can COEs receive external evaluation and validation of their approach? One answer is to adopt methods for evaluating professional training that are already well established and used in a myriad of professional settings. The best practice approach WINS has found is the International Organization for

Standardization (ISO) and its International Standard *ISO 29990:2010 Learning Services for Non-Formal Education and Training*. ISO explains that:

“The objective of this International Standard is to provide a generic model for quality professional practice and performance, and a common reference for learning service providers (LSPs) and their clients in the design, development and delivery of non-formal education, training and development. This International Standard uses the term “learning services” rather than “training” in order to encourage a focus on the learner and the results of the process, and to emphasise the full range of options available for delivering learning services. This International Standard focuses on the competency of LSPs.” [8]

ISO 29990 provides a unified model for a quality and professional mode of operation, as well as a common reference point for a Centre that is conceiving, developing, and delivering programs. The standard is designed for all training institutions and promotes transnational cooperation in vocational education. Its strongest point is a focus on the learner, including learning outcomes and evaluation of learning results to demonstrate evidence of competence and quality. The benefits of such an approach are evident for three important groups of stakeholders [9]:

Benefit for Centres: The providers of certified learning obtain a standard of proof regarding the organized training of the institution. The qualitative level of the training provided is quantifiable and comparable worldwide.

Benefits for Learners: Learners can better select their training based on the needs and expectations that match the skills and abilities they want to acquire. It also ensures an improved learning environment, greater transparency, and strong international recognition in the professional development market.

Benefits for International Cooperation: The standard provides an internationally comparable benchmark of quality without distorting the competitive market and provides the basis for developing further specific requirements for international cooperation in the area of education and training.

To set an example for the nuclear security training community, WINS achieved ISO 29990:2010 certification in December 2014. ISO 29990 certification provides an internationally recognized external benchmark of quality; demonstrates credibility, competence and professionalism; and gives potential employers and others in the industry an objective measurement of participants’ knowledge. Such knowledge is also transferrable across international boundaries. WINS recommends that all NSSCs follow a similar model, in which their programs are evaluated against professional standards developed by a recognized, respected certifying body rather than developing their own *ad hoc* arrangements, which are ultimately unsustainable. And to support the approach, WINS is developing detailed ISO 29990 implementation guidance for NSSCs and will assist Centres upon request.

V. Maintaining Momentum

At the 2014 Hague Nuclear Security Summit (NSS), thirty-five States sponsored a Joint Statement on Strengthening Nuclear Security Implementation. The aim of this Joint Statement was for subscribing States, at their own discretion, to meet the intent of the essential elements of a nuclear security regime, and to commit to the effective and sustainable implementation of the principles therein. The *Joint Statement on Strengthening Nuclear Security Implementation* was subsequently published by the IAEA in 2014 as INFCIRC/869 and is open for any IAEA Member State to support [10].

One of the four key commitments outlined in the Joint Statement on Strengthening Nuclear Security Implementation is for subscribing States to “*ensure that management and personnel with accountability for nuclear security are demonstrably competent.*” The Joint Statement outlines two ways in which States can support the training of effective and competent managers of those materials and related facilities:

- Maintaining and continuously improving domestic or regional training through education, certification and/or qualification activities; and
- Supporting or participating in the development of World Institute for Nuclear Security (WINS) best practice guides and training activities.

To further support INFCIRC/869, on 5 April 2016, twelve States released a *Joint Statement on Certified Training for Nuclear Security Management [II]*. By committing to support the WINS Academy in the *Joint Statement*, Canada, Finland, Hungary, Indonesia, Kazakhstan, Mexico, the Netherlands, New Zealand, Norway, Thailand, the United Kingdom, and the United States recognized that the challenges associated with managing nuclear and other radiological materials are varied and complex, and that effective security relies upon the competence of management and personnel who are responsible for this work.

The signatory States plan to promote cooperative efforts between the WINS Academy and the IAEA’s NSSC Network and the International Nuclear Security Education Network (INSEN). The signatory States also plan to encourage other States, supported by industry and civil society, to provide a tangible commitment in support of the WINS Academy and certified professional development for nuclear security.

VI. Conclusion

International recognition of the need for specialized security training for staff has increased substantially in the last decade and led to a rapid rise in training programs. The IAEA currently runs a host of training courses aimed primarily at increasing the awareness of attendees about IAEA Guidance, including the Nuclear Security Series of documents, and it uses industry consultants to run specialized courses. Still, none of the courses currently offered by the IAEA leads to professional certification. This situation is unlike, for example, civil aviation, wherein the International Civil Aviation Organization (ICAO) and the International Air Transport Association (IATA) certify their professional development courses in security and other subjects [12].

The requirements for certification in aviation security arose because of the events of 9/11. WINS worries that it might take the nuclear security equivalent of 9/11 to shake States out of their complacency and recognize that the industry needs internationally accredited and certified systems for ensuring the basic competence of personnel responsible for protecting some of the world’s most dangerous material. As one official noted while discussing the state of nuclear security arrangements, “We have been running a system a certain way for such a long time and not really thinking about whether it was working or not [13].”

WINS will continue to combat this complacency and provide an example for the international community through the progress of our certification program. Now that we have completed the rollout of the Academy online, we will be working on the development of “blended” online and in-person training, delivered in partnership with NSSCs and other training centres. This blended learning model, leading to certification, has been adopted by aviation and a host of other international certification programs throughout the world.

WINS will also support nuclear security training centres in reaching their own meaningful standards through the achievement of ISO 2990 certification. Having an international benchmark against which training services can be evaluated is a highly effective way to identify an organization's needs and the needs of individual learners—and to evaluate the results of learning. It also provides an effective tool for helping assess the management of resources, finances, and risk, and is consistent with the widely used ISO 9001 Quality Management Standard.

The primary premise underlying the WINS Academy is the necessity to demonstrate individual competence through professional certification, supported by training centres that use internationally recognized systems for managing quality. Leaders of industry who participated in the Nuclear Industry Summits (NIS) supported this approach when they committed to “*ensuring that all personnel with accountabilities for security are demonstrably competent by establishing appropriate standards for the selection, training, and certification of staff* [14].”

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VII. Notes and References

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VIII. Author's Bio and Contact Information

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Daniel Johnson joined the World Institute for Nuclear Security (WINS) in October 2012 and is Head of the WINS Academy.

Mr. Johnson has worked for a variety of organizations involved with nuclear security, safeguards, and nonproliferation. He previously worked at Brookhaven National Laboratory, where he supported the U.S. National Nuclear Security Administration's International Nuclear Safeguards and Engagement Program. He has also worked as a Nonproliferation Analyst at the U.S. Department of Energy's China Office and as a Research Assistant at the Center for Nonproliferation Studies.

Mr. Johnson holds a master's degree in International Policy Studies, along with a Certificate in Nonproliferation Studies, from the Monterey Institute of International Studies. He is currently working toward a Graduate Certificate in Learning Design and Technology from Harvard University Extension School.

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Brunelle Battistella

Brunelle Battistella currently works for the International Atomic Energy Agency's (IAEA) Office of Nuclear Security, starting in December 2016. Prior to her position at the IAEA, she joined WINS as a Project Manager working on the WINS Academy. She also gained professional experiences through internships including at the External Relations and International Cooperation Section of the Preparatory Commission for the Comprehensive Nuclear-Test-Ban Treaty Organisation (CTBTO) in Vienna (Austria) and at the Political chancery of the French Embassy in New Delhi (India).

Ms. Battistella holds a master's degree in International Relations and Affairs from the Aix-en-Provence Institute of Political Studies and her field of specialization is South Asia. She also holds a Certificate in Hindi and South Asian studies from the National Institute of Oriental Languages and Civilizations, Sorbonne University, Paris. She is a French native speaker and speaks fluent English, she has working knowledge of German and is proficient in Hindi.

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Dr. Roger Howsley

Dr. Roger Howsley is the Co-Founder and Executive Director of the World Institute for Nuclear Security (WINS) based in Vienna Austria, a professional institute for nuclear security practitioners formed to

exchange best management practices and promote professional development through the WINS Academy. WINS currently has over 3,500 members in 120 countries.

Dr. Howsley was the former Director of Security, Safeguards and International Affairs (SSIA) for British Nuclear Fuels Ltd. and has over 30 years international experience relating to nuclear nonproliferation and security across the nuclear fuel cycle, working with the IAEA, Euratom, National Police Forces and security organizations. During that period he established and directed the SSIA function across the BNFL Group of companies (16 countries, 17,000 employees), establishing corporate governance arrangements and performance standards with which to provide assurance to the Main Board. Dr. Howsley was Chairman of the UK's Atomic Energy Police Authority on a biennial basis between 1996 and 2005 and managed its transition to become the Civil Nuclear Constabulary in 2005, an armed police force of officers and support staff (current budget over £100M/year) responsible for the protection of many of the UK's civil nuclear sites.

Between 2001 and 2008 he was appointed to serve on the IAEA Director-General's Standing Advisory Group on Safeguards Implementation (SAGSI)

Dr. Howsley holds a first class honors degree and doctorate in Life Sciences from the University of Liverpool in England.

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