Nuclear Knowledge Management in Newcomer Countries

Belarus is building its first nuclear power plant at the Ostrovets site. (Photo: Directorate for NPP Construction, Belarus)

The IAEA continues to work with Member States to draw conclusions and lessons learned from past experience in nuclear energy to develop a better understanding of current and emerging challenges, and to work collectively to ensure its economic and humanitarian benefits can be achieved in a safe and sustainable manner.

In an effort to discover, develop and implement projects to assist Member States in strengthening and maintaining the effective management and use of knowledge and information over the entire life cycle for licensed nuclear facilities, several initiatives are underway to cover areas including, design, construction, commissioning, operations and decommissioning, especially in newcomer countries and new builds.

The IAEA Nuclear Energy Series document from the Nuclear Infrastructure Development Section on “Milestones in the Development of a National Infrastructure for Nuclear Power” (NG-G-3.1) provides guidance to Member States in a wide range of infrastructure issues that need to be considered. And together with the Nuclear Knowledge Management Section’s technical document on “Knowledge Management for Nuclear Industry Operating Organizations” (IAEA-TECDOC-1510) the documents provide guidance for Member States on the necessary measures to manage knowledge. Other documents that will also contribute to specifically addressing knowledge management in Newcomer Countries will soon be available.

It is evident that it is necessary to provide concise practical information on the
necessary knowledge management activities during all the stages of planning and implementing nuclear power plant (NPP) new build projects in any country and especially in countries which have not previously built nuclear power plants or in countries who are building after many years of no new construction and now returning to new build status.

Overall, the problem exists that the owner-operator will need to have adequate competencies in place to make a knowledgeable decision as to their project needs during all phases of a new NPP and ensure that the necessary knowledge sources are transferred in an effective manner and process after construction and the knowledge is maintainable throughout the life of the facility.

New NPP designs are being developed and/or purchased by Member States which will need to ensure a strong transition of knowledge from the vendors to the owner organizations. Many newly developed designs achieve safety and economical improvements over existing “reference plant” designs through incremental modifications as they are being built. During that time there is a strong reliance on maintaining the proven attributes to minimize technological risks. For any Member State owner-operator involved in these projects, the management of this knowledge can become problematic. A new IAEA document is being jointly developed between the Nuclear Infrastructure Development Section and Nuclear Knowledge Management Section that will highlight these issues and provide guidance to Member States on current practices to manage these risks and to improve the process.

Knowledge Management presents a significant issue for the nuclear sector; be it in relation to the safe and efficient operation of NPPs, or the development, retention and sharing of knowledge in technical support organizations, regulatory bodies or academic institutions. The effective sharing of knowledge continues to be a challenge. In this regard, there is a clear need to increase the awareness of the existence of experts and how sharing of information between them can help nuclear professionals to more effectively discharge their duties.

Drawing on these needs and opportunities and considering the importance and value of building professional relationships, it is also now timely to introduce to newcomer countries the benefits of establishing regional or international communities of practice as a useful tool to help in sharing and transferring nuclear knowledge. These communities of practice would typically be established among Member States and would involve their organizing themselves in areas of interest, such as those with shared NPP designs, or similar technical challenges within their region or area.

Article by Y. Troshchenko, NIDS and R. Clark, NKMS
Is it Time to Introduce a Knowledge Management Course for Master Students at Your University?

Considering the importance of nuclear knowledge for power generation and non-power applications (e.g., medicine, agriculture, etc.), it is a good time to introduce the concept of managing knowledge at the university level. A substantive curriculum is vital for a successful course. Although there is no international standard on the contents of such curricula, the IAEA, in close cooperation with international renowned experts, established a consensus among educators in several organizations on what constitutes a high quality basic nuclear knowledge management (NKM) curriculum.

A document was created, which will be published soon, to assist university professors in Member States in developing and delivering an introductory NKM master level course. The course is intended to support the establishment of a knowledge management culture and practice as part of a national capacity-building policy and strategy, as well as an integrated part of the organizational nuclear infrastructure.

The document presents a recommended curriculum and provides basic educational material to support university professors in their development and implementation of this course. It focuses on fundamental aspects of knowledge management and covers the following main areas:

- Knowledge concepts
- Knowledge management evolution
- Knowledge management in nuclear science and technology
- Managing tacit knowledge
- Managing explicit knowledge
- NKM organizational challenges
- Implementing knowledge management in different nuclear organizations
- NKM maturity assessment

A detailed description of each module, including learning objectives, module content, teaching instructions, content of practical sessions, evaluation approach, bank of test questions, self-study recommendations, and educational material (PowerPoint presentations, scenarios for practical sessions, etc.), is provided on the accompanying CD ROM and intended to support teachers in their practical work to introduce the NKM course in their universities.

Train the trainers activities were done in the last three years in collaboration with KIT, the Karlsruhe Institute for Technology from Germany, to support Universities in their implementation efforts. Five Universities have already tested and implemented different flavours of the proposed course, and fourteen more are prepared to start soon.

The course is to be considered among the courses taken for a Master’s degree as a response to current challenges leading to the requirement of additional managerial competences for graduates who represent a new generation of nuclear professionals. You are most welcome to contact us in case you require any further information!

Article by M. Sbaffoni, NKMS
Nuclear Knowledge Management University - Stakeholder Interviews Started

The International Atomic Energy Agency (IAEA) began the initiative called Virtual Nuclear Management University (VMNU, a provisional title) last autumn. VMNU is an IAEA-facilitated collaboration among universities to agree on standardized curricula requirements for them to provide master’s degree programmes in nuclear management, targeting managers working in the nuclear sector.

This initiative was introduced in detail in our last e-Bulletin. Since then, around forty interviews with nuclear-related organizations in some major nuclear energy countries were conducted. The purposes of the interviews were to elicit their needs for such programmes in nuclear management and their expectations on requirements for managers. The goal was to grasp the needs of nuclear energy newcomer countries through a questionnaire.

Generally speaking, the stakeholders’ needs are very high. In order to add value beyond general management courses provided by graduate schools of management, the IAEA is expected to show a list of teaching subjects and the topics for each of the subjects which are specific to nuclear energy. Therefore, a series of consultancy meetings will be held to develop teaching subjects and module topics and peer reviews will be conducted in 2014 and 2015 among some universities that already have some lectures on nuclear management.

Knowledge Management Assist Visits
A Well-received Service in the KM area since 2005!

The purpose of a Knowledge Management Assist Visit (KMAV) is to provide assistance, education and consultancy to a counterpart seeking to benefit from the application of the best practices in the implementation of knowledge management (KM) processes and tools.

The IAEA team also recognizes good practice areas where knowledge management is already providing benefits to the organization’s goals. During the 3-5 days assist visit, the IAEA team introduces and trains the counterpart on the use of the KM maturity tool, which can be used later as a self-assessment tool to measure the effectiveness of the implemented KM system.

The KMAV methodology was first used in 2005 in a nuclear power plant. Since then twelve nuclear power plants/utilities, five nuclear-related education and training organizations, three research development/technical support/nuclear energy programme implementing organizations and one regulatory body were visited. At the end of the KMAV the IAEA team made recommendations to the counterpart on how to respond to the nuclear knowledge management shortcomings identified during the assist visit by also identifying further activities to be implemented that would derive real business value for the counterpart.

The driving document containing all information on how to request and implement the KMAV is the IAEA’s technical document published under the title Planning and Execution of Knowledge Management Assist Missions for Nuclear Organizations (IAEA-TECDOC-1586). After more than 20 successful KMAVs, the IAEA is now preparing a publication summarizing the lessons learnt from these visits. The KMAV history in this document will include both visits to NPPs and to other nuclear organizations during the period 2005–2013. All KMAVs carried out during this period are considered, the details of which are described in this document. A CD containing the updated self-assessment tools for NPPs, R&D and for nuclear education organizations will be attached to this new publication.

An expansion of the KMAV programme to include regulatory bodies and new build NPP organizations is under consideration.
Knowledge Management Issues in Decommissioning, Waste Management and Remediation of Nuclear Facilities

With the growing number of nuclear power plants and related back-end facilities approaching the decommissioning phase, it is timely to determine the needs of the Member States by understanding the issues and challenges related to the effective implementation of knowledge management in decommissioning and environmental remediation and provide a forum for discussion between vendors, regulators and utility interfaces. The first consultancy meeting on this topic will take place in Karlsruhe, Germany in July.

Decommissioning activities are very broad and long term and include a number of challenging technical issues including waste characterisation, treatment, packaging, storage and environmental remediation sometimes on a large scale such as former uranium mining sites or legacy nuclear sites.

Knowledge and information are generated and used right from the design phase of a facility through to its final closure and the future treatment of the site and the radioactive waste produced in the decommissioning process. The timescales for decommissioning mean that owners and operators need to have access to knowledge generated over many decades in order to make intelligent decisions and to ensure that the critical knowledge is available at the point of action.

Attention is necessarily focused on the technical and engineering aspects of decommissioning however the process of managing the critical knowledge needs also to be addressed and integrated into the overall decommissioning and remediation programme. For example nuclear facilities moving into the decommissioning phases normally possess limited expertise in decommissioning and the appropriate knowledge management policies and training programmes for the plant personnel, contractors and regulators.

Particular Knowledge Management challenges include:

- the extremely long timescales over which both explicit and tacit knowledge needs to be transferred particularly in the case of waste management
- the unique nature of many emergent technical and engineering challenges requiring innovative techniques which test the knowledge creation and collaboration processes of the organization
- the change in the knowledge and training required by operational personnel compared to that for routine operations
- the transfer of knowledge from one generation to the next

The consultancy meeting will be discussing these and other issues and also collecting examples of experiences and current initiatives in the field of knowledge management.

Article by John Day, NKMS
Upcoming Meetings in 2014

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<tr>
<th>Date</th>
<th>Title</th>
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<td>5-9 May</td>
<td>Training on Latin-American Network for Education in Nuclear Technology (LANENT)</td>
<td>Cuernavaca, Mexico</td>
<td>M. Sbaffoni</td>
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<tr>
<td>2-5 June</td>
<td>Technical Meeting on the Asian Network for Education in Nuclear Technology (ANENT)</td>
<td>Ulan Bator, Mongolia</td>
<td>R. Kusumi</td>
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<td>9-26 June</td>
<td>Nuclear Energy Management School in Japan</td>
<td>Tokyo, Japan</td>
<td>F. Adachi</td>
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<td>30 June - 4 July</td>
<td>Technical Meeting on Networking Educational Networks</td>
<td>Vienna, Austria</td>
<td>M. Sbaffoni</td>
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<td>7-11 July</td>
<td>Technical Meeting on the AFRA-Network for Education in Nuclear Science and Technology (AFRA-NEST)</td>
<td>Abuja, Nigeria</td>
<td>U. Ugbor</td>
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<tr>
<td>25-29 August</td>
<td>Joint IAEA / ICTP School for Nuclear Knowledge Management</td>
<td>Trieste, Italy</td>
<td>M. Sbaffoni</td>
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<tr>
<td>6-10 October</td>
<td>Training Meeting to Facilitate Communities of Practice for Nuclear Knowledge Management Practitioners in Operating Facilities</td>
<td>Vienna, Austria</td>
<td>V. Kolomiets</td>
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<tr>
<td>13-17 October</td>
<td>Technical Working Group Meeting on Nuclear Knowledge Management</td>
<td>Vienna, Austria</td>
<td>J. de Grosbois</td>
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<tr>
<td>10-14 November</td>
<td>Technical Meeting to Prepare Guidance Documents for Capacity Building</td>
<td>Vienna, Austria</td>
<td>Z. Pasztory</td>
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<tr>
<td>24-28 November</td>
<td>Technical Meeting on Preparation of Guidance Document on Life-cycle Management of Design Basis Knowledge</td>
<td>Vienna, Austria</td>
<td>V. Kolomiets</td>
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<tr>
<td>17-28 November</td>
<td>Joint IAEA / ICTP School on Nuclear Energy Management</td>
<td>Trieste, Italy</td>
<td>T. Yanev- Karseka</td>
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Dates, venues, etc. might change according to Member States needs and availability of participants. http://www.iaea.org/nuclearenergy/nuclearknowledge/Events/index.html

Recent Publications

- Design Features and Operating Experience of Experimental Fast Reactors
  Read more

- Impact of Knowledge Management Practices in NPP Organizational Performance - Results of Global Survey
  English. 2013
  Read more

- Knowledge Management for Nuclear Research and Development Organizations
  Read more

- Managing Nuclear Knowledge—A Pocket Guide
  English. 2012
  Read more

NKM publications: http://www.iaea.org/nuclearenergy/nuclearknowledge/nkmPublications.html
How to order IAEA Publications: http://www-pub.iaea.org/books/HowToOrder.aspx
FEATURED SOON: Cyber Learning Platform for Nuclear Education and Training (CLP4NET)

Cyber Learning Platform for Nuclear Education and Training (CLP4NET) is an online platform that can support instructor-led courses, make self-directed e-learning resources available, and help professionals find resources and opportunities easily.

Open Learning Management System
- Support and enhance instructor-led training courses for closed groups of participants with online learning management features. Visit OLMS

Password protected Learning Management System
- Make self-learning materials available online for a wider audience. Visit PLMS

Integrated Database on Education and Training
- Search for information on educational and training resources and opportunities using your requirements. Visit Database

www.iaea.org/nuclearenergy/nuclearknowledge/CLP/index.html

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