Cyber Learning Platform: CLP4NET

CLP4NET is an online platform that was created to support the development and dissemination of e-learning resources in a cost-effective, scalable and user friendly way.

Information technology improved considerably during the past few decades and should be used to maximize the value that Member States get out of the large body of knowledge and expertise that IAEA and its cooperation partners possess. This is especially important in times when capacity building and knowledge sharing are more important than ever. Hence, CLP4NET aims to help Member States to ensure high standards of nuclear education and training.
The platform is provided cost-free as a service to all of IAEA and its cooperation partners and has recently been revised to better support the needs for e-learning in the nuclear industry, both for the instructors and trainees. The new system offers the following:

- delivery of e-learning resources to the wider public for self-study
- powerful online learning environments to support instructor-led courses
- centralized searchable database of information on nuclear education and training

The first two elements are based on Moodle learning management system (LMS), which is used in many renown educational institutions, non-governmental organizations and commercial companies. The system is easy to use, yet it opens a range of possibilities for the instructors, i.e. to develop or upload interactive, media-rich e-learning materials online; to specify who can access them; to monitor users’ activities; to communicate using a variety of channels; to assess performance, to certify trainees and to collect feedback.

Such systems are generally used to support the whole life-cycle of an educational/training activity, i.e. to prepare and pre-select applicants for a course; to complement the daily activities of the face-to-face stage; but also to preserve the learning materials and evaluate the course.

The integrated database on nuclear education and training was designed to help users find learning resources and opportunities easily, both in the above learning management systems and among the large amount of resources available elsewhere. The database centralizes information from organizations participating in regional nuclear education networks from Africa (AFRA-NEST), Latin America (LANENT) and Asia (ANENT). This information is rich in meta-data and therefore, allows the users to efficiently search and browse according to their needs and preferences.

Recently, the interest in CLP4NET has significantly increased and in order to facilitate its use and explain its functionalities, a community of practice has been created. It is located in CLP4NET and contains a forum to freely discuss topics of interest and share best practices. Whether you are an instructor interested in using CLP4NET for your training courses or self-learning materials or an organization implementing a Moodle solution in the nuclear sector, you are more than welcome to join the community. Just let us know at clp.help@iaea.org.

Please visit the homepage to explore CLP4NET: [http://clp4net-nkm.iaea.org/](http://clp4net-nkm.iaea.org/). If you are interested in the self-instructed courses available, go to the Open Learning Management System. If you were asked to participate in an online training course, proceed to the Protected Learning Management System. If you are an instructor and would like to host your e-learning, support your training courses using the system, or make your materials more visible through our database, please contact us via clp.help@iaea.org.

Article by M. Vojtela, NKMS
NKM Workshop in Kaluzhskaya Region, Russian Federation

From 14 to 18 July, more than 40 young nuclear professionals, selected among the most talented and promising young specialists working in the Eurasian Economic Union countries, participated in a NKM workshop organized by Rosatom State Atomic Energy Corporation, in cooperation with the IAEA.

During this international workshop the young professionals went through basic concepts of knowledge management (KM), deepened their KM understanding using game-design thinking, and developed KM group projects, which were presented to a panel of expert judges. The workshop was part of Rosatom’s Youth Innovation Forum, known as Forsage 2014.

Three of the best topics generated from the NKM groups’ top performers will be implemented as projects at Rosatom. Five of the top performing participants will be funded to attend the 2015 NKM School in Trieste, organized by the IAEA in cooperation with the ICTP.

Role of Design Knowledge Management Over the Life-Cycle

Nuclear technology is complex. The IAEA focuses its attention on the importance of the management and adequate understanding of design basis information from the very beginning of the life cycle. This information is needed for the safe operation, maintenance and any design changes. Design knowledge is much wider than the design information. It involves not only the “what” but also the “how”, the “why” and the “environment”. Design knowledge gives design information a purpose or use. Data leads to information, and information leads to knowledge. Design knowledge encompasses a wide scope and a tremendous amount of detail. It is multi-disciplinary, complex and highly inter-dependent. It includes knowledge of the original design assumptions, constraints, rationale, and requirements.

Design knowledge exists in both tacit and explicit forms. Both forms are required and are complementary. In a licensed facility, it is embedded in technical specifications, operating limits and conditions, operating and maintenance instructions, guides, drawings, databases, training materials, technical specifications, procedures, licensing documents, and finally it exists as tacit and experiential knowledge in experts’ heads. Collectively, all of this design knowledge and its derived information form a “knowledge base” that needs to be maintained and kept aligned and consistent, both with the original requirements and specifications and with the physical design and condition of the plant over time to ensure the technical knowledge base is usable and sustainable.

The design knowledge of any nuclear technology system starts to develop, as soon as a design organization and/or research organizations starts the conceptual design of a new plant, and continues throughout the design process. Recent exponential growth of computer and communication technologies, coupled with more powerful software applications, has made it possible to apply information technologies in all phases of a facility life cycle, creating the potential for streamlining historically fragmented operations. Nowadays new nuclear power plants are being designed, procured, and constructed using modern computer-aided engineering (CAE) and computer-aided design (CAD) systems with two-, three-, four-, and more dimensional modelling along with data, databases, and electronic document sources. As a result, new plants will be designed and delivered with a power plant information model (PIM), that is comprehensive, detailed, and able to be integrated and interoperable with plant designs, operations, and maintenance processes, as well as databases, document systems, and record systems of organizations that own and operate them. These advanced technologies provide an opportunity to radically improve knowledge capture, integration, and transfer between stakeholders.

From the very beginning of the project life cycle, it is essential to highlight the importance of various stakeholder organizations and their different perspectives, needs and involvement in managing design knowledge. This knowledge is created, captured, used, modified, transferred, and maintained by various stakeholders and at various times over the life-cycles of the technology and facility. Stakeholders producing and using the design knowledge may include R&D organizations, vendors, regulators, owner-operators, technical service organizations, owners’ groups and even suppliers. It is also important to recognize their respective roles and responsibilities in the various and necessary processes of design knowledge generation, capture, transfer, retention, and utilization. During the phases of design, licensing, manufacturing, construction, commissioning and throughout operations, refurbishment and decommissioning, design knowledge must be maintained and managed such that it is accessible and available and can be utilized to support organizational needs as and when required.

The IAEA organized a series of consultancy meetings to address the design knowledge management initiative and to collect ideas and case studies from nuclear power plant (NPP) designers, operators and technical support organizations. One of the meetings addressing the application of the plant information models to support the design knowledge throughout NPP life-cycle, will take place in September at the IAEA Headquarters in Vienna.

Article by M. Sbaftoni, NKMS

Number 3, September 2014
Process Oriented Knowledge Management

The NKM Section initiated a Coordinated Research Project (CRP) on ‘Increasing nuclear power plant performance through process-oriented knowledge management approach’ (POKM) in 2010, which was successfully finished in 2013.

The objective of the project was to support nuclear knowledge management (NKM) and implementation of NKM systems in Member States, by selecting and sharing the best industrial practices and effective technological solutions, in order to increase NPP performance. Nuclear organizations from Bulgaria, China, Malaysia, Romania, Russia and the USA participated in the project. Several CRP team members ultimately came from R&D organizations, design institutes and manufacturing organizations, which provided additional insights for a broader POKM user community in the future. During the project, a general road map for the implementation of KM systems was developed and meanwhile also adopted by participating organizations for their internal projects.

The results of the CRP and the country reports will be published as IAEA technical document (TECDOC).

Article by Zoltan Pasztory, NKMS

e-CAT for Knowledge Management Practices in Nuclear Organizations

The development of the e-Catalogue (e-CAT) on ‘Knowledge Management Practices in Nuclear Organizations’ shall facilitate the sharing of knowledge management practices from nuclear organizations.

As part of its statutory obligations, the IAEA has been supporting the development of guidance and methodologies for planning, designing, and implementing nuclear knowledge management programmes, and the continuation to enhance tools and methods to capture, retain, share, utilize and preserve nuclear knowledge. Thus, the IAEA has been supporting the development of guidance and methodologies for planning, designing and implementing nuclear knowledge management programmes, and the continuation to enhance tools and methods to capture, retain, share, utilize, and preserve nuclear knowledge. All this facilitates the management of an entire life cycle of nuclear knowledge and has helped nuclear organizations to establish their own knowledge management programme.

Many organizations have considerable experience and excellent achievements in the use of NKM methodology and tools to improve their organisational performance and effectiveness. Depending on their strategy and the type of business, these organizations choose various methods and tools of knowledge management in order to achieve their aims. NKM systems support nuclear organizations in achieving effective and consistently reliable decision making in the complex environment of nuclear technology.

The e-CAT will be available to all Member States interested in learning more about the collected knowledge management practices in order to enhance their own knowledge management programmes. Moreover, this collection of practices will be used in NKM courses for educational and training purposes, as well as for the development of new knowledge management methodologies and tools.

We encourage Member States to share their good practices and project experiences in implementing knowledge management initiatives and/or programmes.

Member States’ nuclear organizations interested in this activity can send an e-mail request to the IAEA NKM Section (nkm@iaea.org). The request should include the name of the organization and the contact details of the focal point. The focal point will receive a form to be completed with all the information about the activities to be carried out in the future.

Article by S. Sheveleva, NKMS
International Nuclear Management Academy Aimed at Master’s Programmes in Nuclear Management

The IAEA conducted a consultancy meeting at the University of Tokyo from 9 to 14 June with a team of professors from eight leading nuclear engineering universities. The purpose of the meeting was to learn from the existing courses related to management elements in the nuclear field at the University of Tokyo and to further discuss the framework of the International Nuclear Management Academy (INMA), which the IAEA has been facilitating the development of, in conjunction with leading nuclear universities since last fall.

Last November, the IAEA started to develop a framework whereby universities can provide master’s degree programmes in management for managers working in the nuclear sector by kicking off the first of two consultancy meetings on this topic. Based on the conclusions of the two meetings so far, the IAEA has been facilitating the development of common international requirements for nuclear management competencies by collaborating with universities interested in developing master’s level programmes in nuclear management and by agreeing on and defining the competency areas and elements. The draft of nuclear management competencies lists around 60 competencies that managers working in the nuclear sector are expected to acquire. Some of the participating universities expressed interest and ability to implement the entire INMA master’s programme independently, while others continued to be interested in collaboration with other universities. Both approaches are expected to be implemented.

There are currently no full master’s degree programmes specializing in the management aspects of nuclear technology, science and engineering. However, some universities provide courses related to nuclear management as part of their nuclear engineering programmes. The eight universities, which attended the consultancy meeting at the University of Tokyo, are examples of such universities. The University of Tokyo has two graduate schools for the nuclear education, and besides these formal programmes, they annually host the Japan-IAEA Joint Nuclear Energy Management School. The University of Tokyo introduced the details of these three schools and the courses related to management during the consultancy meeting. The professors of the university and consultancy meeting participants discussed the draft nuclear management competencies, referring to the relevant courses of the university. Many useful observations were noted.

The IAEA has also been developing the assessment tool for INMA programmes to ensure they have been developed in conformance to the agreed nuclear management competencies. The IAEA also has drafted the template of the ‘practical arrangement’ agreement that a university, wishing to implement an INMA programme, exchanges with the IAEA. The participants discussed these schemes to facilitate the implementation of INMA programmes at their universities. The first nuclear management programme is expected to start in autumn 2015.

The IAEA will conduct similar consultancy meetings at the other universities by spring 2015, so that the whole framework will be completed and applicable to the first programme.

INMA is the tentative name of the initiative of the master’s degree programme in nuclear management. It was called VNMU, Virtual Nuclear Management University, at the first meeting in November 2013. The appropriate final name is to be given when the concept of the initiative has been finalized.

The IAEA’s NEM School Alumni
A new generation of nuclear professionals with the common understanding of global trends

The next IAEA Nuclear Energy Management (NEM) School is going to take place in Trieste, Italy from 17 to 28 November 2014. This will be the 5th School conducted jointly with the ICTP and the 10th School after its launch in 2010.

In the nuclear domain, like in any other field where decisions involve both technical and political components, misunderstandings might happen due to simple misinterpretations in a dialogue. The IAEA Nuclear Energy Management School within the 5 years became a forum, which not only offers its participants new knowledge, but also provides the key for cross-border communication, for understanding and for being understood by different groups of people. Furthermore, it gives a chance to make professional peer contacts for life.

Every year more and more nuclear professionals better understand common issues after graduating from the School. More details about the School in general and about the upcoming School in particular can be found on http://www.iaea.org/nuclearenergy/nuclearknowledge/schools/NEM-school/index.html.

The IAEA NEM School graduates from 2010 to 2014, including participants selected for the upcoming School.
10 Years of Fruitful Collaboration: The 2014 NKM School at ICTP

ICTP and IAEA have collaborated in the last 10 years in the development and deployment of its Nuclear Knowledge Management (NKM) School. The one-week school provides advanced topics in NKM with international student participation.

We thank and congratulate the Italian Government and the ICTP authorities for their continuous support to the young professionals’ progress, especially those from developing countries. We also acknowledge the important role the IAEA’s Technical Cooperation programme plays in funding participation of students from developing countries.

As it is shown in Graph 1, applications to the NKM School have steadily increased over the years, evidencing the increased interest of Member State organizations in finding out more about how to manage their knowledge and how to create a sustainable NKM programme.

More than 300 young professional from all over the globe (Graph 2) have already successfully completed the School and form an active alumni network. The School aims to achieve a balanced distribution of participants, considering gender and country of origin.

The NKM School is committed to continuous improvement. Therefore, two years ago an on-line pre-training was implemented, with the purpose of ensuring participants’ common understanding of the NKM fundamentals, which in turn allows the face-to-face stage to be focused on more value-added activities, i.e. group projects and better interaction with peers and lecturers.

After these 10 years of sustained and quality work, universities are recognizing the course. Recently, the Academic Council of The National Research Nuclear University “MEPhI”, Russian Federation, approved the School as a part of their continuous education system. From 2014 onwards, the participants will also receive a state certificate of professional development from the university. The 2015 edition will take place from 14 to 18 September 2015.

A Successful ‘Networking Nuclear Education’ Technical Meeting

From 30 June to 4 July 2014, the third meeting of the nuclear education networks took place in Vienna, with the participation of 28 representatives from 22 countries.

ENEN, AFRA-NEST, ANENT and LANENT signed in 2013, during the IAEA General Conference, a common action plan. During this meeting they highlighted the achievements of the past year and proposed some priorities for the coming year.

Among the achievements was the creation of an Integrated Nuclear Education Data Base. It will enhance visibility of nuclear education opportunities and provide better access to supporting educational material. To foster the usage of e-learning tools and of the Cyber Learning Platform for Nuclear Education and Training (CLP4NET) implemented in the regions, the Virtual Moodle Support Group was created.

During the meeting, representatives from academia, industry and government discussed the following priority topics to work on in the near future, in order to advance the present state of nuclear education:

- methodology for evaluation and inter-comparison of available courses and careers;
- best practices in outreach from universities, to society in general and schools in particular;
- students mobility and professional development of nuclear related university teachers;
- use of e-learning and other ICT technologies and tools;
- best practices in academy/industry/government interaction to support high quality nuclear education;
- enhanced communication among regional networks;
- creation of national networks and other actions to improve regional networks sustainability; and
- creation of repositories of nuclear educational material for different target audiences.

They acknowledged the opportunity to have a discussion forum and suggested topics for a proposal of a coordinated research project, focusing on issues in nuclear education and networking. Cooperation among educational networks permits not only sharing best practices and finding synergies and common solutions, but also building lasting international relationships and collaborations, something not always easily achieved in today’s global nuclear education context.
Upcoming Meetings in 2014

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<thead>
<tr>
<th>Date</th>
<th>Title</th>
<th>Place</th>
<th>Contact</th>
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<tbody>
<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>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>
</tr>
<tr>
<td>17-28 November</td>
<td>Joint IAEA / ICTP School on Nuclear Energy Management</td>
<td>Trieste, Italy</td>
<td>T. Yanev-Karsek</td>
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<tr>
<td>Moved to 9-13 Feb. 2015</td>
<td>Technical Working Group Meeting on Nuclear Knowledge Management</td>
<td>Vienna, Austria</td>
<td>J. de Grosbois</td>
</tr>
<tr>
<td>Moved to 23-27 Feb. 2015</td>
<td>Technical Meeting to Prepare Guidance Documents for Capacity Building</td>
<td>Vienna, Austria</td>
<td>Z. Pasztory</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

- **Nuclear Engineering Education: A Competency Based Approach to Curricula Development**
  English 2014
  This publication provides guidance to decision makers on a competence based approach to curricula development, presenting the established practices and associated requirements for educational programmes in the field of nuclear education. Read more

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

- **Design Features and Operating Experience of Experimental Fast Reactors**
  English 2013
  Read more

- **Knowledge Management for Nuclear Research and Development Organizations**
  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