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WD7.2 Development of modern learning tools (e-learning) for the RPE or RPO training.

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ENETRAP II: EUROPEAN NETWORK ON EDUCATION AND TRAINING IN RADIOLOGICAL PROTECTION.

1 INTRODUCTION

Euratom BSS are Guidelines of the Council of the European Union dated 13th May 1996 to stipulate the **basic safety standards for the protection of labor and the population against the hazards of ionizing radiation.**

COUNCIL DIRECTIVE 96/29/EURATOM, 13 May 1996 lays down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionizing radiation.

The basic standards of 13th May 1996 are geared to the new scientific findings in radiological protection contained in the ICRP Publication 60.

The member states of the EU were obliged to enact the required national legal and administrative regulations to implement the Euratom basic standard by 13th May 2000.

The European Commission is currently developing a modified European Basic Safety Standards Directive covering two major objectives: the consolidation of existing European Radiation Protection legislation, and the revision of the European Basic Safety Standards.

The revision of the European Basic Safety Standards will take account of the latest recommendations by the International Commission on Radiological Protection (ICRP) and will improve clarity of the requirements where appropriate.

Following a recommendation from the Article 31 Group of Experts, **the current draft of the modified BSS will highlight the importance of education and training by dedicating a specific title to radiation protection education, training and information.**

This title will include a general requirement on the Member States to ensure the establishment of an adequate legislative and administrative framework for providing appropriate radiation protection education, training and information. In addition, there will be specific requirements on training in the medical field, on information and training of workers in general, of workers potentially exposed to orphan sources, and to emergency workers.

The revised BSS directive will include requirements on the competence of a radiation protection expert (RPE) and of a radiation protection officer (RPO). The concept of a radiation protection expert will replace the current concept of a Qualified Expert (QE), which has been interpreted differently within Europe. These new requirements together with clearer definitions of the concepts RPE and RPO shall support harmonization in Europe.

For the purposes of this project, the Radiation Protection Expert can be defined as:

“A person having the knowledge, training and experience needed to give radiation protection advice in order to ensure effective protection of individuals”

and the Radiation Protection Officer as:

“An individual technically competent in radiation protection matters relevant for a given type of practice who is given the role of overseeing the application of relevant radiation protection standards in the workplace”.

With particular respect to the RPE a methodology for mutual recognition on the basis of available EU instruments, such as the European Qualification Framework (EQF) and/or the Directive 2005/36/EC is also seen as enhancing the profile of such professionals.

2 OBJECTIVES

The overall objective of this project is to develop European high-quality "reference standards" and good practices for education and training (E&T) in radiation protection (RP), specifically with respect to the RPE and the RPO. These "standards" will reflect the needs of the RPE and the RPO in all sectors where ionizing radiation is applied (nuclear industry, medical sector, research, non-nuclear industry). The introduction of a radiation protection training passport as a means to facilitate efficient and transparent European mutual recognition is another ultimate deliverable of this project.

With respect to the RPE the overall objective is to be achieved by addressing both education and training requirements. In the field of education this project deals with high-level initial programs, mainly followed by students and/or young professionals. It is foreseen to analyze the European Master in Radiation Protection course, which started in September 2008. This Master is organized by the consortium of universities as established in the ENETRAP 6FP. Broadening of the consortium and quality analysis of the providers and the content of the modules can be performed according to, primarily, the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ENQA) and, secondly, to the ENEN standards.

In the field of RPE training the ultimate goal is the development of a European mutual recognition system for RPEs. Hereto, the ENETRAP Training Scheme initiated as part of the ENETRAP 6FP will be used as a basis for the development of a European Radiation Protection Training Scheme (ERPTS), which includes all the necessary requirements for a competent RPE. In addition, mechanisms will be established for the evaluation of training courses and training providers. These actions will contribute to facilitate mutual recognition and enhanced mobility of these professionals across the European Union.

With respect to the RPO role the desired end-point is an agreed standard for radiation protection training that is recognized across Europe. Data and information obtained from the ENETRAP 6FP will be used to develop the reference standard for radiation protection training necessary to support the effective and competent undertaking of the role.

Furthermore, attention is given to the encouragement of young, early-stage researchers. In order to meet future needs, it is necessary to attract more young people by awakening their interest in radiation applications and radiation protection already during their schooldays, and later on during their out-of-school education (university or vocational education and training). Radiation protection experts and officers work more and more on a European level. It is therefore important to bring together all the national initiatives at a European level: tomorrow's leaders must have an international perspective and must know their counterparts in other countries.

It is envisaged that the outcome of this project will be instrumental for the cooperation between regulators, training providers and customers (nuclear industry, medical sector, research and non-nuclear industry) in reaching harmonization of the requirements for, and the education and training of RPEs and RPOs within Europe, and will stimulate building competence and career development in radiation protection to meet the demands of the future.

3 WORKING PACKAGES

The specific objectives of the project are trying to be reached through the working packages:

WP1 Co-ordination of the project

WP2 Define requirements and methodology for recognition of RPEs

WP3 Define requirements for RPO competencies and establish guidance for appropriate RPO training

WP4 Establish the reference standard for RPE training

WP5 Development and apply mechanisms for the evaluation of training material, events and providers

WP6 Create a database of training events and training providers (including OJT) conforming to the agreed standard

WP7 Develop some course material examples (text book, e-learning modules, ...)

WP8 Organise pilot sessions, test proposed methodologies and monitor the training scheme effectiveness

WP9 Introduction of the training passport and mutual recognition system of RPEs

WP10 Collaboration for building new innovative generations of specialists in radiation protection

7 WORK DETAILS, TASKS PROPOSED

T1. Defining a detailed work programme for WP7 and subsequent tasks for the process of developing training materials.

Investigate the current situation in each WP 7 participant country at least.

T2. Using the outcomes of WP5, identify and select module(s) of interest both in RPEs and RPOs Training Scheme.

T3. Defining the most adapted form (text books, slides or e-learning modules) of training materials which will be proposed for RPEs and RPOs.

- Based on Enetrapp 1 results (WP5) and on the current practices in other domains (analysis of the current situation).
- Feed-back of b-learning courses (e-learning) implemented in RP

T4. Elaborated adapted training material for RPEs and RPOs.

- Content on which part (common basis/specific modules...)?
- Support form (text book, b-learning, webcasting...)
- For text book : Identify and get the textbooks which are referred to (a lot of texts already exist)
- Structure the final document in coherence with the RPE definition and the validated training scheme

8 TASKS DEVELOPED

WD7.2 Development of modern learning tools (e-learning) for the RPE or RPO training

Thanks to a system of tracking integrated in a LMS platform, it will be possible to identify educational resources the most used and in the same way, those that are less visited or assessed less useful by the learners.

Based on an integrative approach, we have selected a learning and content management system (LMS/CMS) able to manage several types of embedded educational resources.

Work achieved in the previous ENETRAPP WP5 project is used in this Work Package. We took into account the results and deliverables of its WP. The ENETRAPP WP5 “new concepts and tools for a European Radiation Protection Course (ERPC)”, had to assess new modern training tools (distance

learning). For this purpose, a study was conducted on e-learning and b-learning methodologies and resources.

8.1 The ENETRAP “Cyber-book”: an integrative approach

The function of this cyber-book, is to propose a panoply of additional educational resources to which the reader of the text-book will be able to refer. The concept of "to learn more" is often integrated into text-books by using special frame.

With this cyber-book, the participant will have access to different types of resources and he/she will choose those that suit to him/her.

This summary of the cyberbook is organized in the same 6 chapters of the textbook.

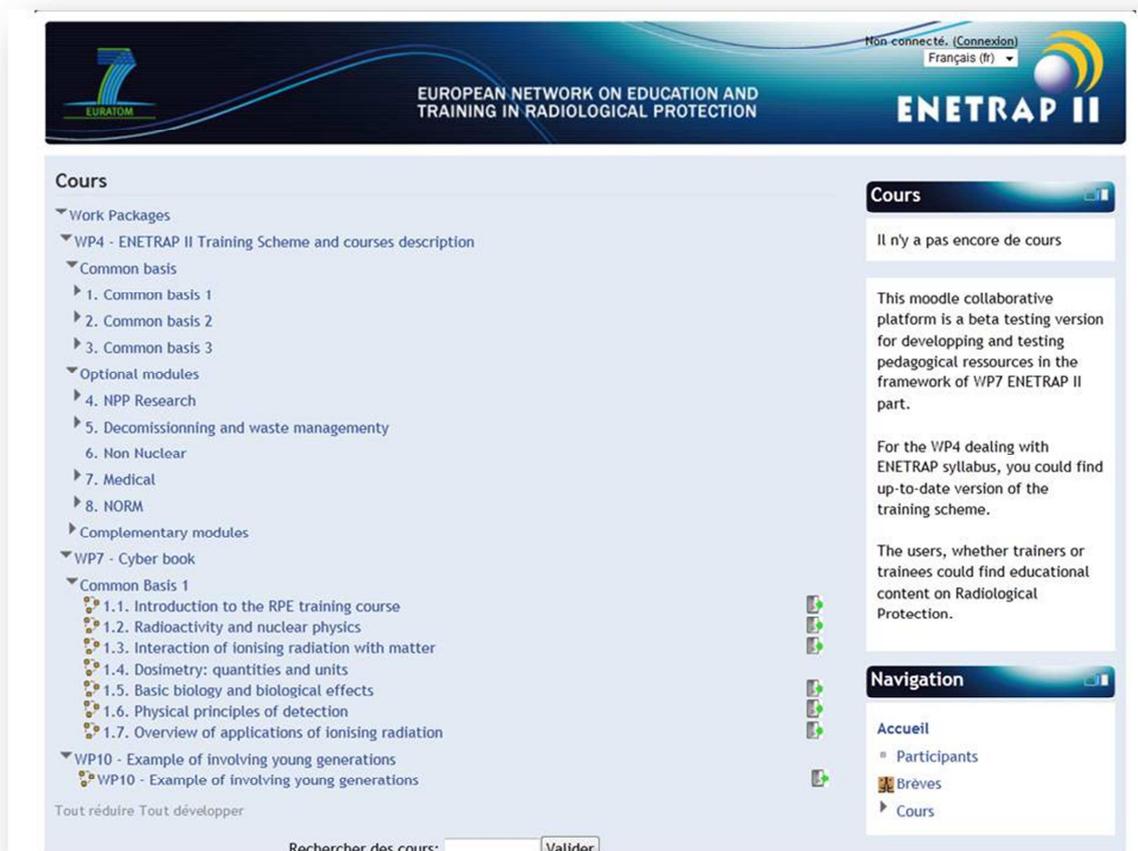


Figure 1: A capture screen of the ENETRAP II portal

But what types of efficient resources are available?

In the framework of this WP, we will be interested in the following resources:

- a) hypertext links and/or QR code
- b) Exercises with solutions
- c) Ppt soundtrack with video
- d) Audio podcast
- e) Serious games
- f) Radiation Protection forum

These resources will be integrated into the LMS.

What would be the advantage of using such type of book, instead of putting resources, exercises and solutions directly on the internet?

If the goal is that resources can be available at any time, in the one hand content could be more pleasant to read on a paper book than on a screen (ergonomic) and on the other hand, the other resources (videos, audio, exercises, serious game) could be easily accessible using PC or other internet connected devices. Therefore the two ways could be used simultaneously.

These hypertext links will be able to be either next to the text to illustrate with videos, animations..., or at the end of a chapter with exercises and solutions for example.

8.2 hypertext links and/or Flashcode

Next to the text-book, we created a web site hosted in a LMS, within complementary resources that will be available. We called it “cyber-book” because links could be found in the text-book as a classical internet link, (<http://www.rpe-training.eu>) as a flashcode or a QR code.



ENETRAP2 cyber-book QR code

8.3 Exercises with solutions

We are going to suggest a few examples of exercises with their solutions. .

8.4 Powerpoint Soundtrack (RapidLearning)

An assessment of rich media resources using synchronized PowerPoint files was performed. As an example of the complement between the two pedagogical resources, we can name the topic “radionuclide’s chart” whose explanation and use are developed in chapter 1 “Radioactivity and nuclear physics “of the cyberbook whereas the concept is just mentioned in the textbook

The synchronized PowerPoint files was made by filming a pilot course in radiation protection at Karlsruhe Institute of Technology (KIT) in Germany. This pilot session was built according to the ERPTS training scheme (WP8 of ENETRAP II) at KIT in March 2011.

This course is about radioactivity. It belongs to the module 1 “Common Basis” of the training scheme (WP4 of ENETRAP II).

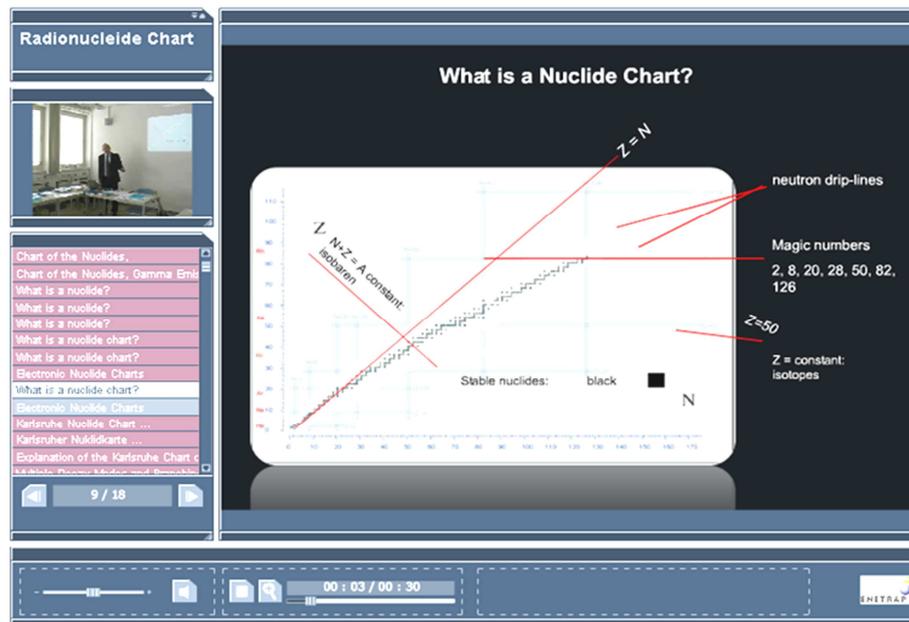


Fig 2: A capture screen of the Powerpoint Soundtrack of the Radionuclide chart training course

A few important remarks concerning PPT video webcasting can be made:

- To be authorized (lecturers and participants) Intellectual property
- Which standard of Video and audio quality
- Be careful with the size of file (eg. HD)
- Classroom lighting
- Color of slides
- Adapted microphone for lecturers and participants
- Ergonomic aspects
 - Laser cursor not visible → capture of mouse cursor
 - Slide title
 - Which kind of lecturer are you? (static or dynamic)
- Post synchronization is time consuming if problems occur
 - Only one shot: (backup with webcam)
 - Easy to use but difficult to configurate

Directly recorded by participants or students or video professional

- Cost : 3 500€ (min.) video camera (not HD), sound system and software

All these points must first be studied in details before video recording a trainer in order to provide the best result for the trainees.

8.5 Audio podcast of RP courses

Podcasting means the way to fix a multimedia content on a digital file (the podcast) and its broadcast using the internet. The word « podcast » more extended than the traditional recording of a course to diffuse it by streaming. Nowadays, podcast is a process of universal diffusion of contents standardized (SCORM format), reachable and downloadable with a computer, tablet or Smartphone. The broadcast of training courses in podcast can be done by downloading or by direct visualization (streaming) on intranet or internet with restricted access (identification).

Nevertheless, the question of intellectual property rights has to be solved.

For RPE/RPO training course, podcast could be restricted to short lectures (max. 20 minutes) and for subject more general than specialized. Indeed, in specialized conferences or lecture on very specific topic, the lecturer leans often on PPT presentations or slides with a lot of technical information. In this case, podcast is obviously not the best tool.

8.6 Serious Games

A demonstrator of what a serious game could be is presented in this chapter. This new concept was used for the first time in may 2011 and was assessed as a powerful and pedagogical tool by trainees.

Situation problem:

Using a dose rate cartography of controlled areas established by a RPE/RPO or a member of radiation the protection team, the trainee has to carry out a dosimetric study based on the ALARA procedure.

Several radiation protection actions can be created and their efficiency in terms of person.Sv saved is quantified.

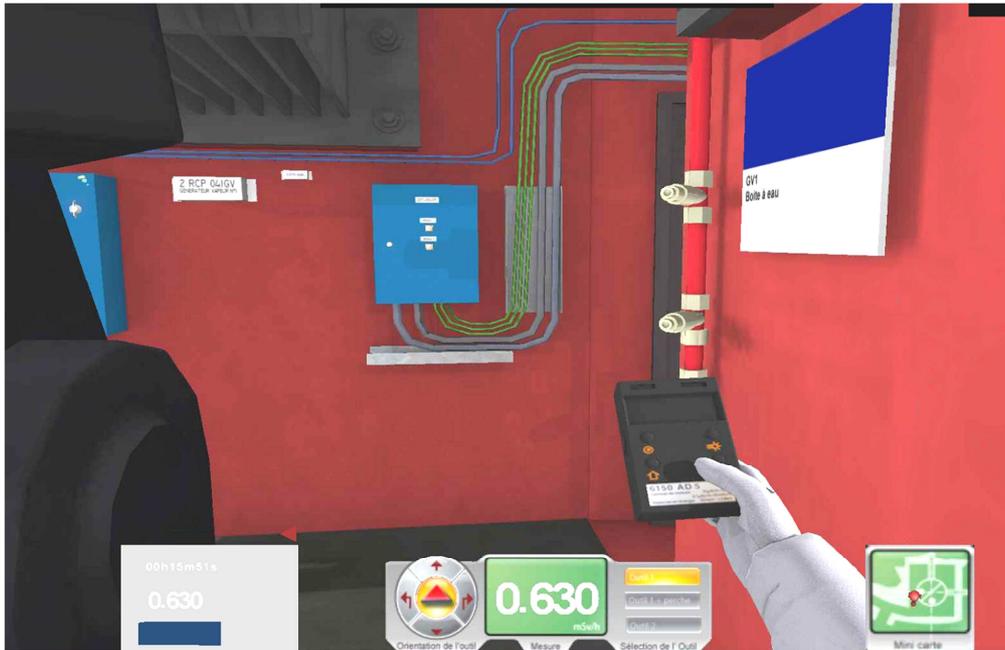


Fig.3 Measurement of dose rate

Remarks: In this serious game, the learner is not disturbed because the dose rate meter's design used is the same as the one used in real situations in nuclear power plant or installation.

An enhancement of this tool could be based on an increased reality approach.

In this case, the trainee is surrounded by a look alike representation of the nuclear installation (video capture) and he/she introduces dose-rate cartography by using a virtual dose-meter or by viewing representation of dose-rate levels (gamma camera) with virtual glasses in 3D mode.



Fig.4: control panel with different parameters

The trainee has the possibility to implement several RP actions such as:

- Building as in the steam generator area
- Removal of the highly contaminated ring in a lead container
- Protection shielding of the steam generator man-hole
- Choice of the steam generator man-hole tap
- Use of a distance tool for the speeder machine used inside the steam generator bowl

8.7 Forum: exchange in the RP community



		SUJETS	MESSAGES	DERNIERS MESSAGES
	PCR Travaux Publics L'actualité du réseau, Divers	1	4	Mar 23 Mar - 6:13 SKATING
	RaMIP Journées, Groupes de travail, S'investir dans le réseau RAdioprotection MIDI-Pyrénées	3	22	Mer 3 Mar - 21:33 KLOUG
UN PEU DE THÉORIE		SUJETS	MESSAGES	DERNIERS MESSAGES
	Physique nucléaire et radioactivité Tout sur la physique du phénomène.	19	291	Hier à 18:48 thesweetgirl
	Interaction rayonnement-matière Rayonnements secondaire, lésions moléculaires, descriptif de l'impact.	4	31	Hier à 15:45 Radisvert
	Calcul et dimensionnement de protections biologiques Calcul d'épaisseur, pertinence des matériaux, épaisseur de plomb.	3	56	Lun 15 Fév - 18:30 KLOUG
	Code de calcul et transport de particules Amateur de Panthère, MCNP, Tripoli, Mercurad, Fluka, Microshield, j'en passe et des meilleurs, défoulez vous, cette rubrique est pour vous !	3	12	Hier à 9:59 Nico27027
	Effets biologiques des rayonnements Seul le monde médical devrait voir des effets biologiques positifs.	2	13	Mer 24 Fév - 17:49 KLOUG
RÉGLEMENTATION		SUJETS	MESSAGES	DERNIERS MESSAGES
	Décryptage réglementaire Pour ceux qui ne savent pas comment interpréter les différents textes.	29	270	Aujourd'hui à 11:30 Radisvert
	Mise en conformité Pour respecter au mieux les textes et réussir ses audits.	7	75	Aujourd'hui à 14:43 Nico
	La RP au niveau international Pour parler un peu de l'AIEA et des bonnes pratiques dans le monde.	1	3	Mer 2 Déc - 0:28 KLOUG

Figure 5: a capture screen of the RP Cirkus Portal

This type of resources could be one of the missing components of a comprehensive capability to enrich the learning process of RPEs.

Feedback coming from a recent free Radiation Protection forum (<http://www.rpcirkus.org/>) shows that such a tool is considered as a complementary and efficient means to enhance the radiation protection culture among beginners, skilled, knowledgeable experienced and expert RP staff.

To date, more than 850 people have joined this RP group. It translates the fact that these people felt solitary in their RP occupational environment.

8.8 Conclusions

In conclusion, the production of the module 1 “common basis” training material (WD7.1) in the combined form of a textbook plus cyberbook is a first step. In the next one, all the ENETRAP partners should collaborate to complete at least the whole “common basis” training resources, as learning tools contribute to facilitate mutual recognition and enhanced mobility of these professionals across the European Union.