

4th ASEM Seminar on Nuclear Safety

Knowledge Management to Enhance Nuclear Safety

CO-CHAIRS' SUMMARY REPORT

1. The 4th Asia-Europe Meeting (ASEM) Seminar on Nuclear Safety has been convened in Madrid, Spain on 20-30 October 2015, hosted by the Spanish Nuclear Safety Council. The seminar's theme is "Knowledge management to enhance nuclear safety", which aims to continue discussions on nuclear safety to foster Asia-Europe capacity-building and cooperation in nuclear safety. The seminar was attended by representatives from national governments, nuclear regulators, energy companies, radiation protection and nuclear safety authorities, research institutes and universities. The official dinner was offered by Ensa, Enusa, Tecnatom and Ringo Válvulas.
2. The Seminar was chaired by Mr. Fernando Castelló, Commissioner of the Spanish Nuclear Safety Council (CSN); it was co-chaired by Mr. Alfredo de los Reyes, Director of the International Relations Office of the Spanish Nuclear Safety Council (CSN); Mr. Mohd Pauzi Mohd Sobari, Deputy Director General of the Atomic Energy Licensing Board – Malaysia; Prof. Jazi Eko Istiyanto, Chairman of the Badan Pengawas Tenaga Nuklir (BAPETEN) – Indonesia; Mr. Peter Faross, Chief Counsellor, K&S Consultants AG; Ms. Alumanda M. Delarosa - Director of the Philippine Nuclear Research Institute.

OPENING SESSION

3. Mr. Fernando Marti Scharfhausen, President of the Spanish Nuclear Safety Council extended a warm welcome and sincere gratitude to all the participants for their support and contributions. Along the presentation, he focused on the subject of the Seminar, highlighting the main actors on knowledge management and essential elements of capacity building: education and training, human resource development, knowledge networks.
4. Mr. Patrick Majerus, Luxembourg Presidency of the Council of the European Union and Radiation Protection Division of the Ministry of Health of Luxembourg, made a summary of the development of regulations and Directives through the working groups established for that purpose. The Euratom Treaty provides for an established way for the development of regulation. Some relevant Directives have been put into force and shall be transposed to the national framework: on safe management of radioactive waste; nuclear safety and radiation

protection. Convenience for the sharing of experiences in transposition of specific aspects is mentioned, being these the emergency preparedness and the medical applications. Besides the KM provided by the sharing and harmonization process inside Wenra and Herca, special mention was made to the sharing of experiences of regulators with respect to the retirement expectations of their staff.

5. Mr. Gerassimos Thomas, Deputy Director General of the European Commission, gave a general background of the EC activities and remarked that about one third of the power generation in Europe corresponds to nuclear power, and generation is expected to remain constant. To reach this goal, the long term operation of facilities extending beyond 40 years, the replacement by new reactors and the starting of activities towards decommissioning and the needs for the last part of the fuel cycle are the main issues in the short future. Europe has high standards in nuclear safety. Asia has countries with substantial tradition in nuclear power and a large number of countries are moving towards nuclear programs. Hence, international cooperation is very important. The Euratom model has been a successful model of cooperation with practical tools for international activities: peer reviews in Europe, stress tests to other countries under regional cooperation, regional cooperation networks (Ensreg, Herca, Wenra), involving countries with nuclear program as well as countries without nuclear program. Central-Asia has engaged with Europe, sharing IAEA rules and rules of Europe. KM is important for Europe in terms of construction of new reactors and also in terms of non-power applications (e.g. medical). The top-down approach applied implies that part of the obligations by law is the education defined under the Directives. Specific budget has been dedicated to R&D and various initiatives.
6. Mr. Juan Carlos Lentijo, Deputy Director General of the IAEA, thanked ASEM organization and the host for the Seminar. He presented the efforts and developments made by IAEA towards KM. IAEA has a central role in promoting safety and security. Some future challenges are the aging and life extension, expansion of new nuclear programs, decommissioning and remediation, radioactive waste management, radioactive sources and security. For all them, the need to strengthen education, motivation of young generations, etc. are aspects where IAEA applies a global framework to: assist in the implementation of guides and standards; peer-reviews; provide support for the legal instruments (The Conventions) and promote the exchange of knowledge. KM is one the main four pillars of capacity building, being the others education and training, human resources and knowledge networks. He mentioned, among others, the peer review services and associated self-assessments that provide a good means of monitoring progress and identifying gaps and areas for further work and improvements in capacity building. A systematic approach to training needs as well as the management through programs at both national and international levels, including all involved parties, from TSO to regulatory bodies. Knowledge networks were identified as an effective important mechanism to share knowledge. IAEA has prepared strategic approaches 2010 and 2020. The IAEA is working together with its Member States in order to integrate the lessons learned from the TEPCO Fukushima accident into our global efforts for enhancing nuclear safety worldwide. The global Networks have provided, among others, for technical and scientific forum, regional networks and thematic networks.
7. Mr. Alberto Nadal, Secretary of State for Energy from the Ministry of Industry, Tourism and Commerce of Spain, who welcomed all the participants and CSN for the organization. He

highlighted KM as a key topic, considering the significant increase of energy needs expected by the year 2040. The energy diversification is appropriate from environmental and economical points of view. He marked that nuclear power does not contribute to greenhouse emissions. To ensure safety in the operation, all parties involved should have enough capabilities and resources (regulators and operators). Procedures and organizations should provide for KM transfer together with the contributions of R+D activities for allowing high technological levels. In the year 1999, an initiative to coordinate the National R+D Plan was initiated in order to guide efforts. In the year 2007, nuclear initiatives in R+D were included in the National Plan. A main aspect for development is the collaboration with international organizations, such as NEA/OCDE, IAEA, EU/Euratom. This seminar contributes to this collaboration.

SESSION 1. NUCLEAR SAFETY KNOWLEDGE MANAGEMENT: CAPACITY BUILDING, TRAINING, HUMAN RESOURCES AND NETWORKING.

Chaired by Mr. Alfredo de los Reyes Castelo, Director of the International Relations Office of the Spanish Nuclear Safety Council (CSN).

8. Mr. Lingquan Guo, Unit Head of Knowledge Networks Unit belonging to the Safety and Security Coordination Section from the Nuclear Safety and Security Department (IAEA). He made a presentation about the Global nuclear safety and security networks (GNSSN). The Global Nuclear Safety and Security Network (GNSSN) initiative was announced in 2006 at the occasion of the First International Regulatory Effectiveness Conference in Moscow. GNSSN supports Member States and the IAEA to manage nuclear safety knowledge as required by the IAEA Safety Standards GR-R-3 and recommended by the INSAG 21 report. GNSSN is a SharePoint Platform that creates, develops and maintains knowledge as a resource and assists the IAEA in fulfilling its mandate. During his presentation, Mr. Guo highlighted the importance of KM in the context of nuclear safety, mentioning that however, also poses specific challenges, in that securing an adequate knowledge base is legally mandatory for both operators and regulators; manifold types of knowledge need to be dealt with (e.g. legal, technical, operational knowledge); relevant knowledge might have manifold owners (e.g. regulators, TSOs, vendors and operators); a lack of nuclear safety knowledge can have significant implications (i.e. much beyond an undesirable lack of efficient use of knowledge as a commercial resource); long timescales need to be considered (e.g. the decision basis for regulatory decisions needs to be kept available); and the dual role of regulators, who need to have corporate nuclear safety knowledge themselves, but also be able to make knowledgeable judgements about knowledge the operators have.
9. Mr. Kazuhide Tomita, as Vice Chair of the Steering Committee of the Asian Nuclear Safety Network, NRA - Japan - "Overview of Asian Nuclear Safety Network". He gave an overview of the Asian nuclear safety network (ANSN). The ANSN policy consists of two missions of nuclear safety capacity building and sustainable regional cooperation with supporting four strategies such as self-initiative, strong network, practical knowledge and experience and best use of existing resources. The participating countries are China, Indonesia, Japan, Korea,

Malaysia, Philippines, Thailand, Viet Nam, Singapore, Bangladesh, Kazakhstan and Russia. The supporting countries are France, Germany, USA and Australia and a supporting organization is EC. Pakistan is an associated country. From 2004 until 2013, 458 activities conducted are categorized as 81 management activities, 155 national activities and 222 regional activities which were carried out by topical groups. The ANSN has played an important role in building nuclear safety capacity through regional cooperation for more than ten years and will actively collaborate with other regional cooperation to share nuclear safety knowledge and experience.

10. Mr. Pablo León, Director of Nuclear Technology and Development at Endesa and Mr. Eugenio Gil, Technical adviser from the Spanish Nuclear Safety Council on KM, gave a presentation of the Spanish Nuclear Fission Energy Technology Platform (CEIDEN) – Spain; an example of networking in R&D, Education & Training and KM. CEIDEN is a Spanish organization for the coordination of the needs and efforts on nuclear fission R&D. It was created in 1999 and since 2007 has the status of technology platform. The main functions of CEIDEN are to define and develop joint R&D projects, and to present a common position for national and international commitments and proposals in the nuclear fission R&D field. With around one hundred of Spanish members and a significant number of foreign collaborative entities, CEIDEN groups all sectors involved in this field. In 2011 the CEIDEN F+ permanent group was created to cope with the E&T issues. The main objectives of F+ are to promote the coordination of E&T programs in a national level and to support the Spanish participation in international networks, programs and projects in this field. Knowledge management is more and more a paramount issue that conditions the future of the Spanish nuclear sector, especially all the related to the generational replacement. In response to this challenge, the Platform has an initiative, KEEP, to exchange know how on KM, propose a methodology for KM friendly and accessible for the Spanish nuclear industry. This initiative KEEP is composed by 18 organizations which are actively involved; it is under continuous increase of members.
11. Mr. Hartmuth Teske, Department Head for International programs in GRS- Germany-, explained on National and organizational aspects of knowledge networking and management for project purposes and GRS activities in the frame of the KM group of European TSO network (ETSON). For the purpose of capturing knowledge where it is being produced, an information, knowledge and collaboration system was put in place which is using the web application platform MS SharePoint. The main platform to support internal KM is called GRS Portal. This intranet portal provides browser-based access to all information and knowledge sources and supports a document management function covering topical themes and a collaboration function through team-sites accessible to everybody or to close circles. An extensive search facility, very good integration with MS Office and user-friendliness are important benefits. Beside the internal platforms and the Internet GRS is dealing with KM and Knowledge Networking for external cooperation with its partners. In close connection with BMUB, the German nuclear regulator, GRS is hosting a web-based national platform for inter-institutional collaboration, information sharing and KM. This platform is called InfoServer. The External Knowledge and Collaboration Platform of BMUB, the Portal for Nuclear Safety, is one major part of the InfoServer. Other areas are the GRS Cooperation Portal and the EUROSAFE-ETSON Portal.

SESSION 2. ROLE OF KM IN NUCLEAR ORGANIZATIONS: REGULATORS, TECHNICAL SUPPORT ORGANIZATIONS, RESEARCH AND DEVELOPMENT CENTERS, NUCLEAR FACILITIES OPERATORS AND SERVICE PROVIDERS.

Chaired by Mr. Mohd Pauzi, Deputy Director General of the Atomic Energy Licensing Board of Malaysia.

12. Mr. Hans Wanner, WENRA Chair and Director General of the Swiss Federal Nuclear Safety Inspectorate presented Wenra structure, methods and projects as well as the focus of activities towards the development of standards and Safety Reference Levels for harmonization. WENRA is the association of the Heads of the nuclear regulatory authorities in Europe. The technical work of WENRA is performed in two permanent working groups: The Reactor Harmonization Working Group (RHWG) and the Working Group on Waste and Decommissioning (WGWD). The mandate of the working groups is to analyze the current situation and the different safety approaches, compare individual national regulatory approaches with the IAEA Safety Standards, identify differences and propose a way forward to eliminate the differences. The proposals are based on the best practices among the most advanced requirements for existing power reactors and nuclear waste facilities. To harmonize nuclear safety in European reactors, Safety Reference Levels were developed and published in 2006. After a revision in 2008, based on stakeholder comments and IAEA Safety Requirement GS-R-3, the lessons learned from the Fukushima Dai-ichi nuclear accident were considered for another revision of WENRA's Safety Reference Levels in 2014. In the field of radioactive waste, spent fuel storage and decommissioning requirements were also harmonized and the Safety Reference Levels are based on the best practices among the most advanced requirements for nuclear waste facilities. WENRA published a report on the implementation of Waste and Spent Fuel Storage Safety Reference Levels in 2014. The report to be published on waste processing will include pre-treatment of radioactive waste, treatment of radioactive waste and conditioning of radioactive waste.
13. Ms. Nataliya Saulskaya, HR Director of Scientific and Engineering Center for Nuclear and Radiation Safety (SEC NRS-TSO of Rostechnadzor) shared the experience of SEC NRC as an example of KM in TSO for regulatory bodies. SEC NRS serves a TSO to the nuclear regulatory authority (Rostechnadzor), provides with expertise and in KM in terms of human resources management. The areas of support are expert examination, working out normative documents, safety ideology, research activities and education. This organization has run various training e-learning courses and makes periodic assessment of personnel competences, achievements, leadership included, etc. the results of these training and assessment methods have been presented.
14. Prof. Lim Hock, presented the Singapore Nuclear Research and Safety Initiative (SNRSI) from IRSN (TSO of ASN France) & ENSTTI with the title, "Asia-Europe cooperation in supporting the Singapore Nuclear Research and Safety Initiative". The SNRSI is the research arm of the Nuclear Safety Research and Education Program (NSREP) recently launched by the National Research Foundation. SNRSI will focus on research and developing capabilities in nuclear safety, science and engineering. SNRSI is a national resource hosted in the National University

of Singapore (NUS). SNRSI aims to provide technical support to Singapore's active participation and promotion in global and regional cooperation on nuclear safety, monitor the development of nuclear energy technologies, and support research in nuclear science and engineering. The Institute for Radiation Protection and Nuclear Safety (IRSN) is the French public organization expert in nuclear and radiation risks. In May 2015, NUS (acting through SNRSI) and IRSN signed an MOU to establish collaboration in areas of mutual interest, such as radiation protection, environmental monitoring, nuclear safety, and nuclear emergency management. This collaboration will enable Singapore and countries in the ASEAN region to build up further their technical capabilities. The presentation has described the methodological bases and the practical approaches of implementation currently planned within the IRSN-SNRSI collaboration.

15. Prof. Naiyyum Choudhury, Chairman of the Bangladesh Atomic Energy Regulatory Authority (BAERA), gave an overview of the national safety infrastructure and knowledge management in Bangladesh for NPPs. Mr. Choudhury explained the vision of the Bangladesh government for 2021, which includes among its objectives the universal electrification and achieving a per capita usage of 600 kWh. This vision demands the increase in energy production from 12,000 MWe to 20,000 MWe, including the creation of 2000 MWe of nuclear capacity. In 2011, a Cooperation Agreement was signed between the Government of Bangladesh and the Russian Federation for the construction of the first NPP at the Rooppur site with two VVER units, of 1000 MWe each. Mr. Choudhury offered an overview of the legal and regulatory framework for the establishment of an effective and independent regulatory body (BAERA) and to ensure nuclear safety, security and safeguard of nuclear and radioactive materials and civil liability for nuclear damage in the event of an accident in Bangladesh. A human resource development and a licensing program development action plans in collaboration with the IAEA are currently in place to strengthen the nuclear safety infrastructure by strengthening the professional capacity of the nuclear regulatory body in compliance with international standards. Also, the government has taken initiatives to strengthen infrastructure for education and research in nuclear science and technology, major universities have been instructed to open nuclear engineering departments and courses and a Nuclear Training Institute has been established, among other initiatives to develop a national nuclear workforce.

SESSION 3. NUCLEAR SAFETY KNOWLEDGE MANAGEMENT IN EDUCATION, TRAINING AND HUMAN RESOURCES DEVELOPMENT. NATIONAL PRACTICES AND INTERNATIONAL COOPERATION.

Chaired by Prof. Jazi Eko Istiyanto - Badan Pengawas Tenaga Nuklir (BAPETEN), Indonesia.

16. Mr. Wu Yulin - Manager of Quality, Safety and Nuclear Safety issues, State Nuclear Power Technology Corporation - China – presented about the nuclear safety knowledge management capacity establish and talents cultivation in China. This paper includes three parts. Part One, Chinese nuclear power present status and development trend; it states the Chinese nuclear power plant quantities and development plan. Part Two, main challenges on the nuclear safety

management in future, emphasizes the recent and foreseeable challenges including the rapid NPP construction, various kinds of nuclear technology and public concern. Part Three, talents cultivation and capacity establish practice, focus on two good practices in China which introduced from USA and adopted according to Chinese present status.

17. Mr. Mikko Merikari, training specialist from the Radiation and Nuclear Safety Authority (STUK), Finland who told the participants about KM and regulatory capacity building in STUK. He gave a view of the nuclear landscape in Finland. There are activities in all phases of the life span and hence, entirely knowledge and capacity needs are identified (decommissioning, new plant types, etc.) as well as the need because of the retirement of the senior professionals throughout the industry. This comes with the risk of knowledge loss, the overall age structure of the Finnish society and the competition for the young talent. To the question ‘why KM and capacity building?’ the answer is ‘to improve nuclear safety through better understanding’. Km is an organizational value. Examples of the KM role in regulatory capacity building are: senior nuclear expertise in management; competence driven recruitment; use of various expertises; use of competence profiles and various experts; etc.
18. Ms. Francisca Nieto, Program Manager of the Directorate-General for International Cooperation and Development of the European Commission (EC-DG DEVCO) titled her presentation "Capacity building actions under the Instrument for Nuclear safety Cooperation (INSC)". The Instrument for Nuclear Safety Cooperation 2014-2020 (€ 225 million) continues to promote high level standards of nuclear safety amongst nuclear regulators in non-EU countries, safety management of radioactive waste and efficient and effective safeguards for nuclear materials. This program has its roots in the TACIS Nuclear Safety Program. The INSC has its main objectives aimed at the strengthening of regulatory authorities, the promotion of an effective nuclear safety culture, and the safe management of spent fuel and radioactive waste in non-EU countries. In recent years, the Instrument has substantially extended its geographical scope to include South East Asia and Latin America, although it continues to support ongoing nuclear safety projects in the countries of the former Soviet Union. In the framework of Capacity building the EC launched in 2011 a new initiative called Training and Tutoring (T&T). The main objective of this EU project is the provision of training and tutoring to the employees (experts) of National Regulatory Authorities and their Technical Support Organizations in view of strengthening national capabilities in nuclear safety. The cooperation activities will support NRAs in their effort to become self-sufficient in terms of technical management and the regulation of nuclear systems.
19. Dr. Didier Louvat, Managing Director of the European Nuclear Safety Training & Tutoring Institute – ENSTTI introduced the meeting challenges of professional development of EU Safety Organizations experts towards harmonizing training in safety assessment. He mentioned the different European projects under development in the field of training and tutoring on assessment in nuclear security, nuclear safety and radiation protection. He outlined the large spectrum of projects, training schemes and programs aimed at sharing and growing nuclear safety culture. The presentation has provided an overview of this pilot study of a concrete field test case developed for entry-level skills that is implemented on the basis of ENSTTI existing training program for NRAs and TSOs in the field of nuclear, radiation, and waste safety. This will serve the purpose of harmonization and qualification of curriculum aiming to transfer

expert know-how to professionals from regulatory bodies and Technical Safety Organizations in the European Union.

20. Mr. José Mota, Program Manager, Instrument for Stability, Nuclear Safety - Directorate-General for International Cooperation and Development of the European Commission, remarked on the regional cooperation on emergency preparedness and response in South East Asia. He presented a feasibility study of the regional cooperation on EP&R in South East Asia, launched in August 2014 to be completed in February 2016. The scope is the compilation of EP&R capabilities and arrangements in 6 ASEAN MS and the transfer of European experiences, assess early warning/radiation monitoring networks to develop a strategy/action plan for regional cooperation on EP&R in ASEAN. This strategy/action plan has been broadly agreed and is to be finalized by the end of 2015. It will underpin ASEAN cooperation with 3rd parties (e.g. EU, IAEA, etc.). The main elements of the strategy/action plan are the arrangements/capabilities for EP&R in ASEAN and priorities from the main elements of the action plan have defined to be, among others, tools to support decision making, radiation monitoring networks and early warning and notification. The next step is the start-up of an IAEA regional cooperation project (to start in January 2016) and a possible INSC follow project for 2017.
21. Mr. Nguyen An Trung, Director of the Technical Support Center for Radiation & Nuclear Safety and Emergency Response, Vietnam Agency for Radiation and Nuclear Safety (VARANS). He underlined the technical capacity for safety assessment for the first nuclear power program in Vietnam. Vietnam is embarking on developing a nuclear power program. Vietnam Agency for Radiation and Nuclear Safety (VARANS), the National Regulatory Body, is responsible for safety assessment of Safety Analysis Report at various phases of the NPP project, including site approval, feasibility study approval, construction permit, commissioning and operation license. As an embarking country, VARANS decided to hire an international competent consultant for assisting VARANS in evaluating Safety Analysis Reports of the first NPPs. For the long-term regulation of national nuclear power program, however, technical capability enhancement is identified as one of the top priority activities of VARANS at this moment. In recent years, through several international cooperation programs, in particular with the support from European Commission (EC) under both national and international projects, the competence of VARANS' staff in terms of nuclear safety has been significantly improved.

OPEN DISCUSSION ON SESSIONS 1,2 & 3

Chaired by Mr. Peter Faross - Chief Counsellor - K&S Consultants AG.

Two aspects were debated. In a first part the open discussion for the presentations on KM and conclusions were summarized. The second part of the session was dedicated to the identification of potential items of interest for the future ASEM Seminars.

22. Ms. María Josefa Moracho, Nuclear Safety officer and Coordinator of Education and training of nuclear installations of the International Atomic Energy Agency (IAEA), gave an introduction to this session to open subjects for discussion. Along the presentation, the IAEA strategic approach to capacity building in nuclear safety was introduced. Strategy in E&T in nuclear safety is defined until 2020. It follows a systematic process with the objectives of maintenance and continual improvement; development of an education and training support program. The main components are: national strategies, capacity building mechanisms, regional, international cooperation and networking and management systems, including management of competence and KM. The mechanisms put in place are review services and tools; courses and practices learning; sustainability; steering committees and networks. Challenges: Promoting a systematic process; Regional knowledge maps and harmonizing approaches; Efficient of fulfilling gaps; Analysis of common issues and identifying priorities. More focus on sustainability, KM, train and trainers: identifying synergies and overlaps globally: coordinating, synchronizing work programs amongst thematic groups.
23. A national statement on Singapore's Perspective on Knowledge Management and Nuclear Safety in Southeast Asia was made by the head of the Singaporean delegation, Professor Lui Pao Chuen, Advisor at the Prime Minister's Office and the National Research Foundation. According to Mr. Chuen, the Fukushima Daiichi nuclear power plant accident reminded us that all major nuclear accidents are man-made. Therefore, education and training of people are essential and nuclear engineers must be lifelong learners. Between 2010 and 2012, Singapore conducted a pre-feasibility study on nuclear energy which concluded that the present technologies were not suitable. As a result, in April 2014 Singapore launched the Nuclear Safety Research and Education Program (NSREP) with the goal of building up their capabilities in nuclear safety, science, engineering and technology to be able to assess the risks and opportunities of future nuclear reactors. Singapore has actively pursued cooperation with relevant partner institutes in other countries to drive their human resource development effort, being mentioned the ASEAN Network of Regulatory Bodies on Atomic Energy (ASEANTOM) – an excellent initiative by Thailand. Mr. Chuen also stated that Europe provides a model for many countries in Asia and hoped to keep counting on the continued support and assistance of their ASEM partners.

The discussion was open to the floor, being the main aspects discussed the following:

24. Construction, decommissioning, new reactors.... Limited resources, people to have to be trained permanently. Also new technologies, new criteria... this involves many stakeholders. The model provides for possibilities for max use of resources. Safety and security should be treated together, with the human factor being the common denominator of this.

Participation in this seminar can come into good collaboration

25. Importance of the interchange of experiences among technical people.
Interlink, technical cooperation.
26. Online-course on nuclear safety management.

Online for better cooperation.

27. Motivation of young people to get involved in nuclear engineering, how? Definition of an objective indicator to assess KM?
Indicators not yet. The systematic assessment of competencies is a way of analysis of competences needs. In a second stage of the process, measure the needs again and highlight the real needs. This process is coherent with the management systems of the organization. Interest in the organizational knowledge, not only the personal knowledge.
KEEP (CEIDEN Platform) is to identify indicators for KM.
On the motivation, it depends on the job prospects and opportunities.

Issues of interest/areas for cooperation identified during the last 2014 ASEM Seminar were taken into consideration with respect to future ASEM Seminars.

28. Nuclear security was mentioned by IAEA, indicating that there is a lot of work and program to strengthen nuclear security. Support of the idea from the floor has made a point of maintaining the focus on nuclear safety, but considering the interface among nuclear safety and security.
29. Modify the idea of the transfer of experience, only from Europe. Balance and sharing and exchange of experiences in fields where one of the parties has some advantage to shorten the learning curve of the other parties.

SESSION 4. KM IN SPECIFIC NUCLEAR SAFETY RELATED TOPICS: NUCLEAR EMERGENCY PREPAREDNESS AND RESPONSE (EPR), LIFE-CYCLE PHASE, R&D CONCEPTUAL DESIGN, DETAIL DESIGN & LICENSING, CONSTRUCTION & DECOMMISSIONING, OPERATION & MAINTENANCE, REFURBISHMENT & DECOMMISSIONING.

Chaired by Ms. Alumanda M. de la Rosa - Director of the Philippine Nuclear Research Institute.

30. Mr. Jean-Paul Minon - General Director of the Belgium Agency for Radioactive Waste and Enriched Fissile Materials (ONDRAF / NIRAS) introduced the specifics of integrated knowledge management as applied to radioactive waste management. He underlined the main requirements and elements towards implementation with the views of ONDRAF/NIRAS. According to ONDRAF/NIRAS, the main specific requirements are twofold. On the one hand, the necessary and sufficient knowledge of the waste at the time of production and throughout the successive management steps (including transport) until disposal. On the other hand, the traceability of the rationale behind all decisions and choices, regardless of their nature, directly or indirectly related to the safe management of the waste in the long term and, in particular, the traceability of the justification of safety and feasibility cases. The necessary knowledge aspects identified along the presentations are: knowledge of the waste, Knowledge related to decisions and choices. The implementation strategy of these aspects was presented.

31. Mr. Khoirul Huda - Deputy Chairman for Licensing and Inspection of the Nuclear Energy Regulatory Agency (BAPETEN), Indonesia, gave a view of the KM of regulatory practices in BAPETEN. As a national regulatory authority, the Nuclear Energy Regulatory Agency of Indonesia (BAPETEN) is one of organizations that are facing the problem of manpower ageing. A lot number of safety inspectors and evaluators were involved in controlling the nuclear activities from the early stages: Site Evaluation, Construction and Commissioning Stages. However, when BAPETEN facing a challenge of regulating the new project of nuclear facility, BAPETEN has to build the new capacity to be able controlling the project, as most people involved in controlling the nuclear activities in the past time have been retired or approaching retirement. Recognizing this situation and to prevent its repetition in the future, BAPETEN has initiated performing self-assessment to identify the needs and gaps to be filled in the framework of regulatory knowledge management. Based on the assessment results, knowledge management system in BAPETEN is designed. The assessment results are presented with the proposed design of regulatory knowledge management system in BAPETEN.
32. Mr. Dong Li, Program Officer at the Department of Nuclear Emergency & Security Regulation, China Atomic Energy Authority (CAEA), presented the Knowledge Management on nuclear emergency preparedness and response (EPR) in China. An introduction of the knowledge management on nuclear EPR in China has been given. It has included three parts. Part One, capacity building, focusing on the establishment of the nuclear emergency regulation system, and nuclear emergency plan system in China. Part Two, knowledge application, emphasizing the organization system, staff training, experts exchanging, drilling and exercise. Part Three, knowledge renewal, introducing when to renew, lessons learned from Fukushima Accident, and what has been done since 2011. Finally, the presentation has concluded into six key points: dynamic process, establishment of regulation system, renewal of arrangement and plan, qualified staff and training, public communication, international cooperation.
33. Mr. Francisco Sánchez, VP Safety, Operation & Training Direction of TECNATOM – Spain, introduced how to managing safety knowledge and safety culture. The results of a global knowledge management survey conducted in 2010 by the IAEA presents interesting findings which strongly support the link between knowledge processes (that enables organizational learning) and firm performance at NPPs. In general, the findings show that NPP organizations with higher levels of support for Knowledge Management (KM) practices have higher levels of organizational effectiveness (measured across a range of performance measures that include safety, economic, operations, and maintenance indicators). Finally, the survey concludes that the extent of a supportive organizational culture has a strong positive effect on the quality of knowledge processes and organizational effectiveness. Several reports about the Fukushima accident identify that a systemic approach to safety needs to consider the interactions between human, organizational and technical factors. Ensuring proper management of knowledge of all safety influences is essential to a systemic view of safety. Besides that, there are several nuclear knowledge networks with massive data bases including among others: training materials, on-line courses and master programs (explicit knowledge). The Systematic Approach to Training (SAT) is presented as an adequate methodology to organize and identify safety critical explicit knowledge. The presentation has introduced a practical approach to safety and safety culture in the different processes of KM, describing several experiences of acquisition, generation, sharing

and transfer, storage and utilization of tacit and explicit knowledge, with different stakeholders and different approaches.

OPEN DISCUSSION ON SESSION 4

The debate was open, with discussions about the following aspects:

34. The meeting agreed that basic science is a vital component of creating knowledge in order to sustain technological advancement. through their R & D activities, the academic institutions, research organizations and TSOs provide important inputs to KM.
35. The organization decides on the most appropriate KM models to address its needs and to suit its level of development. Analytical tools including IT tools are needed for KM in the same way as these tools are used in other areas of work.
36. Emergency preparedness and response was discussed in the light of active nuclear power programmes being pursued in Asia. The crucial role of knowledge management as well as the benefit of regional and inter-regional cooperation in enhancing the capabilities in Asia for emergency preparedness and response were highlighted. The ongoing feasibility study on EU-ASEAN regional cooperation on EP & R can provide a template for enhancing capabilities within ASEAN and for sharing tested arrangements and capabilities by the EU on EP & R. Commitment and ownership by parties is essential to the success of a regional/international cooperation.
37. Radioactive waste management is another important topic discussed considering that radioactive waste is one of the major concerns of stakeholders relative to a nuclear power programme. concerns put forward dealt with disposal issues, KM and transfer of knowledge to future generations, ethical, safety and funding issues relating to the recoverability of radioactive waste, traceability of justifications/rationale behind all decision taken over time, and the maturity of both licensee and regulator. The open discussion underscored the role of KM to address these concerns.

CONCLUDING SESION

The session was co-chaired by Mr. Fernando Castello, Commissioner of the Spanish Nuclear Safety Council, and Mr. Alfredo De Los Reyes, Head of the International Relations of the Spanish Nuclear Safety Council. Mr. De Los Reyes presented the conclusions raised from KM and Mr. Castelló gave the view of items identified as points of interest for future Seminars during the open session of the previous day.

In the area of knowledge management, the discussions and conclusions from the floor can be summarized as:

38. The relevance of the elaboration and having available national strategic approaches to education and training in a variety of disciplines covering aspects of nuclear safety, nuclear security, emergency planning, etc.
39. The establishment of international networks helps ensure sustainable nuclear safety and security by acting as a resource base to facilitate national training. Networking not only geographical, but of kind of organizations: regulators, agencies, TSO...
40. The provision of technical support services can be obtained by this networking as a way for the exchange of information, experience and knowledge. Different experiences, competences and needs at the individual, organizational and national levels exist. Countries with limited technical infrastructure are embarking on nuclear power programs and networking constitutes a procedure to bring together international knowledge. A point of interest is the exchange of personnel, exporting the knowledge, through international cooperation, networking and organizations. This is provided also by training and education. An example of areas for exchanging knowledge is the capacity in Asia in the construction of installations and on the other hand, the capacity in Europe on decommissioning.
41. Number of participants and number of countries and international organizations (IAEA, EC...), regulatory organizations, utilities, universities... what is a broad scope. Each agent has a role in providing for knowledge, training and education. A key role on this has been pointed to universities, together with technical safety organizations.
42. In KM, elements needed: tutoring, networking... The role of documentation, society of knowledge, international exchange, etc. All the actors presented part of the whole spectrum. A marked aspect has been how the information related to KM can be centralized by all the actors and covered through the interregional cooperation.
43. Emergency preparedness and response (EP&R) was prominent during the discussions. In this respect, Knowledge Management is critical in a situation where emergencies are very rare but response needs to be timely and effective. The feasibility study on ASEAN regional cooperation on EP&R has created a framework to enhance arrangements and capabilities. A coherent strategy and Action Plan have been established and agreed, but its success will depend on strong commitment and ownership by ASEAN.
44. Areas out of the scope of the seminar that need enhancing Knowledge are radiation protection areas or nuclear applications not related to nuclear power. In this last he system is well established. For other areas such as medical applications, KM exchange is needed.
45. KM regarding the organizational level, as an element of the management system of the organization. Not one especial aspect, but part of the management system.

With respect to future activities, a number of items have been identified:

46. International cooperation in nuclear safety and security constitutes a relevant objective, as exposed by the participants. They have proposed to continue with annual Seminars. The items identified in the previous Seminar in Yogyakarta (Indonesia) last November 2014 remain as issues of interest:

Continuing discussion on development of emergency preparedness and response with focus on:
Developing EPR cooperation amongst Asia countries, learning from the experience of the European region.

Enhancing public awareness on nuclear energy development and safety.

Format and approach to be taken on periodic safety reviews of non-power reactors.

Technical support for regulators on licensing, review and assessment as well as international or regional consultancy assistance for regulatory bodies of embarking countries.

Knowledge transfer of European experience on decommissioning of nuclear installations.

Use of risk-informed decision making in regulatory process.

Knowledge transfer of European experience on decommissioning of nuclear installations was an item identified. It has been considered during this fourth Seminar, in a broader sense, jointly with the whole fuel cycle.

47. Additional items of interest have been identified during the open discussion session. These points of interest include:

Nuclear security. The idea from the floor has made a point of maintaining the focus on nuclear safety, but considering the interface among nuclear safety and security. Security is still an issue not easy to share, however, exercise for sharing and openness both internally in the countries and internationally.

Assessment of natural hazards. Much work has been done as consequence of Fukushima and the request for siting, mainly for Asia, is a challenge. Europe has been working in the stress tests to mitigate consequences of natural hazards. Much recent work has been done in Europe and Asia as a consequence of Fukushima.

Modify the idea of the transfer of experience, not only from Europe. Balancing and sharing and transfer of experiences between Asia and Europe in those fields where one of the parties has some advantage.

48. The results of this Seminar (report/presentations) will be reported to the ASEM Senior Officials so they can be taken into account. All the participants expressed their appreciation to the

Spanish Nuclear Safety Council for their successful hosting and look forward to the next Seminar which will be held by one of the Asian partners.

On the concluding remarks, Mr. Castelló expressed his expectation for the future fruitful Asian-European discussions on nuclear safety and extended his appreciation for the support and active contributions of the participants.

CLOSING SESION

The session was chaired by the President of the CSN and speeches were delivered by Mr. Fernando Castelló, Commissioner of the CSN, and Mr. Victor Calvo-Sotelo, Secretary of State for Telecommunications and the Information Society from the Ministry of Industry, Energy and Tourism of Spain.

49. The Commissioner, Mr. Castelló, informed that the seminar had been attended by representatives from national governments, nuclear regulators, energy companies, radiation protection and nuclear safety authorities, research institutions and universities. The number of attendees has been one hundred and ten, with experts from twenty seven countries worldwide. The presentations have shown national and international programs on capacity building. The IAEA is giving support and active involvement through the networks established for nuclear education and training in nuclear safety and security. The IAEA technical cooperation programs have shown to be essential in this area. Examples of the effectiveness and progress of the interregional or international initiatives in nuclear safety have been shown along this Seminar. The regulatory bodies need to be directly involved. The presentation given by the Wenra Chair has shown its structure, methods and projects towards the standardization and harmonization of regulation in Europe. CSN as a member of Wenra is immerse in this process of harmonizing regulation with other European colleagues. Other examples of regulatory actions in Knowledge management have been presented (e.g. from Indonesia). The reason for this kind of activity is that the international framework provides for continuous improvement through co-operation and peer reviews, which are closely interlinked and are seen as a set of necessary characteristics of an effective regulator, as this promotes an environment of continuous learning to maintain competence and credibility. These are not my words, but are recognized in the NEA document on the Effective nuclear regulator published recently. At national level, a sustainable approach should include the necessary Nuclear Knowledge Management actions to ensure that every actor having a significant role in the national nuclear programs infrastructure acquires, preserves and improves its corporate and individual knowledge. Representatives of every part involved have been present in this Seminar. He thanked the Asia-Europe ASEM organization for the help and support for the organization of this 4th seminar, to all the speakers, sessions chairs and to the seminar rapporteurs and specially to all the participants for the valuable contribution and active collaboration to the discussion and the conclusions raised.
50. Mr. Calvo-Sotelo thanked ASEM and CSN, in its 35th anniversary, for the organization of the 4th ASEM Seminar on Nuclear Safety and for choosing the city of Madrid to host it. He

remarked the importance of international collaboration to exchange knowledge and experience among countries, especially in an interconnected world. International coordination actions are complex and not spontaneous, and they require financial and human resources to be carried out. In this globalization context, it is also important to coordinate and harmonize the training programs for our experts, from basic to specialized levels. New technologies are essential for education at all levels, including the training of professionals. As a crucial priority for safety, KM has to be included in the normal operation of nuclear facilities. An important challenge nowadays is the aging of safety workers, especially in the Administration. The digital revolution affects all fields of society and requires new skills in addition to the traditional ones. Governmental institutions have to ensure continuity and consistency in the nuclear policy decision making process. To ensure the safety of nuclear facilities, security and cybersecurity must be guaranteed. The introduction and use of digital technologies in these facilities and other sectors of society pose strong security concerns. This process of digital transformation of society and industry comes with the increasing risk of cyberattacks and the need to defend our critical infrastructures against them. These risks are not as visible as the physical ones but are equally important. We must not leave the doors opened in the digital world. As a recent report from the Chatham House states, the risk of a serious cyberattack on nuclear power plants around the world is very high. We need to face these problems and bring private agents into the process, if necessary. At the national level, there are cybersecurity action plans being developed. At the European level, a new Directive is being developed to ensure a common level of cybersecurity in the EU by improving capabilities and enhancing the cooperation among Member States and key Internet Service Providers.