**GOOD PRACTICES AND OUTCOMES OF THE ASIA**

 **REGIONAL NETWORK OF NUCLEAR SECURITY**

 **TRAINING SUPPORT CENTERS**

 **Yosuke Naoi, Yosuke Nakagawa:** Integrated Support Center for Nuclear Nonproliferation and Nuclear Security (ISCN), Japan Atomic Energy Agency, Japan (JAEA)

 **Na Young Lee**: International Nuclear Nonproliferation and Security Academy (INSA), KINAC, Republic of Korea

 **Xu Zhenhua:** State Nuclear Security Technology Center (SNSTC), China

 **In Young Suh** ：Division of Nuclear Security, IAEA

 **Abstract**

 The paper describes how the cooperation among the three capacity building support centers on nuclear security in China, Japan and the Republic of Korea (ROK) began and has developed; what has been done thus far; and what is expected to be done to better contribute to strengthening nuclear security in the future. Since the first Nuclear Security Summit in 2010 in which the three states made declaration of establishing such center, each center began working and soon initiated cooperation as the Asia Regional Network of Nuclear Security Training Support Centres (ARN) with each other along with the International Network for Nuclear Security Training and Support Centres (NSSC Network) of the IAEA. Their concrete cooperation started in such way as avoiding conflict of schedule of training so that they can provide stakeholders in the region with more opportunity of learning. Subsequently, their activities progressed, recognizing the different characteristics and strength of each center to be made use of, to sharing good practices in several respects gained by each center through their experience and also to jointly conducting training at other states in the region. In the meantime, the ARN transformed into the ARN+1 with the IAEA incorporated in order to facilitate collaboration among the four. Furthermore, with need of more activities perceived, they have agreed on managing quality of their training among the three centers and holding joint technical visits in order to help operational NSSCs work more effectively and to assist states with interest of building their NSSCs by sharing expertise and experience.



*FIG. 1. Map showing the locations of the three centers.*

1. INTRODUCTION

 The history and functions of each center is described in this chapter for better understanding of the key issues elaborated in the following chapters. Among the International Network for Nuclear Security Training and Support Centres (NSSCs), the three centers are called Center of Excellence (COE) as declared in the first Nuclear Security Summit.

**1.1. Integrated Support Center for Nuclear Nonproliferation and Nuclear Security (ISCN), Japan Atomic Energy Agency (JAEA), Japan**

 The Integrated Support Center for Nuclear Nonproliferation and Nuclear Security (hereinafter referred to as the ISCN) was established under the Japan Atomic Energy Agency (JAEA) in 2010, soon after the first Nuclear Security Summit. In this summit, the then Prime Minister of Japan declared in the National Statement that Japan would establish “a regional center for the strengthening of nuclear security [

[…] with the aim of institutionalizing support for nuclear security on a permanent basis and contributing to strengthened nuclear security in Asia and other regions”. This is a tangible asset achieved by the summit. The JAEA is a sole and comprehensive research and development institute related to peaceful uses of nuclear energy. It has much experience for international safeguards and physical protection of nuclear materials and facilities. ISCN made the best use of those JAEA’s expertise for offering training courses. It conducted its first training course on nuclear security in October 2011 and on State Systems of Accounting for and Control of Nuclear Material (SSAC) in November 2011. Since then, the ISCN has conducted training courses both for foreign stakeholders mainly from Asian states such as operators, inspectors of the regulatory body, low enforcement officer and for national ones, either bilaterally or multilaterally; since its inception, with 170 courses conducted and five international organizations involved, the ISCN has provided 4,294 participants from 90 countries with the opportunity of deepening their knowledge. Furthermore, what make the ISCN attractive to participants of its training courses are the facilities such as reactors the JAEA owns, a virtual reality system which lets participants feel as if they were in genuine facilities, and a physical protection exercise field which is equipped with various types of sensors, cameras and a mock Central Alarm Station(CAS); participants are with these facilities able to experience the practice of both nuclear security and safeguards. The ISCN has thereby helped further enhance international institution on nuclear security and nonproliferation.

**1.2. International Nuclear Nonproliferation and Security Academy (INSA), KINAC,**

**Republic of Korea**

 The International Nuclear non-proliferation and Security Academy (hereinafter referred to as the INSA) was initiated by a presidential pledge during the 2010 Nuclear Security Summit, and was established under the Korea Institute of Nuclear Non-proliferation and Control (KINAC) in 2014. Prior to its establishment, INSA developed a long-term plan for both domestic and international training by establishing a specific target audience and objectives of each training. Based on this information, INSA was able to design training courses that caters to the regional countries’ needs.

 INSA offers domestic training courses for nuclear security staff, which are made mandatory by the enforcement decree of the nuclear safety act. KINAC’s mission as a regulatory organization allows INSA to apply KINAC’s experience and expertise in crafting its training courses. As such, INSA provides mandatory courses for safeguards staff and nuclear fuel cycle researchers that deal with the purpose, techniques and measures of implementing safeguards obligations. It also offers training/certificate courses for the domestic inspectors in the area of safeguards and security.

 In terms of international training, INSA has developed training courses in three areas: safeguards, nuclear security, and export control. INSA draws upon from KINAC’s regulatory activities to design and develop introductory and specialized courses for each area, considering both the needs of the region and INSA’s capacity to operate the courses. Based on these infrastructure and capabilities, INSA also conducted IAEA regional/international training courses. In 2019, a total 9 international/regional training courses were conducted at INSA with more than 200 trainees. INSA also trains more than 2,000 nuclear facility staffs per year in domestic mandatory courses.

 INSA strives to achieve the COE mission, which is to support the region’s capacity building. As such, a work system that acts as a foundation for all training course development and operation is required. INSA has acquired the ISO9001 certification to maintain and improve this work system. It also strives to possess indigenous capability by utilizing SETT (Nuclear Security Research, Training and Test Facility) as well as integrating virtual reality in its training course.

 INSA is firmly committed and continuously endeavors to create courses that are customized to the specific needs of regional countries.

**1.3. State Nuclear Security Technology Center (SNSTC), China**

The State Nuclear Security Technology Center (SNSTC) was established in November 2011, which is located in Fangshan District, Beijing, covering an area of 53,300 square meters. As an affiliate to China Atomic Energy Authority(CAEA), SNSTC’s main function are to provide technical support for nuclear material regulatory, nuclear security and nuclear export and import; to provide nuclear security training; to conduct nuclear security international exchange and cooperation; to undertake the construction and operation of the Center of Excellence(COE) on nuclear security. Since SNSTC’s establishment, nuclear security capacity of China is furthered strengthened. The main outcome of SNSTC include:

* To promote the establishment and improvement of nuclear security regulations and standards
* To conduct nuclear security inspection and provide technical support for nuclear material licensing
* To conduct nuclear security technology R&D on measurement of nuclear material, NMA&C, environmental testing of nuclear security equipment, development of reference materials and standards methods, nuclear forensics etc.
* To conduct nuclear security contingency response drill
* To conduct effectiveness evaluation of physical protection system
* To host more than 150 workshop/trainings with 3500 national, regional and international participants
* To undertake IAEA Coordinated Research Programme and act as Coordinated Center of IAEA on nuclear security technology

To cooperate with the United States to design and establish the COE. COE was completed and put into operation in March 2016, which integrates advanced technology and instruments at home and abroad which cover nuclear security, nuclear safeguards, nuclear material control, physical protection and other fields, including Demo&Training building, Analytical Laboratory, Environmental Testing Laboratory, MOCK facility, Nuclear Material Bunker, Response Force Training and Exercise Facility and Physical Protection Test Area. COE acts as an international platform for nuclear security human resource development, technology R&D, international exchanges, equipment testing and certification

**1.4. Asia Regional Network of Nuclear Security Training Support Centres (ARN)+1**

 As described above, Japan, ROK and China established their NSSCs as declared at the first Nuclear Security Summit.

 The idea of cooperation among three COEs dates back to 2012, when the NSSC Network was established by consensus. The NSSC Network aims to: strengthen information sharing; identify good practices; and facilitate cooperation and joint activities among States with NSSCs and States interested in establishing centers.

 What has been shared among the three COEs in cooperating with each other is to make the most use of the unique characteristics they have in their structures; the SNSTC in China has been established under a governmental body, the China Atomic Energy Authority (CAEA), which undertakes analysis, research and development; the INSA in ROK is the competent authority itself and has experience of regulation and export control; the ISCN in Japan has been established under the JAEA and thus has expertise and experience as an operator on both physical protection and international safeguards, which the ISCN has been make use of. The three COEs have intended to make their cooperation more effective with these characteristics recognized.

 Along with the NSSC Network, even before their official inception, the three COEs started cooperating with each other under the name of the Asia Regional Network of Nuclear Security Training Support Centres (ARN). Since then, the ARN has held around two meetings per year. The aim of the ARN has been to strengthen relations among them and, more concretely, to avoid conflict of schedule so that these three COEs can provide their trainings more effectively and efficiently as a whole in Asia. At that time, under this cooperation each center talked with the IAEA separately.

 After several years of cooperation along with the NSSC Network, the ARN began to hold their own meeting called the Asia Regional Network meeting with the IAEA (ARN+1). While the major goal of the ARN remained intact, this transition was conceived in order to facilitate deeper cooperation on a broader range of technical topics and to coordinate with the IAEA on planning joint activities to meet states’ needs. In addition to that, the purposes have progressed to sharing good practices gained through their activities, as the following chapter illustrates. Its first meeting was held in China in 2017, and then second meeting in ROK in 2018 and the third in Japan in 2019 by rotating within the three COEs.

2. SHARING GOOD PRACTICES AMONG THE THREE COEs

 The ARN+1 has succeeded in producing multiple achievements beyond just harmonizing their training schedules. As the aim of the ARN+1 has moved forwards to sharing good practices, the emphasis has been put on: dispatching instructors to training courses and sending ones to workshops held at the other centers; sharing the way to evaluate the effectiveness of their training courses; considering sustainability of a training center; and reaching out to other states with interest in capacity building in nuclear security by conducting training at their locations.

 First, the three COEs have dispatched their instructors to training courses held at the other centers. The aim is to share their good practices in a more direct manner; good practices can be better demonstrated when instructors deliver a lecture in the others’ courses or participate in discussions at a workshop. This not only allows instructors to make a contribution to the other centers; it also let them learn what could be applied to their own training. For instance, the INSA dispatched an instructor to a training course on nuclear security culture, a major issue in nuclear security, which was held at the ISCN in 2016. In addition to that, the three COEs have sent their instructors, as a participant instead of as an instructor, to workshops organized by the other centers. This gives them an opportunity of leaning, from the perspective of a participant, how a training course can be conducted and implemented. In the latest case, the ISCN sent an instructor as a participant to the “Regional Workshop on Protection Activities for Nuclear and Radiological Events” which was held at the SNSTC in 2019.

 Second, it has also been discussed as a major concern for the three COEs to evaluate the effectiveness of their courses. It is necessary for them to evaluate their courses appropriately in order to improve their training. Methods used for evaluation have been: questionnaires in which course participants answer multiple questions on the course they have participated in and provide their comments; and quizzes which take place at the end of either each class, the day or the course. The discussions have ranged from whether a center does questionnaires and quizzes by paper form or through the internet, to how a center can reflect their outcomes to their future courses in an effective manner.

 Third, how to keep the COEs sustainable is another interest of all the three COEs; that is: how to secure budget and human resource; and how to approach potential participants and then select them in an appropriate manner. The three COEs have accumulated good practices and thus have exchanged potential solutions.

3. OUTREACH PROGRAM AS AN OUTCOME OF THE ASIA REGIONAL NETWORK +1

 Aside from sharing good practices described above, outreach program to the outside of the framework has been under development. Since the ARN+1 framework has worked well, it is of great interest for other regions to have similar form of collaboration besides the NSSC Network. The ARN+1 has expanded its outreach at, for instance, the IAEA conferences such as ICONS 2013, ICONS 2016 and in Washington D.C. in order to disseminate information on its activities to international stakeholders. More significantly given their foremost goal, it is also great interest for the three COEs to conduct training at other states which are in need of cooperation with the three COEs. In light of this need, as the first effort, the ISCN and the INSA held a training course in 2018 on Additional Protocol and Commodity Identification Training at Thailand with the Thai Atoms for Peace and Thai Ministry of Foreign Affairs. In this course the ISCN and the INSA jointly developed and implemented the agenda and shared expertise with Thai participants. This course also demonstrates a sound example of making good use of characteristics of each center; the INSA offered expertise on export control on which it regulates domestically. This is still a nascent attempt and will continue to be a major way for the three COEs to achieve their goal of contributing to strengthening of nuclear security in the region and worldwide.

4. THE WAY FORWARD FOR THE THREE COEs

 As a next step challenge, the ARN+1 has also identified quality management to be addressed in the near future. It ranges from quality management of instructors, materials for lectures, facilities used in training to logistics. In addition, joint technical visit is expected in 2020 and this way of coordination will continue to be a key challenge for the three COEs.

 As for the quality management of instructors, its aim is to give them input from diverse perspective in terms of how to deliver a lecture and how to engage with audience. Yet equally important here is that when they try to do so at another organization it could be more comfortable to tell others what they have thought of since if people gather from different countries and different organizations who usually work separately, it can let them express their view relatively easily very because of their difference.

 Concerning the quality management of materials used in lectures, they have been developed discretely by each center and have not been shared by the others so far; then, each center will be able to learn by the other centers’ materials with regard to both style and information contained.

 Facilities used in training can also be improved by looking at the others’ facilities. Each of the three COEs own their field for the purpose of practical exercise on physical protection. As each center has developed and operated them on their own, there should be much to be leaned with each other in terms of what equipment, how to utilize it in a course, and how to maintain and operate an exercise field as a whole.

 Logistics matters are of great importance as well in light of conducting effective training and letting participants fully focus on learning. For example, Japan had prepared a guide of each course for participants that contains any useful information on traveling, staying and participating in a course, and shared this method with the others.

 Finally, apart from quality management, the three COEs and the IAEA have agreed to jointly conduct a technical visit to an operational NSSC in Asia including the three COEs. This way of coordination is aligned with the original NSSC Network goals and will be the first major activity for the three COEs to help other NSSCs facilitate their human resource development activity. Also, this will not be confined only to operational NSSCs; this can be applied to states which do not have its own NSSC but with intention of establishing one. Since assisting an existing NSSC to operate more effectively and helping a state build a NSSC from scratch require different methodology and in either case much collaborative effort, developing such methodologies will be a key challenge to be tackled by the three COEs in the long run. It has been agreed that there will be the first such visit in Beijing in 2020 at which those from operational NSSCs and/or from states without a NSSC will gather.

5. CONCLUSION

 The three COEs have successfully implemented their training on nuclear security since their establishment and have also collaborated in several ways, with their discrete characteristics and strength perceived. While they had started, as the framework of ARN, harmonizing their schedules by avoiding duplicating training courses among them, they have afterward moved on to sharing good practices in such ways as : dispatching instructors to training courses and sending ones to workshops held at the other centers; sharing the way to evaluate the effectiveness of their training courses; considering sustainability of a training center; and reaching out to other states with interest in capacity building in nuclear security by conducting training at their locations. Then, as they have identified more challenges to be addressed in order to achieve their goal of strengthening nuclear security in the region and worldwide, they have agreed on: attempting to manage quality of instructors, materials for training, facilities used there and logistics; and jointly organizing technical visits in order to help operational NSSCs work more effectively and assist states with interest of building their NSSCs in the future by sharing expertise and experience. As such, the three COEs are expected under the ARN + 1 framework to make what has been done more productive and to make sure what needs to be done happens.