CORONA PROJECT – CONTRIBUTION TO VVER NUCLEAR EDUCATION AND TRAINING

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ABSTRACT

CORONA Project is established to stimulate the transnational mobility and lifelong learning amongst VVER end users. The project aims to provide a special purpose structure for training of specialists and to maintain the nuclear expertise by gathering the existing and generating new knowledge in the VVER area.
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 Framework Program 7 of the European Union (EU) and CORONA II (2015-2018) "Enhancement of training capabilities in VVER technology through establishment of VVER training academy", co-financed by HORIZON 2020, EURATOM 2014-2015.
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 project will target also new-comers in VVER community like Vietnam, Turkey, Belarus, etc.

Key words: Nuclear Education and Training, VVER Technology, ECVET, lifelong learning, transnational mobility

Introduction

Within European Union (EU) there is a strong need for maintaining and preserving knowledge and nuclear competence including VVER competence. Russian technology is very popular amongst the European countries but except in Russia, it is operated mainly in small countries, which have no enough resources to maintain individually the whole necessary knowledge. In addition, there are approximately 30 VVER units under construction in 10 countries in Europe and Asia. Some of these countries will operate nuclear power plants for the first time and will spend significant amount of resources in education and training in the near future.

With regard to Education and Training (E&T) the key challenge is still to raise the attractiveness for qualified young people of studies and professions related to nuclear technologies. Systematic approaches are under preparation to develop solutions tailored to meet the challenges that nuclear E&T is facing in the near future [1].

The investment of European Commission (EC) in VVER technology competence preservation is beneficial for the entire European community. The integration of VVER knowledge is a must. For this

reason the establishment of VVER Training Center (also called CORONA Academy) is the solution that comes in the exact moment of time.

Objectives

CORONA I project showed the sustainability of the idea of establishment and maintenance of a Regional Centre of competence in VVER technology (RCC). It revealed some important advantages of such centre by:

- Contributing to the enhancement of safety and performance of nuclear installations with VVER technology through specialized initial and continuous training of personnel involved;
- Keeping the adequate level of safety culture;
- Contributing to the development of Knowledge Management System for VVER technology;
- Preserving and further developing nuclear competencies, skills and knowledge related to VVER technology, as a technology used in the EU.

After successful completion of the CORONA project most of the Consortium partners expressed their will to continue cooperation with the purpose to make the project idea viable and applied for additional funding from the EC, under the EURATOM program 2014-2015 [2].

The CORONA II project specific objectives are:

- To elaborate a harmonized approach to education in the nuclear science and nuclear engineering in VVER countries to support improving the safety of nuclear installations;
- To achieve co-operation and sharing of academic resources and capabilities at the national and international level;
- To accelerate and optimize the development of competences in the nuclear area to ensure the high quality of nuclear education and training in VVER area;
- To further develop the VVER training infrastructure;
- To promote the implementation of modern training methodologies and technologies, dissemination of experience and best practices in Europe in the field of training;
- To promote the establishment and development of national training systems for the nuclear power sector in the new-coming countries;
- To establish a framework for mutual recognition: Implementation of European Credit System for Vocational Education and Training (ECVET), which is one of the mail goals of EC in education and training area, will be supported through testing of its elements and pilot implementations;
- To integrate VVER education and training with the European education and training in nuclear safety and radiation protection;
- To foster and strengthen the relationship with technology platforms, networks and other organisations in the nuclear education and training sector;
- To enhance knowledge sharing, dissemination and online collaboration through an advanced knowledge management portal.

Implementation

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 selected courses will cover the whole range of training of VVER specialists from the university until reaching high professional skills and competences in the area. The CORONA Academy will meet the social goals of EURATOM program by providing

training and source of knowledge also for non-nuclear specialists including school teachers, journalists and government officials.

Networking has been widely recognized as a key strategy for capacity building and better use of available educational resources. Via networking the available expertise, resources, information and facilities can be easily exchanged. In practice, its benefits have been acknowledged, and networks are being established at all levels i.e. national, regional and global levels. Networking might even become more important in the future, both in terms of the extent and depth of co-operation.

Networking establishes and promotes national and international collaboration in educational and/or training programmes, bringing a key benefit for many private and public organizations. In addition, national as well as international institutions are aware of the possible lack of nuclear experts and plant operational staff (at both higher education and technical levels) in the coming years. There is a general concern about the maintenance of qualified staff in the areas of reactor systems, spent fuel and radioactive waste management as well as radiation protection. As a consequence, education and training is becoming a key issue for many private and public organizations.

In the frame of CORONA project the training needs of different types of personnel operating and maintaining nuclear installations with VVER technology were analysed in order to develop training schemes and programs, training materials and training tools required to meet the identified needs, to assess the results and recommend additional training tools and equipment for RCC sustainable development.

The following training needs (and target groups accordingly) were identified:

Group A: Specialized training on specific VVER technology aspects for nuclear professionals and researchers
Group B: Basic training on VVER technology specifics for non-nuclear professionals and subcontractors
Group C: Specialized technical training on VVER technology for students studying nuclear disciplines.
Group D: Safety culture and Soft skills training for nuclear professionals and personnel of nuclear facilities suppliers and contractors.

After the identification of the training schemes the objective was to develop training programs and training materials for the target groups as well as to conduct a pilot training. For each target group the following was done:

- Development of training programs and training materials;
- Deliver a pilot training;
- Validate the training program.

Part of the work was the development of the concept for the Knowledge Management (KM) portal, which collects information related to the operational experience of VVER reactors, outcome of the scientific research and its applications in the nuclear industry, technologies and safety requirements and rules, which will contribute to its wide dissemination and application in various countries, operating that type of reactors. The portal is intended to provide information relevant to the key stakeholders of the nuclear power industry such as scientific organizations, academia, industry and government.

Based on the results of CORONA I project it was concluded that the idea for VVER Education and Training Center (now called CORONA Academy) has a great potential for development and has to be explored further. After a numerous discussions held during the meetings of CORONA between partners the idea was transformed and enhanced.

The CORONA II project has started in September 2015. Nine organizations from seven European countries are involved in the project, which is scheduled for a total duration of 3 years. It consists of the following activities:

1. Evaluation of the training schemes and training programs for possible improvement, review and enhancement of the training materials developed during the previous project, evaluation of the courses and providers, and revision, exclusion, inclusion of new ones. Implementation of corrective measures identified during the previous project.
2. Extension of KM Portal.
3. Selection of appropriate qualification and development and application of the set of activities towards pilot implementation of ECVET.
4. Development of pilot courses using distance and e-learning tools (via Moodle based platform).
5. Establishment of CORONA Academy.
6. Increased outreach, inclusion of partner training institutions and establishment of regional training hubs
7. Development and pilot implementation of public outreach programmes to increase awareness of VVER technology

It commenced with analysis of the pilot trainings' evaluation and proposed corrective measures developed as part of CORONA I project. Based on this analysis the partners are in the process of elaborating a list of training schemes, programs and courses which should be improved or newly developed in order to make an explicit and comprehensive set of training programs, which cover all areas of training courses necessary for training of the target groups.

A pilot implementation of ECVET system [3, 4, 5] is planned as part of the work on the project. ECVET is a system of accumulation and transfer of credits designed for vocational education and training in Europe. It enables recognizing and recording of the learning achievement/ outcomes of the individual engaged in a learning pathway leading to a qualification, a vocational diploma or certificate. ECVET is based on the description of qualifications in terms of knowledge, skills and wider competences, organised into units (that can be transferred and accumulated), and the allocation of credit points to qualifications and units depending on their relative weight. The tasks in question are the design of qualifications, the design of formal or non-formal programmes, the design of assessment /validation processes and procedures, delivery of education and training programmes, assessment and recognition of learning outcomes [4].

ECVET is applicable for all learning outcomes which should in principle be achievable through a variety of education and learning paths at all levels of the European Qualifications Framework (EQF) for lifelong learning. EC recommends that member states create the necessary conditions and adopt measures, in accordance with the national legislation and practice and on the basis of trials and testing for ECVET to be gradually applied to VET qualifications at all level of the EQF and used for the purpose of transfer, recognition and accumulation of individuals' learning outcomes, achieved in formal and where appropriate non-formal and informal contexts [3].

Leadership has been demonstrated to be one of the most important aspects in the enhancement of safety and culture in nuclear organizations. The way management behaves and transmits their beliefs has a huge impact on others' behaviours. This is a key factor in the effort of improving safety. The goal is to create an academy for managers, from field supervisors to Chief Executive Officers (CEO), in which they can develop and grow their capabilities as safety leaders. In order to achieve this goal it will be necessary to identify the existing development programs on leadership for safety. Then, taking into account the best practices and theories on leadership for safety, specific leadership development schemes will be elaborated. The development process will be designed to include the particular necessities for each of the leadership levels. Special attention will be paid on training capacities to become the next level leader and

how the transition will be successfully achieved. This activity will result in a leadership pipeline for nuclear organizations.

Based on the evaluation of the results of CORONA I project it was concluded that is necessary to strengthen focus on practical training. Human factors simulator (HFS) becomes a powerful tool for training of plant personnel to communicate expectations and practical expertise. After achievement of the optimal knowledge and skills during the theoretical training, the second step is to start with on the job training independently of the training level (basic, intermediate or advanced).

One of the objectives that the consortium wants to achieve with the HFS is to have a specific and complementary resource oriented to practice human performance tools and human behaviours modelling tools. Strengthening and improving attitudes, practices and behaviours of staff to fulfil the expectations and standards established in the plant have to be a result achieved by the practical training conducted at the HFS.

The main objective of using the Training Station is to know and train the different expectations of the plant in a dynamic way, also the objectives and procedures of different areas and organizational units and also make an assessment to see if the nuclear professionals really understand the objectives of each task of the plant. Several indicators that will be defined during the project will help to measure the results after training using the HFS.

The Consortium is focusing its efforts on using the most advanced ways of providing training to the trainees saving cost and time – distance learning and e-learning approaches will be tested in CORONA II Project.

The knowledge management portal, which development started within CORONA I project will be enhanced to include new features and various information for user's benefit. It will integrate the information on VVER web into a single communication system and develop and implement a semantic web structure to achieve mutual recognition of authentication information with other databases. The structure of the knowledge portal will ensure the possibility of creation, filling-up and further development of the database on available training programmes, training materials, training and methodological documents to be shared by all the countries using VVER technology in the process of nuclear facilities personnel training and advanced training. That will enable the partners to share the materials available in each specific training centre.

The key components of the knowledge management portal are

Information	**Education**
News	i. Training resources from Project CORONA
VVER Reactor Information	ii. Links to external training and education providers
	iii. Knowledge Resources
Collaboration	**About Project CORONA**
Discussion Forums	i. Overview
Blogs	ii. Work Packages

Social networks	iii. Project Participants iv. Achieved Results v. Reference Documents vi. Contact Us

The involvement of lecturers and trainers representing different institutions and countries will take into account the different approaches applied in education and training in different countries thus providing the trainees with broader competences and enhanced flexibility.

The project will apply the most advanced approaches to coordinate the project specific tasks and actions with the similar European actions taken in the field (by other European projects).

In order to meet the end users requirements and needs and the proposed solutions for the E&T framework in VVER area the following actions are intended to be done in coordination by the working groups:

- assess the training needs of the VVER field;
- consolidate E&T programmes necessary to meet stakeholder requirements and addresses the human resources required to deliver E&T and KM;
- evaluate the need for facilities to support Education & Training;
- perform a gap analysis between demand and offer;
- perform pilot implementation of ECVET;
- outline the basic requirements to improve the current situation;
- ensure co-ordination within EURATOM and HORIZON 2020 E&T activities.

The preservation of the greater part of CORONA Consortium partners will ensure succession of the project activities and initiatives and will serve as a base for the members to continue and strengthen the networking and coordination of their training programmes and policies. On the other hand the newly involved partners will contribute to the implementation of the envisaged activities with their solid knowledge and experience in the area.

The proposed structure of CORONA Academy is shown in Fig. 1.

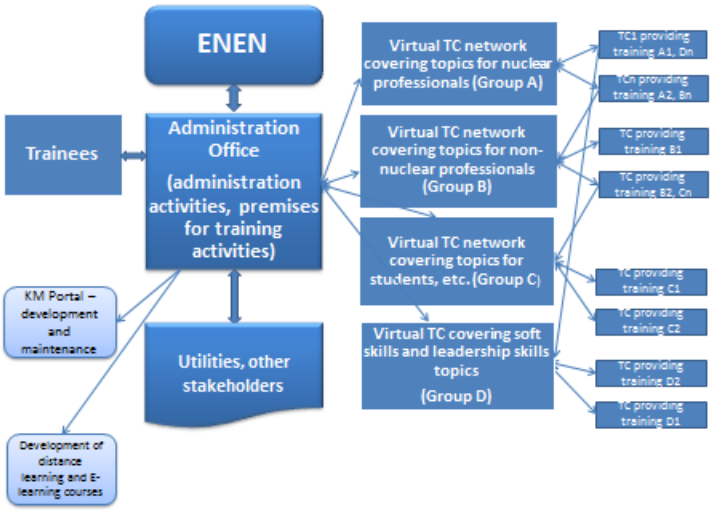

Fig.1: *Proposed organizational structure of CORONA Academy*

Dissemination activities

A large amount of the dissemination activities is necessary to be done in order to promote and to present the CORONA II project objectives and results, as well as the Community's contribution, and to raise awareness of the project activities in order to make it successful and sustainable.

For the purposes of CORONA II project the following main target groups were identified:

- CORONA II beneficiaries;
- European Commission;
- Basic stakeholders: IAEA, WANO, regulatory bodies, vendors, utilities, technical support organizations, universities involved in the VVER operation;
- Non-governmental organizations;
- Academic circles;
- General public - a heterogeneous group consisting of the countries' population;
- Media representatives.

This separation is based on the specific role of each group in relation to CORONA II project, as well as on the difference in the level of information, the level of interest, and the preferred communication channels.

The main objective of the exploitation of CORONA II project results is to guarantee the transfer of project outcomes beyond its lifetime, and among and beyond the consortium members.
The developed and tested training schemes in the frames of the project will take into account the different approaches applied in VVER education and training thus achieving synchronization between the training policies of the partners. The difference in the education and training approaches and the cultural attitudes across the European Union and Russia, being main reactor designer and vendor, will be considered during the development of the programmes. The training schemes will create an environment where the partners can discuss and evaluate how to integrate the different perspectives as an integral part in the curriculum.

As a result the project will unify the existing VVER related training schemes according to the IAEA standards and commonly accepted criteria recognized in the EU. Furthermore this will aid to the cross-

border mobility within the EU contributing to the flagship initiatives within the Europe 2020 Strategy for smart, sustainable and inclusive growth [6].

The pilot implementation of ECVET within CORONA II project will enable recognition of learners' achievements during periods of mobility. In the context of international mobility but also mobility within countries, ECVET implementation is aimed to support recognition of learning outcomes without extending learners' education and training pathways.

The knowledge management portal will integrate the information on VVER web into a single communication system providing the prerequisites to capture the existing VVER related knowledge and to store and retain the verified one, allowing timely and ease computer based access.

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