

International Nuclear Security Education Network (INSEN): an interdisciplinary forum for nuclear security development

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Introduction

Nuclear security hasn't achieved a unanimously recognised status as an education track. Such a gap is partially understandable as a newcomer in the nuclear domain. But also because of the hybrid disciplinary nature of nuclear security. If physical protection pertains to engineering, security involves a multidisciplinary approach. Its growing relevance needed dedicated training and education track as autonomous curricula. This would improve the intertwining of security with safety and safeguards because it provided its own status in the education offered by academic institutions.

With a bottom-up approach, INSEN gather experiences from different countries and regions, clustering areas and themes, enforcing their members and promoting nuclear security in the same academic institutions. The risk of a nuclear or radiological terrorist attack is newly recognised as high. But it wasn't the same for the need for dedicated education for nuclear security staff in the national agencies.

Malicious acts against nuclear facilities couldn't be aimed at performing a terrorist attack but at nuclear smuggling for potential proliferator governments. The nuclear black market showed how a nuclear security breach would raise a safeguard infringement. Nuclear or radiological accidents could invite malicious acts exploiting the safety breach. For instance, the Goiania accident prospected the possibility of criminal actions not involving the main and usual nuclear facilities (such as reactors) because a security infringement triggered it.

1.1

The diffusion of nuclear and radiological applications in medicine or agriculture broadens the spectrum of nuclear security issues over a wide range of possible incidents that couldn't be dealt with only by safety measures or by physical protection without considering institutional and human factors. The paper will provide an outline of the ongoing comprehensive approach of INSEN to nuclear security education, which offers an international and interdisciplinary forum for the elaboration of curricula, teaching materials and outreach promotion.

The worldwide resurgence of nuclear energy poses a significant obstacle in terms of ensuring security measures are successfully implemented in areas where nuclear or other radioactive

materials are utilized, stored, and transported, particularly in regions where security risks are elevated. To achieve this objective, the provision of appropriate infrastructure, equipment, and resources is essential. However, the most critical factor is the presence of skilled and motivated personnel at all levels.

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

The need for energy is growing day by day and nuclear energy has the potential to meet the growing energy demands of society in the future. Several countries have shown an increased interest in pursuing nuclear energy as one of the major sources of energy to meet their national demands of energy. These countries, in addition to those countries that already have an established nuclear energy programme, are seeking to widen their resources of energy supply to meet the growing national demands of energy. Moreover, nuclear material and radiological sources have many growing application in medicine and agriculture. The potential use of these nuclear and radioactive materials is very high for malicious acts of terrorism as these materials may be vulnerable to theft, unauthorized circulation and diversion if they are not properly protected.

2.1

Security of these nuclear and radioactive materials along with the relevant facilities poses a great challenge and requires the development of necessary infrastructure, equipment and the use of sufficient resources. Implementation will require highly trained human resources for the optimum utilization of the infrastructure and equipment. The capability of these human resources can be greatly enhanced through rigorous education and training at all levels. The need for the human resource development in the area of nuclear security has been greatly felt by several countries. This concern was raised at various IAEA forums including several IAEA General Conference meetings. In September 2009, the Board of Governors considered and approved a new Nuclear Security Plan covering the period 2010– 2013, which recognizes that education and training is critical for States to be able to implement nuclear security. This would require very special attention of the states for specific investments in the area of nuclear security education for the development of human resources for implementation of a nuclear security culture for management of activities involving nuclear or other radioactive material.

In 2009, the International Atomic Energy Agency (IAEA) collaborated with global university representatives to consider the establishment of a Master of Science program and a certificate program focused on nuclear security. After refining the draft that outlined these programs, the IAEA documented the description in the IAEA Nuclear Security Series. Despite some unresolved matters, these discussions and publication stimulated the emergence of the International Nuclear Security Education Network (INSEN) and other advancements in nuclear security education.

2.2

INSEN was established in 2010 during an IAEA workshop by a group of experts from academia, international organizations, and professional nuclear material management associations. The INSEN mission is to promote nuclear security education, providing support to establish and strengthen nuclear security in the educational course offer worldwide.

INSEN promotes among universities and other educational institutions the IAEA Nuclear Security Series No 12 – Educational Programme in Nuclear Security setting out a model of a Nuclear Security Master of Science curriculum by (1) assisting in the development of comprehensive and up-to-date educational materials; (2) assisting in the development of faculty members in the area of nuclear security; and (3) promoting professional careers in nuclear security as the means of promoting this multidisciplinary field of nuclear technopolicy.

The IAEA introduced a pioneering guidance for a new Master of Science program that addressed the absence of academic recognition for nuclear security, despite the importance of nuclear safety and safeguards. Nuclear security was not defined within a specific disciplinary framework, as it existed in a cross-over frame among various fields such as security studies, nuclear engineering, and other disciplines related to nuclear security. Unlike nuclear safeguards, nuclear security lacked academic definition in international treaties and institutional commitments, and it was not included in the EURATOM framework nor represented in the Non-Proliferation Treaty. Nuclear security is an interdisciplinary field that requires growing academic recognition and attention.

Establishing a new graduate course in nuclear security curricula posed a significant challenge for universities in 2009. This challenge prompted the establishment of INSEN the following year, which aimed to enhance the exchange of ideas and cooperation among members to promote nuclear security education at the university level. Over the past decade, INSEN has evolved into a valuable resource hub for its members, offering access to educational materials and resources through its three working groups. These groups provide teaching resources, faculty development frameworks, and outreach materials for nuclear security education.

3.1

In retrospect, it is necessary to reevaluate the history and significance of nuclear security in light of the global context in which the International Nuclear Security Engagement Network (INSEN) was established. US President Barack Obama's speech in Prague on April 5, 2009, is recognized as a declaration of the United States' dedication to nuclear security. This speech led to the organization of an international conference on nuclear security the following year in Washington, marking the start of the nuclear security summits during President Obama's second term. These summits introduced a novel form of multilateralism known as "gift baskets" into the diplomatic arena.

Several clusters of countries articulated their shared priorities and tasks towards achieving common goals, though consensus was not reached during their conferences. The proposed tasks were not financially feasible for all participating nations, prompting some delegations to voluntarily agree upon a final communique with more assertive language than what is typical of international conferences. This practice was beneficial for nuclear security summits (NSS), ultimately yielding tangible outcomes in targeted areas of nuclear security and in some countries' individual efforts towards nuclear security.

One of the positive outcomes of these efforts is the establishment of the inaugural nuclear security school, which was organized by Italy and overseen by both the IAEA and the International Center of Theoretical Physics (ICTP) known as "Abu Salam." The school, which is located in Trieste, is the first of its kind to concentrate exclusively on nuclear security. A significant number of students enrolled in the program are members of the International Nuclear Security Education Network (INSEN), who have utilized the opportunity to enhance their knowledge and skills in this area.

The 2016 conclusion of the NSS cycle resulted in numerous advancements in promoting global safety. However, the threat of a nuclear terrorist attack still exists, highlighting the crucial need for continued international collaboration and education in nuclear security. Failing to maintain this partnership and cooperation would mean losing a critical tool for combating criminal activities. Therefore, it is imperative to sustain and internationalize this network, utilizing its knowledge and resources to a greater extent than terrorist groups and smugglers who maintain constant interest in nuclear and radiological materials. It is an interdisciplinary and international group of academic institutions with many different specializations as in nuclear transport and radiation protection, reactor science, medical science, and physical security.

3.2

INSEN is defined as a partnership between the IAEA and educational and research institutions, and competent authorities. The mission of INSEN is to enhance global nuclear security by developing, sharing and promoting nuclear security education. It fosters collaboration in various areas/activities, among them:

- Development of peer-reviewed textbooks, computer based teaching tools and instructional material, including exercises and materials for laboratory work;
- Faculty assignment and development in the different areas of nuclear security through mutual faculty exchanges and/or joint development and implementation of in-depth nuclear security training programmes or schools;
- Joint research and development activities to share scientific knowledge and infrastructure;
- Student exchange programmes to foster international cooperation and exchange of information;
- Quality assurance: consistency with IAEA defined terminology described in the IAEA Nuclear Security Glossary, the Fundamentals and the Recommendation documents;
- Theses evaluation, coordination and improvement;
- Performance of surveys on the effectiveness of nuclear security education among students and faculty.

INSEN is guided by a leadership agreed by all members of the network. INSEN leadership gathers the current network chair, the vice chair and the former chair. This three roles model is applied to the three working groups. Each working group is responsible for the coordination of activities of the overall working group team, the liaison with the IAEA and for providing information/materials to be uploaded to the Nuclear Security web-Portal. Each group is made up of INSEN members.

Working Group I has the responsibility of facilitating the exchange of information and creation of resources pertaining to nuclear security education, which align with the terminology and guidance outlined by the International Atomic Energy Agency (IAEA). This group also oversees the development of peer-reviewed textbooks and instructional materials, integrates findings from nuclear security research into educational content, and supplies relevant information and materials for publication on the Nuclear Security web-Portal.

Working Group II plays a crucial role in promoting the professional growth of faculty members in the field of nuclear security. This group is charged with identifying educational institutions that are willing to provide comprehensive courses taught by leading experts, developing customized curricula for these courses, and collaborating with Working Group I to create instructional materials. In addition, Working Group II is responsible for facilitating the implementation of in-

depth nuclear security courses for faculty members, compiling a list of qualified nuclear security instructors, establishing a system for exchanging students, teachers, and researchers, and supplying relevant materials and information for the Nuclear Security Information Portal (NUSEC).

Working Group III has a crucial responsibility of knowledge management. It engages with various entities involved in nuclear security and advocating for the importance of qualified nuclear security professionals. This includes establishing the necessary qualifications for specialized roles in different aspects of nuclear security and aiding in the creation of corresponding job descriptions. Furthermore, Working Group III is tasked with providing relevant materials and information for integration into the Nuclear Security Information Portal (NUSEC).

3.3

The primary responsibility of the IAEA within INSEN consists of organizing annual INSEN meetings and leadership meetings, collaborating with INSEN members to determine discussion topics, and reporting on the general progress of activity implementation. Furthermore, the IAEA is responsible for the management of INSEN section on the IAEA portal. The IAEA organizes the meetings necessary for the life of INSEN. Additionally, the IAEA encourages political awareness and support for nuclear security education, as well as advocating for nuclear security professional development among both the academic community and competent authorities.

INSEN adopted its terms of reference (ToR) which stated that all INSEN decisions are taken by consensus. The ToR established the membership of INSEN as open to any educational/research institute and national competent authority that is currently involved, or plans to be involved, in nuclear security education. In addition, relevant international organizations may request to participate and/or support INSEN activities and attend the Annual Meetings in an observer capacity. Observers cannot hold leadership positions in INSEN or participate in the decision-making process. Membership and observer status requests should be directed to the IAEA Secretariat. A State has the right to establish a procedure of nominating its INSEN members and observers.

The Nuclear Security Information Portal (NUSEC) was introduced during a workshop in March 2010 by IAEA. The portal is a collaborative web platform that is restricted to users and is designed to accelerate and facilitate activities related to INSEN. The user groups on the portal are categorized according to their specific responsibilities. The purpose of the portal is to provide an infrastructure for promoting, managing, sharing, and preserving nuclear security knowledge. It also serves as a hub for each working group to share information and materials related to their area of responsibility. It is a communication platform for the sharing of information and experiences among members of

INSEN, and to obtain comprehensive details regarding the INSEN, including its objectives, constituents, framework, and undertakings.

Conclusion

INSEN is an interdisciplinary partnership that gather various expertise such as nuclear engineering, cyber security, international policy and diplomacy, and communication studies. It has established a relationship with the International Journal of Nuclear Security, which is sponsored by the University of Tennessee. The journal's editor, who is also affiliated with INSEN, promotes it as the leading organization for nuclear security and safety scholarship. To support INSEN's mission, the editor engages his students as writers and editors in the discipline of communication and rhetoric. INSEN's openness to all disciplines and countries has enabled it to establish these kinds of relationships for the purpose of nuclear security education and training.

The issue of nuclear security is increasingly important in the international community. Establishing a multi-disciplinary education frame in nuclear security is challenging but necessary to produce highly educated experts who can improve global nuclear security. The release of the IAEA Nuclear Security Series No. 12 – Educational Programme in Nuclear Security (NSS-12) was the first step towards developing nuclear security education worldwide. The INSEN network serves as a hub for nuclear security education and promotes collaboration among educational and research institutions to provide comprehensive academic programs in nuclear security. These efforts will ultimately enhance the global nuclear security regime and safeguard people and the environment from nuclear terrorism.

References

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