VVER Technology Knowledge Management through CORONA Academy – Activities Overview

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Abstract. The purpose of this paper is to give the nuclear community an overview of the training capabilities that the CORONA Academy will bring as an added value to the European nuclear education area. Preserving and further developing nuclear competencies, skills and knowledge related to VVER technology, as a technology used in the EU is among the main objectives of the CORONA Project. CORONA Project consists of two parts: CORONA I (2011-2014) "Establishment of a regional center of competence for VVER technology and Nuclear Applications", co-financed by the EC Framework Program 7 and CORONA II "Enhancement of training capabilities in VVER technology through establishment of VVER training academy", co-financed by the EURATOM 2014-2015 Working program of HORIZON 2020. Specific training schemes aimed at nuclear professionals and researchers, non-nuclear professionals and students are developed and implemented in cooperation with local, national and international training and educational institutions. The outcome of the project will provide adequate ground for transfer of VVER related knowledge.

Keywords: VVER, knowledge management, knowledge transfer, European recognition.

1 Introduction

The future safe and sustainable use of many nuclear installations that nowadays face lifetime extension requires operating personnel that have adequate scientific and engineering capabilities. Others that are in process of decommissioning will also require skilled personnel for the decades to come. Unfortunately the nuclear technology sector significantly suffers from an increasing in the number of retirements of high qualified personnel. Preserving and further transferring of competencies, skills and knowledge related to VVER technology, as a technology used in the EU, is among the main objectives of the CORONA II Project "Enhancement of training capabilities in VVER technology through establishment of VVER training academy", co-financed under the EURATOM Work Program 2014-2015 for Nuclear Research and Training Activities. This objective will be achieved by the establishment of state-of-the-art regional training center for VVER related competence – the CORONA Academy. The Academy will provide support and services for preservation and transfer of VVER-related nuclear knowledge as well as know-how and capacity building. Such an approach will ensure that existing VVER related training schemes will meet the International Atomic Energy Agency (IAEA) standards and generally recognized criteria in the European Union (EU).

The project structure is based on three general pillars:

- Training schemes for different target groups;
- VVER related knowledge management system, which will accumulate the available information;
- Specialized training centre for supporting VVER customers with theoretical and practical training sessions, training materials and general and special assignment training tools and facilities.

The expected outcome of the project is to develop new skills and competences within the context of the Nuclear Renaissance for implementing the EC decisions following SNETP NET [1] and SRA [2] and to contribute to the improvement of the safety and the reliability of the nuclear installations existing in EU.

2 Main Goals of the Project

The main objective of the proposed CORONA II project is to enhance the safety of nuclear installations through further improvement of the training capabilities aimed at building up the necessary personnel competencies. Specific objective of the proposed CORONA II project is to proceed with the development of state-of-the-art regional training center for VVER competence (which will be called CORONA Academy), whose pilot implementation through CORONA project (2011-2014) proved to be viable solution for supporting transnational mobility and lifelong learning amongst VVER operating countries. The project aims at continuation of the European cooperation and support in the area for preservation and further development of expertise in the nuclear field by improvement of higher education and training. This objective will be realized through

networking between universities, research organisations, regulatory bodies, industry and any other organisations involved in the application of nuclear science, ionising radiation and nuclear safety.

The proposed CORONA Academy will maintain the nuclear expertise by gathering the existing and generating new knowledge in the VVER area. It will bring together the most experienced trainers in the different aspects of the area within EU and abroad, thus overcoming the mobility challenge that stands ahead the nuclear education and training community. The selected form of the CORONA Academy, together with the online availability of the training opportunities will allow trainees from different locations to access the needed knowledge on demand. The available set of courses will cover the whole range of training of VVER specialists from the university until reaching high professional skills and competences in the area.

3 Approach Towards Meeting the Project Goals

Seven work packages are engaged in pursuing the project goals:

- Overview and update of existing training schemes and training programs. Development of new training schemes and programs.

- Update of existing training materials. Development of new training materials.

- Pilot implementation of ECVET

- Set-up VVER technology excellence leadership academy for safety

- Upgrade of knowledge management portal and implementation of advanced training tools (e-learning and distance training system)

- Sustainability of VVER Education and Training Association (CORONA Academy). Link with ENEN and outside Europe

- Dissemination

3.1 Educational framework of the CORONA Academy

The first four of the CORONAII work packages are devoted to establishment and development of framework for providing of high quality education that covers to a large extent the skills and competences necessary for successful work in the VVER technology area.

Within the first work package a complete set of training schemes and training programs are developed. The training schemes define the training programs, set of courses, training materials, training aids and various forms of training activities, designed to meet the requirements for the necessary professional knowledge and skills. They should provide certain knowledge, methods and forms in a way that ensures their good understanding and will help attract the trainees to nuclear activities.

Training schemes for the following target groups were produced:

- Non-nuclear professionals and subcontractors;

- Students studying nuclear disciplines;

- Nuclear professionals and researchers.

The training schemes for each target group are then subdivided into sub-groups (see Table 1) in order to provide more specialized knowledge, according to the specific needs of the trainee.

The training schemes were elaborated after the project partners identified the training needs of nuclear professionals and researchers, subcontractors and students in nuclear disciplines. This was done in close collaboration with the stakeholders in the nuclear area.

The training scheme for non-nuclear professionals and subcontractors included general education on the radiation detection and radiation protection principles, general knowledge on Nuclear Power Plant (NPP) electricity generation, VVER construction specifics and safety culture principles.

Table 1. List of the target sub-groups within each target group to be trained by CORONA Academy

TARGET GROUPS	Nuclear professionals and researchers	Non-nuclear professionals and subcontractors	Students studying nuclear disciplines
SUB-GROUPS	Management	Non-nuclear professionals for works at NPP	Power nuclear students; The specialists in nuclear power facility (NPF) designing, manufacturing, operation and maintenance.
	Operation		
	Maintenance	Non-nuclear professionals for works related to NPP and nuclear applications	Non-power nuclear students; The specialists who are only indirectly connected with NPF operation, but NPF cannot exist as a nuclear object without their activities, for example, the specialists on radiation monitoring.
	Engineering and technical support		
	Radiation protection	Non-nuclear technical staff	Non-nuclear students; The specialists who are only indirectly connected with nuclear industry.
	Design		
	Research & Development	Public communicators	
	Regulatory body specialists		

Table 2. List of the newly identified target sub-groups within each target group to be trained by CORONA Academy

TARGET GROUPS	Nuclear professionals and researchers	Non-nuclear professionals and subcontractors
SUB-GROUPS	Personnel involved in construction and commissioning of NPPs	Personnel involved in construction and commissioning of NPPs
	Personnel involved in long term operation activities	
	Personnel involved in decommissioning	Personnel involved in construction and commissioning of NPPs
	Personnel involved in management of radioactive waste	

The training scheme developed for students studying nuclear disciplines brought additional in-depth knowledge on VVER reactor physics and safety, plant operation and life management.

The training scheme for nuclear professionals and researchers used as a base the whole VVER technology related knowledge for providing advanced skills and competences in operating and supporting a VVER based NPP. The available knowledge on enhancing safety and performance of nuclear installations with VVER technology was used in the preparation of the training materials. NPP Lifetime Management main activities/stages were described within their technical, economical, legal and safety culture aspect.

In addition to the existing of new target subgroups (see Table 2) was established based on the analysis of the lessons learned, recommendations of the stakeholders and assessment of the trends in development of nuclear power that include continuing new construction, plant life extensions implemented for many existing plants, improved operational and safety performance of plants overall. It is considered that the needs of supply and demand for nuclear experts depend of the main stages of NPP lifetime: construction, long term operation and decommissioning. Each of these stages requires personnel suitable for fulfilment of specific tasks and responsibilities. The expectations for large replacement of the retired workforce were taken into account. As a result of the analysis, collected information and recent positive trends in the nuclear power industry 4 (four) new subgroups were identified.

Specification of the training needs of the newly identified sub-groups is also based on the Systematic Approach to Training (SAT) [3]. The systematic approach to training is accepted as the international best practice for the training and qualification of nuclear power plant personnel. The SAT is a training approach that provides a logical progression from the identification of the competences required to perform a job to the development and implementation of training to achieve these competences and subsequent evaluation of this training. SAT consists of five interrelated phases: Analysis, Design, Development, Implementation, and Evaluation. The phase Analysis, presented in detail in [4], was applied for the identification of training needs and of the competencies required to perform a particular job.

The mutual recognition of the training outcomes is important aspect of the common European education ef-

forts. Also, the lifelong learning requires common EU approaches for assessing and validating the learners' qualifications by respective authorities. Borderless mobility implies mutual recognition of learners' qualifications, thus supporting the free circulation of service providers amongst the EU Member States. The European Credit system for Vocational Education and Training (ECVET) is one of the latest European instruments promoting mutual trust and mobility in vocational education and training. The development of the competence based design of Radiation Protection Worker qualification is part of the work done for pilot implementation of ECVET, which is one of the objectives of CORONA project. The methodology [5] for competence based qualification design is based on the methodology developed by JRC-IET for the ECVET implementation in the Nuclear Energy Sector. The approach includes selection of one particular job for pilot implementation, which is subject to increased mobility; definition of competence requirements for this qualification; selection of appropriate training scheme for this qualification, conductance of pilot training on at least one selected course; recognition of acquired learning outcomes (LO); evaluation of the results and proposal of corrective measures.

Integrating the safety as a main pillar in NPP operation and maintenance is the main outcome of the work in the forth work package of the CORONAII Project. The goal of the proposed training is to ensure enough competences to develop a strong safety culture and to improve the awareness about the impact that each employee has in safety in his work and to acquire the necessary skills to develop a right attitude to the organizational culture, which improves the safety culture.

The overall objective is the enhancement of Nuclear Safety of NPPs operated by VVER technology through the improvement of the collective activities and behavioral peculiarities which develops the positive Safety Culture.

A key aim is to foster the management and 'worker' cooperative atmosphere, creating conditions for the improvement of organizational and managerial influences on NPP safety, deepening on the understanding of the importance of safety culture, and practical implementation of safety culture principles in production processes. This will encourage the development of the effective safety culture at NPPs.

Leadership is one of the most important functions of management which helps to maximize efficiency and to achieve organizational goals even in terms of safety. Lead-

ership pipelines, thinking in the peculiarity of the field we are working will us have a clear and real vision of our possibilities and our necessary development associated with growth within the industry. Awareness of the peculiarities of the nuclear world and the fact that they work under a very specific point of view must be brought to the trainees. Motivation, guidance, confidence, safety as a value are some of the points that a great leader should know and work and a pipeline with all the skills, courses and techniques necessaries for this goal, would make it happens.

3.2 Organizational framework of the CORONA Academy

The training service provided by the CORONA Academy will be managed through marketing office and management board. The management board will be comprised by the training providers. In this way the preservation and upgrade of the specific knowledge on the VVER technology, available within EU and abroad, will be ensured. The European Nuclear Education Network (ENEN) will facilitate the process by spreading the service to its counterparts, in this way bringing a completion for a true VVER Training Network. The training will be provided by means of in-class teaching and e-learning. The Cyber Learning Platform for Nuclear Education and Training (CLP4NET) [6]

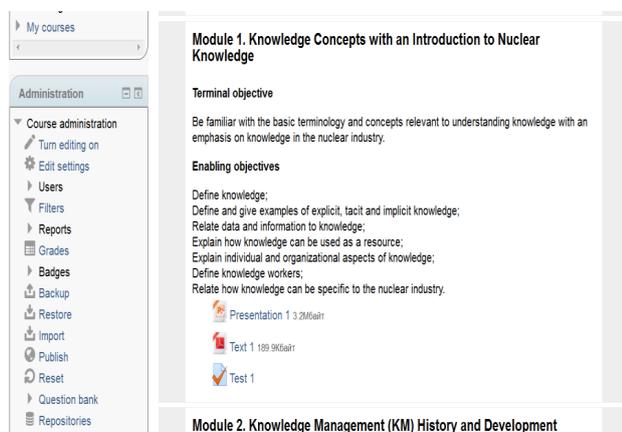Figure 1. The VVER nuclear knowledge management portal.

Figure 2. General view of e-learning courses at CLP4NET platform.

is used as a base for distance training providing. Using its features a VVER Knowledge management portal (Figure 1) with on-line training courses is created (Figure 2). This will also allow the specialists working in the nuclear area to receive the knowledge they need in comfortable and time independent way.

4 Conclusion

The educational framework of the CORONA Academy is nearly completed. The training schemes developed cover the identified demand of the market, but also provide a way for preservation and transition of less required, but inevitable knowledge required for maintaining the life cycle of VVER based NPPs. The safety culture and leadership skills successfully close the framework by ensuring the safe and successful application of the skills and competencies acquired within the training.

The organization of the training is based on two main pillars. The management of the Academy will be performed by management board, comprised by all training providers. The Training will be provided by means of on-site training and/or e-learning, depending of the requirements of the trainees. In this way bigger flexibility of the training will be achieved, while providing more complex knowledge to the specialists that have to acquire certain skills and competencies in the area of the VVER technology.

The project results respond to the current and the future need of specialized training in the area, bringing the available knowledge out of the specific training institutions and giving the opportunity to access this knowledge on European level.

Acknowledgments

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