

# Capacity Building and Transfer of Know-how in Radiation Protection. Dissemination of Enetrapp Projects Results

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**Abstract:** The ENETRAP (European Network on Education and Training in RAdiological Protection) project series, since the first edition in 2005 till the current ENETRAP III, always have been the objective to maintain a high level of competence in radiation protection (RP), assuring the continued development of suitable well-trained personnel and adequate knowledge management. This objective is crucial to ensure future safe use of ionizing radiations (IR) and the development of new technologies in a safe way. A big effort and lot of work has been done in these 11 years including the new definitions in the BSS for RP Expert (RPE), RP Officer (RPO) and Medical Physics Expert (MPE) which are the basis for future national development and implementation and adequate the high-level education and training (E&T) in the countries. In order to manage all the valuable results of the projects and to distribute them to the society, is required a tool, developed with this specific propose, that will be the object of this paper.

**Key words:** Capacity building, radiation protection, education & training, Radiation Protection Expert, Radiation Protection Officer, knowledge management, ECVET, Train-the-trainers.

## 1. Introduction

In the last years there has been an increment in the use of the ionizing radiations (IR) (medicine, industry and research). This issue represents a challenge for the society in order to maintain an adequate level of knowledge, skills and competences (KSC) in RP and prevent a decline in expertise.

The EU has been founded the ENETRAP project series [1, 2, 3], through the six and the seven European Framework Programs, with the aim of maintain a high level of competence in radiation protection (RP), assuring the continued development of suitable

well-trained personnel and guarantee an adequate knowledge management (KM) to ensure future safe use of IR as well as the development of new technologies in a safe way, in line with EU policies on Education & Capacity Building [4].

The current ENETRAP III project, started in June 2014 and ends in June 2018. There are thirteen European institutions working over seven working packages and the main objective is to enhance the education and training in radiation protection, at European and national level, taking into account the different sectors as industrial, medical, research or nuclear field.

## 2. Materials and Methods

The adequate high-level education and training

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(E&T) is crucial element to prevent the decline in expertise and to ensure the availability of elevated RP KSC which can meet the future demands. In order to also contribute to a common high level safety and RP culture, the training policy and its implementation should have an international character, encourage lifelong learning and facilitate exchange of workers across national borders. ENETRAPP III is developing several elements that contribute to the implementation of this approach with the special perspective that the new legal framework has set.

The RP E&T activities are embedded in the European legal framework through the Euratom Basic Safety Standards (BSS) [5] published on January of 2014 where the new definitions for the Radiation Protection Expert (RPE), Radiation Protection Officer (RPO) and Medical Physics Expert (MPE) are used. These definitions are basics for the transposition to European countries legislations and have a harmonization of the RP actors across the European Union.

Education and Training in RP is very next to the legal framework and because of that and with the aim of promote the RP professionals mobility between countries, ENETRAPP III is implementing the European Qualifications Framework (EQF) [6] and using the European Credit System for Vocational Education and Training (ECVET) principles[7], to deliver a technical framework to describe training schemes in support of the RPE and RPO job profiles, in terms of learning outcomes, and transfer, accumulation and recognition procedures, under the advice of the Regulatory Authorities, represented by HERCA—Heads of European Radiological Protection Competent Authorities [8], and the end users, represented by EUTERP Foundation—European Training and Education in Radiation Protection [9].

The objectives of the ENETRAPP III project are the following:

- To extend the European radiation protection training scheme (ERPTS) for RPE developed in

ENETRAPP II, (Basic Modules and some modules of specific fields) developing three new specialized modules in (i) the medical area, (ii) geological disposal and (iii) nuclear power plants (NPP). The developed modules aim at stimulating competence building and using learning outcomes for knowledge, skills and competences like is foreseen in the ECVET approaches.

- Establishment a Regulatory and End-users Consultancy Group (CG) in order to develop the training schemes in close collaboration with the specific groups HERCA and EUTERP.

- The competence and suitability of those delivering the RP training is one of the key factors in qualitative high-level training. ENETRAPP III is developing a train-the-trainer (TTT) strategy and will organize a TTT event, promoting amongst other things the ECVET concepts and giving attention to the challenges involved in teaching difficult scientific/technical topics that have a significant societal impact.

- Development of tailored guidance with respect to the national implementation of the requirements for the RPE and the RPO. These guidelines will address E&T (initial & refresher training), competence, professional experience and suitability requirements, as well as methodologies for national and mutual recognition. The practical feasibility of the developed concepts for mutual recognition of RPEs and methodologies for comparison of training courses will be demonstrated in terms of specific learning outcomes.

- To preserve and disseminate all the results and developments done and to be done during the ENETRAPP projects developing a tool for Capacity Building (CB) and transfer of know-how in RP using as basis the EUTERP web portal and organizing an open workshop project.

All ENETRAPP III activities are being carried out in work packages (WP), described as coordination activities, except WP1 which is management activity, with one of the Consortium partners taking the lead and

with collaboration from appropriate partners of the Consortium or external advisors.

### 3. Results and Discussion

#### 3.1 The Expected Project Results

The expected results can be summarized by the specific tasks of ENETRAPP III

- Organization of “think-tank” activities and establishment of partnerships ensuring feedback from stakeholders (WP2).
- Establishment of three specialized training modules for RPE and implementation of pilot sessions (WP3).
- Development of a TTT strategy and organization of a TTT training event (WP4).
- Dissemination of project results and contribution to a website for CB and transfer of know-how in RP (WP5).
- Testing of methodologies for RPE recognition and mutual recognition in practice (WP6).
- Preparation of guidance to support the implementation of E&T requirements for RPE and RPO as defined in the Euratom BSS (WP7).

#### 3.2 CB and Transfer of Know-how Tool

One of the most important results of the ENETRAPP III project is the development of a tool for CB and transfer of know-how in RP (WP5) in order to contribute the main objective of ENETRAPP: to maintain a high level of competence in RP, assuring the continued development of suitable well-trained personnel and adequate knowledge management.

The specific outcomes expected of the implementation of this tool are:

- providing an electronic platform where all relevant information about E&T in RP can be found.
- increasing awareness and visibility of existing E&T resources for RP, thereby also providing a better understanding on where and which E&T actions are currently missing;
- enabling access to learning materials and useful

information around E&T in RP, providing support to E&T providers and enabling them to improve the quality and increase the availability of training courses;

- combining all relevant available information regarding E&T in RP, currently spread over different carriers, and offer them to the stakeholders in one coherent tool.

The CB tool aims to be a complete online RP knowledge management system, a multi-stakeholder platform to address major challenge using the RP know-how in CB to help local providers and stakeholders to meet the EU requirements by combining the expertise of a broad range of participants.

#### 3.3 Capacity Building in Radiation Protection

For the purpose of ENETRAPP projects, Capacity Building is understood as a strategy, based on a consensus on common needs, the vision and the means for transferring knowledge and developing skills and competencies, both individually and collectively, in RP matters to protect workers, the public and the environment from the potential risks of ionizing radiation today and in the future.

CB considers different aspects to produce the expected change in the RP community: Education & training, Knowledge management, Knowledge networks and Human resource mobility [9, 10].

(1) Education and training (E&T): is the critical element to create capacities and prevent the decline in expertise and to meet the future demands. This is the main pillar of ENETRAPP-projects.

(2) Knowledge management: deals with the process of creation, organization, storage, preservation, transference and utilization of knowledge.

(3) Knowledge networks: are related with the social interaction between the actors involved in the RP Knowledge (experts, regulators, E&T providers, students, young professionals, senior professionals, other stakeholders,...) in order to have communication,

ask questions, share ideas, participate in constructive debates to have better understanding on where and which education and training actions are currently missing.

(4) Human resource mobility: easiness of the exchange of workers across the national borders, developing a common high-level safety & RP culture, supported by the EU training policy. The instruments for borderless mobility are the lifelong learning strategy and the mutual recognition of the RPE status between Member States.

This approach is in line with the Europe 2020 strategy of the European Commission [4]. This strategy, focused on Education, can be summarized as follows:

- Needs analysis (results of the training, knowledge, skills and competences ...)
- The convergence towards a common vision.
- The development of common instruments to meet the above needs and vision (EQFs, ECVET, and continuous professional development.).
- Lifelong learning and mobility without borders.

### 3.4 Steps to Develop the CB Tool Structure

In order to design the structure of the CB tool, several analysis were done and can be remarked:

- An overview of the ENETRAP and ENETRAPII projects results and of the expected results for ENETRAP III.
- An analysis of the structure of different recognized web portal delivering a capacity building strategy in other activity fields.

After the first mentioned revision, the main documents (already produced, and to be produced) in the context of ENETRAP projects that must be included in the new tool where determined, allowing to identify the main concepts to be developed in the tool.

With the study of different capacity building strategies in other activity fields, some new concepts and tools available in the Internet were detected as an effective mean to contribute to CB in RP, like social networking and open-source software. The webs



**Fig. 1 Pillars sustaining CB in RP.**

analyzed were: Spanish Ionizing Radiation Portal [12], IRELP [13], ENEN [14], CEIDEN [15] and MAGHRENOV [16].

To make efficient use of resources and to reach an optimal result, assuring the continuity in time, ENETRAP III collaborates with the EUTERP Foundation that has previously an operational E&T in RP website, which is the base for this electronic platform to become a knowledge/document management system. This website will also increase the transparency in capacity building on RP, will facilitate the access to available E&T material and foreseen course events, and will improve the coordination between the different institutions involved in capacity building. The web of the EUTERP Foundation, aims to facilitate information exchange between all stakeholders in E&T in RP through the website, publication of newsletters and organization of workshops. The aims of the EUTERP foundation are in accordance with the objectives of the CB tool. The use of this web as basis provides the advantages of a solid community to support the CB tool.

Taking in consideration that CB requires influencing multiple entry points to produce the expected change in the RP community (Education & training, Knowledge management, Knowledge networks and Human resource mobility) the proposal for the website-structure is to organize the information around three concepts:

- The professionals → CAREER CENTRE
- The people in training (students in all stages and young professionals) → EDUCATION AND TRAINING CENTRE

- The community → RADIATION PROTECTION COMMUNITY

Around these three concepts the CB tool will organize all the information previously contained in the EUTERP website and the valuable information that is spread in different places in an integrated way forming a multidimensional system of knowledge management in RP.

### 3.5 Functional Analysis

We have design the CB tool including three main “points of menu” or “big blocks” corresponding with the three main concepts described before. All the information is grouped in several sub-menus contained inside the main three:

Career Centre: is the space that has been design to contain all the information related with the professionals of RP and their career (HR mobility). Inside this block we have included some submenus as “Relevant legislation”, “Qualification framework”, “Professional workshops, conferences and meetings” and finally “Opportunities”.

Education and Training Centre: is the point that of menu design to cover all the information related with the students at all stages and young professionals in training (E&T). In this block we have included different utilities as “E&T Database”, “Resources for educators (TTT)”, “Training guides and manuals” and “Library”.

Radiation Protection Community: is the functionality designed to include information and utilities to create an active virtual community, where the interchange of ideas provides a better understanding on where and which E&T actions are currently missing (Knowledge management and knowledge networks). In this block we have included information about “ENETRAPP projects”, “Related projects and networks”, “Glossary” and “Forums”.

Some of the blocks were presented in the previous EUTERP web. The proposal for CB tool has rearranged the existent blocks and has integrated them

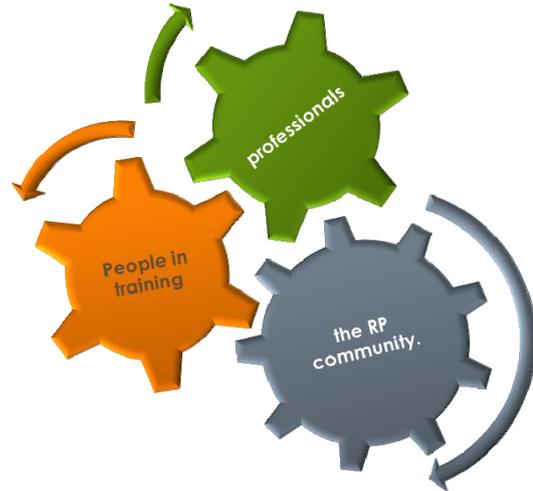


Fig. 2 Concepts selected to organize the information in the CB tool.

with the new utilities and functionalities proposed as part of the CB strategy.

### 3.6 Career Centre

The strategy that we have established to develop the CB tool tries to group in the Career Center block the utilities to enhance the know-how and the mobility of the RP professionals grouping the most relevant information as follows:

“Relevant legislation”, including by one side at the European Union level, headed by the EURATOM Basic Safety Standards followed by other RP Directives, and by the other side at the international level, the IAEA- Basic Safety Standards [16].

The “Qualification framework” is the space that we have implemented to include all the elements that the European Commission has enabled to make it easier for people to get validation and recognition of skills and knowledge acquired in different systems, countries and work-experiences. Between this information are described the ECVET (European Credit system for Vocational Education and Training), EQF (European Qualifications Framework) and EQAVET (European Quality Assurance in Vocational Education and Training). Complementing these concepts the tool is completed with “Career profiles”, including a compendium of information that can be found in

several recognized places like legislation, international projects or professional societies about different RP career profiles.

In order to present in one place information of the RP professional agenda of meetings, workshops, and conferences we have included the “Professional meetings”-block. Also are included the presentations and the proceedings of such us meetings in order to have together all the relevant information and most actualized in E&T in RP matters.

Complementing the Career Center block, we have developed a utility for “Opportunities”. This application is linked with the database to organize information about “On the Job Training”, “Internships” and “Job opportunities”. This information will be provided by the E&T providers or the associated member of EUTERP.

### *3.7 Education and Training Centre*

The CB tool strategy aims to improve the CB pillars devoted to education and training and knowledge management, through the Education and Training Center block, including relevant information for the students at all stages and young professionals in training, as well as resources for trainers.

The most important application developed for this block is the “E&T Data base”, containing information about E&T events and providers. This application includes the information organized by the nature of event: E&T courses, Degrees, PhD topics and Masters; about the receiver of the E&T: RPE, RPO, Exposed Workers ... and regarding the kind of the event: initial, retraining and specialization in any type of areas of the radiation protection. This application is being connected with the IAEA new development database “Integrated database for nuclear education and training” in order to promote the CB in RP not only at the European context but at the international level minimizing the efforts and with the aim of the E&T in radiation protection can be part of the pan-database devoted to the specialized E&T.

One of the key factors ensuring qualitative high-level training is the suitability of trainers. The trainers not only need to have a high-level understanding of the scientific and technical basis they are training, but also an insight in the context and a sense for the social and philosophical aspects of the situation, and appropriate didactic skills. At the current scenery, an understanding of the existing credit and qualification systems is also very relevant. Providers and trainers must be able to develop “learning outcomes” for all new topics they will teach. In this sense we have implemented the “Resources for educators” area, devoted to the train-the-trainer (TTT) strategy, developed as part of the objectives of ENETRAPP III to facilitate good practices in training course development and implementation adapted to different teaching modalities (from face-to-face to b-learning). The TTT-events organized will be allocated and announced in this place.

With the aim of encourage the knowledge management addressed to the people in training and trainers two blocks have been developed:

“Training guides and manuals” is the section containing information and documentation related with syllabus, recommendations, as well as teaching material usable by students, teachers, and general public. Some of the documents included have been developed in the ENETRAPP projects.

“Library” including information of reference text books that is used for E&T in Radiation Protection. An exhaustive analysis of reference text books used in different RP courses was done as part of the ENETRAPP II-WP7 and the most relevant will be included. The free application of Google, “Google Books”, has been used to link the references because allows users to view the complete book, pages from the book or a complete reference, depending on the rights. Some course material examples (text book, e-learning modules ...) developed at ENETRAPP projects will be included in the library.

### 3.8 Radiation Protection Community

A virtual community is a social network of individuals who interact through specific social media, potentially crossing geographical and political boundaries in order to pursue mutual interests or goals. The last pillar of the CB strategy to be implemented in the CB tool is to build a knowledge network in RP. It is important to introduce the new concepts and tools available for free on the Internet to be connected throughout social networking, in order to spread the entire activities and resources object of the Education and Training in RP to the community and promote the creation an active knowledge network in RP. This kind of new tendencies is widespread between a big amount of people, since the introduction of the portables devices with connection to Internet. Social networking not only permits the widespread of the information but also encourages the establishment of a virtual community. At this sense and as transversal functionality of the entire web portal, the “Share-icon” will be introduced in order to promote the visibility of the information included in the portal.

At this block, the CB tool will be fed by a description and contact of the main projects and networks involved not only in the E&T in radiation protection but working on different fields and aspects of the RP and IR applications, promoting the “who-is-who” and the contacts among the different stakeholders. At first place the “ENETRAPP projects” are included with a description of each one of the three projects. In order to bring together all the relevant information spread over

**Table 1 Summary of the related projects and networks included in “Radiation Protection Community”.**

<u>Projects:</u>	<u>Related Networks:</u>
EUTEMPE-RX	IRPA
TRASNUSAFE	ENEN Association
NUSHARE	MELODI
PETRUS	NERIS
GENTLE	ALLIANCE
CINCH	EURADOS
MEDRAPET	EAN
	EMAN
	EFOMP
	HERCA

the individual web pages, the public information released of these projects is going to be linked.

After this, “Related projects” and “Related networks” describe different projects financed by the EU and European and international networks, which work in different aspects and applications of ionizing radiations.

The RP community block is completed with two functionalities:

“Glossary” includes an alphabetical list of terms and acronyms with the correspondent explanation that appear in the information presented in the entire site, related with the RP, the E&T and the concepts introduced by the European framework for the Vocational Education and Training.

“Forum” with the new concept for the EUTERP portal as transparency platform of knowledge, this subject is being assessed, in order to provide a tool for the community to open discussions and participate in them about the RP matters. It is under study for the moment but applications as LinkedIn are being considered.

## 4. Conclusions

A big effort & lot of work has been done in the 10 years of ENETRAPP projects, including the work done to harmonize the new definitions for RPE, RPO & MPE in the EURATOM-BSS and mainly on the use by the new EU countries.

The mission of the ENETRAPP III-WP5 is to preserve and disseminate the results of the ENETRAPP projects, bring together valuable information spread, and promote the education and training in RP community. The instruments to achieve the WP5 objectives are: to improve the EUTERP website to become a transparency platform, delivering a RP capacity building strategy and to organize an open project workshop (Oxford-2016).

The design of a CB tool has been done after:

- A deep reflection on EURATOM research, innovation and education strategy that supports the H2020 program.

- A study of other webs of entities of recognize prestige delivering a CB strategy (strengths and weakness).

- The revision of the ENETRAPP project results.

The WP5 has design a CB tool that encompasses a big amount of information around 3 concepts, the professionals, the people in training & the RP community.

With the development of this CB tool, supported by the EUTERP foundation, the WP5 aims to contribute in the transferring of knowledge and developing skills and competencies, at individual and collective level, in RP matters to protect workers, the public and the environment from the potential risks of ionizing radiation today and in the future.

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### Disclaimer

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