RESULTS OF THE 6FP "ENETRAP" ON RADIATION PROTECTION EDUCATION AND TRAINING IN EUROPE

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1. Introduction

Occupational, public and environmental radiation protection (RP) is a major challenge in the industrial applications of ionizing radiation, both in the nuclear and non-nuclear domain, as well as in other areas such as the medical and the research area. As is the case with all nuclear expertise, there is a trend of a decreasing number of experts in radiation protection. Maintaining a high level of competencies in this field is crucial for (i) the future research and development of safe applications of ionizing radiation and (ii) the assurance of the protection of workers, the public and the environment.

In 2002, a survey was carried out on the situation of radiation protection experts (RPEs) in the Member and Candidate States of the European Union [1]. The survey covered all qualification aspects of RPEs, including:

- current definitions and other regulatory provisions and requirements,
- legal status,
- pre-educational requirements,
- duration of the education and training program.

The results of the survey revealed significant differences in the legislative approach to the issue of RPEs within the European Union along with a wide variety of systems for the underpinning education and training. However, the survey also highlighted considerable interest among Member States for better harmonization of education and training requirements in the different areas of radiation protection.
In a feasibility study [2], a number of recommendations were made during a workshop that was attended by most of the Member and Candidate States of the European Union. The feasibility study was intended to explore the possibilities of establishing a European Platform on Training and Education in Radiation Protection (EUTERP Platform), which could pre-eminently play a role in reaching consensus about an internationally agreed system of recognition of radiation protection experts. It was also recognized that all countries have developed their own education system over a long period of time and it would be impossible to strive to uniformity in the educational approach. Instead of that, and despite the diversity of education and training systems, harmonization should be reached by evolution of internationally agreed common minimum criteria for the qualifications of the radiation protection expert. Recognition should not only be based on the initial education and training, but also on competence. The feasibility study showed, again, a wide interest in the EU Member and Candidate States to participate in such a Platform. More detailed information on several of the issues identified in the feasibility study is required if the EUTERP Platform is to have a sound basis. Therefore, in April 2005 the ENETRAP project has been launched in the 6th Framework Programme of the European Commission, specifically to address these issues.

The ENETRAP project aims at establishing a sustainable Education and Training (E&T) infrastructure for radiation protection as an essential component to combat the decline in expertise and to ensure the continuation of the high level of radiation protection knowledge. This infrastructure needs to offer both the initial training ("Education") and the unceasing maintenance of the level of competencies ("Training").

The main objectives of the ENETRAP project are:

- to better integrate existing education and training activities in the radiation protection infrastructure of the European countries in order to combat the decline in both student numbers and teaching institutions,
- to develop more harmonized approaches for education and training in radiation protection in Europe and their implementation,
- to better integrate the national resources and capacities for education and training,
- to provide the necessary competence and expertise for the continued safe use of radiation in industry, medicine and research.

It is the intention that these objectives are achieved via the establishment of a European-wide E&T network in radiation protection which will:

- assess training needs and capabilities,
- identify the potential users and their future involvement in order to insure the sustainability of the network,
- launch a consortium of universities with the aim of create an European Master in Radiation Protection,
- review the scientific contents of current E&T activities,
- explore the effectiveness of on-the-job training and identify options for additional programmes,
- propose recommendations for the recognition of courses and competencies of radiation protection experts,
- make recommendations for revising the current European Radiation Protection Course (ERPC) to include a system for credit points and modern educational tools, such as distance learning.

The main deliverables of the ENETRAP project are:

- comment on the status, value and appropriateness of current education and training initiatives within the EU,
- recommendation to EUTERP regarding the way forward with respect to (i) required developments in education and training resources to support the radiation protection expert, and (ii) establishing a system for mutual recognition of training and competencies,
- the delivery of a pilot session for a revised ERPC,
- a proposal for the establishment of a Universities Consortium.

2. Details of the project

The objectives of ENETRAP will be reached by a number of distinct activities, carried out in several work packages. These are:

- WP1 - Implementation and co-ordination of ENETRAP
- WP2 - Assessing the training needs and capabilities within the EU Member, the New Member States and the Candidate States
- WP3 - Recognition of competencies and diplomas
- WP4 - On-the-Job Training (OJT) programmes
- WP5 - New concepts and new tools for an ERPC
- WP6 - Comparison of the current ERPC syllabus with IAEA E&T modules and EU requirements
- WP7 - Validation of the results and recommendations for a pilot course
- WP8 - Establishment of a consortium of universities

3. Main results from the ENETRAP questionnaire

In a first phase of the ENETRAP project, a questionnaire was set up, the objective of this questionnaire being to elicit detailed information which will enable us to:

- assess the actual training needs in the EU Member States and Candidate States;
- understand the various regulatory aspects and consequently propose minimum requirements for mutual recognition of RPEs and RPOs;

- collate details of the various training and education activities available in the EU Member and Candidate States, and
- review the content, structure and methods of these training and education activities.

Hereto, an extensive list of questions was set up addressing the following topics:

- numbers of RPEs;
- identification of practices;
- national capabilities for education and training in radiological protection;
- regulatory requirements and
- recognition.

This questionnaire was sent out to 31 countries, i.e. the European Member States, the Candidate States Bulgaria, Croatia, Romania and Turkey, and the Associated States Norway and Switzerland.
Results can be found in reports published on the ENETRAP website [3].

3.1. Training needs and recognition of the radiation protection expert

Constructive responses were obtained from 28 of the 31 countries originally contacted; in itself this level of response points to the high level of interest in the ENETRAP project. Only two countries failed to respond (Romania and Slovakia); limited information was provided by Turkey. A significant amount of data and information was provided. A preliminary rationalisation of the initial returns indicated a need for a degree of follow-up either for the purposes of clarification of the detail provided, or to elicit some further or supplementary information.

i) Of the 28 countries that responded to the ENETRAP questionnaire more than half indicated that they felt that the number of radiation protection experts (RPEs) is currently inadequate and does not satisfy national needs.

ii) Very few countries (<10) are able to provide any sort of detailed information, or comment on, the distribution of RPEs, licensee/employers or workforce across listed practices. This makes it difficult, at the present time, to comment in detail on "needs and capabilities".

iii) Despite the lack of detailed information referenced in (ii) above, statistical analysis undertaken on the data provided points to a general coherence between the simple qualitative judgement about the adequateness of the number of RPEs and a given country's radiation protection issues (as quantified by the number of radiation workers and licensees; RWL)

iv) There are significant differences in interpretation of the roles of the RPE and the RPO (radiation protection officer) across Member States. These differences have a strong influence on specified legislative requirements with respect to RPE and RPO as well as on the approaches taken with respect to Education and Training. There are wide ranging approaches to the latter.

v) On the basis of the information provided via the ENETRAP questionnaire and given the significant issues with the interpretation of key roles, it is difficult to conclude a workable "de-minimus" level of training for the RPE (or RPO). Further investigation of this issue is required.

vi) The majority of Member States have mechanisms in place for the recognition (and re-recognition) of the Radiation Protection Expert. However, the approaches taken vary significantly and are difficult to compare.

vii) Only a minority of countries have a formal system for mutual recognition or RPEs (RPOs and workers) and the study did not elicit a consensus view as to what could constitute minimal requirements for mutual recognition.

Issues v), vi) and vii) above all warrant investigation beyond the scope of the current ENETRAP project. It is suggested that the appropriate mechanism for pursuing these issues is via the EUTERP[5] Platform; the matters raised warrant discussion and opinion from the relevant Member States.

3.2. Conclusions and recommendations on OJT and WE

Practical experience, both as OJT and WE, is a key element of E&T RP – and not only since the ETRAP Conference Declaration [8]. Therefore, appropriate qualification for responsible RPP (RPEs, RPOs, QEs and MPs) must incorporate theoretical knowledge as well as the ability and competency to practice RP. Theoretical knowledge is obtained through the successful completion by examination of suitable education and RP training courses. These training courses should provide a suitable mixture of theory and practical exercises.

Competency and skills are a second, essential element of RP E&T and can only be acquired by appropriate OJT followed by a period of WE.
From the statistical evaluation and analysis, it can be concluded that OJT and WE are generally required for RPEs as well as for RPOs but only in special cases for RPWs. In general according to the questionnaire, the strictest regulations with respect to practices are in medicine and nuclear technology. The minimum duration of OJT and WE in medicine, where an RPO is likely to be a medical physicist, is in the range of 1 to 2 years. The same timeframe is required for RPOs (QE) in NPPs.
OJT requires a suitable environment where the necessary facilities and infrastructure are available. In addition, direct supervision by an experienced mentor is imperative. Therefore, opportunities and time for this kind of training are usually limited, as well because of financial considerations, as trainees usually require financial support. The responsibilities of host organisations and trainees must be fixed. The duration of OJT activities is typically several weeks up to several months and, in most practical cases, an additional period of time for gaining work experience is obligatory. In WE training activities, employees actively work within a specific practice and gain in-depth knowledge of the practice and experience in relevant RP issues.
Since OJT is not available in some EU Member States (Cyprus, Malta, Lithuania, etc) and is often not or not comprehensively available for all practices in one country, a detailed list of institutes that could provide suitable OJT for foreign trainees should be compiled and published by the European Commission or another suitable platform. Experiences could be provided as well by IAEA. This would facilitate OJT opportunities for young scientists, in particular from Central and Eastern European countries.
In the revision of the EU Basic Safety Standards, RP E&T should be covered in a separate chapter that includes OJT. In the guidelines for implanting the BSS, OJT should be specified, e.g. content of OJT (syllabus, learning objectives), availability of necessary facilities and infrastructures as precondition for OJT, assessment of the competence of the participant, format of certificate, recognition of OJT, responsibilities of host organisation and trainees.

3.3. E-learning

The promotion and implementation of e-learning in the specific field of RP in the European Union increases the participation because of the easier access to the training (anyplace), the less costs, avoiding travelling and stays, and the compatibility of working and training (any pace, anytime). This wider participation also decreases costs to organiser in a long-term. In addition, e-learning standardises training in all EU, offering the same material prepared by professionals who can be in different countries, and facilitating its updating. E-learning also favours student/professional relationship and experts in the EU. On the other hand, RP e-learning allows simulations and practical exercises without ionising radiation exposures, which contributes to promote the ALARA criteria. Therefore e-learning could be used to develop RP courses offering high quality material and relevant education tools. Depending on the level, specialization, responsibility and type of training (initial, continuous, etc) of a particular RP teaching, e-learning can be a solution, offered as a self-learning with a basic communication tool or as a more complete teaching based on a combination of both presence and distance learning.
An evaluation of the e-learning educational methodologies and existing e-learning platforms has been carried out. As an example of the e-learning potentialities, an e-learning pilot session focussed on "Basics of Nuclear Physics and Radioactivity" and “Interaction of Radiation with Matter” was developed with the MOODLE platform, in collaboration with the isRP (international school for Radiological Protection) of the Belgian nuclear research centre SCK•CEN. The methodology selected is based on a high quality material, a high level of motivation stressed on the communication tools and a continuous tracking of the student performance through exercises and evaluations. These modules are available and can be used in the organisation of a European training course or the academic master in RP.

The pro's and con's of e-learning vary depending on program goals, target audience and organizational infrastructure and culture. But it is unarguable that e-learning is rapidly growing as form of training delivery and most are finding that the clear benefits to e-learning will guarantee it a role in their overall learning strategy. E-learning and distance learning can, together with the traditional learning methods, contribute to the ideal mixture called "blended" learning.

4. ENETRAP training scheme

One of the two ultimate deliverables of the ENETRAP project is the design of a revised European Radiation Protection Course, meeting the training needs of the European RPE's. Based on the results and recommendations of the ENETRAP work packages 2 through 6, the so-called ENETRAP training scheme will be developed. A preliminary programme uses a modular approach and puts forward 2 parts : a common basis, to be followed by all participants (students and professionals) and a series of specialized modules on occupational radiation protection in nuclear power plants and fuel cycle industry, the medical sector, non-nuclear industry and research laboratories, waste and disposal sites, etc… a complete programme includes the basic modules plus at least one specialized module. The "theoretical" program needs to be extended by an OJT period and the possibility to follow (parts of) the modules via e-learning needs to be implemented. ENETRAP also strongly suggests to cooperate with European expert networks such as EURADOS and the ALARA network who are willing to "foster" the chapters dealing with their specific competences. The final program needs to be developed in such a way that it gives a common basis which meets as much as possible all national regulations and thus will receive a recognition from the participating European countries. Standardized material should be provided. Also, an overlap with some modules of the EMRP is envisaged. It is aimed for to finalise the programme of the ENETRAP training scheme by mid 2007 and start with a pilot session in autumn 2007.

5. European Master in Radiation Protection

The second mail deliverable of the ENETRAP project was the establishment of a consortium of universities to start a European Master in Radiation Protection. The ERASMUS proposal of the EMRP is supported by the EC DG EDUC. Partners in this EMRP project are the universities UJF, NHC and the Technical University of Prague, the fourth partner is the INSTN. The first edition of the EMRP is foreseen in September 2008.

6. Conclusion

In total 10 partners are joined in this project. It is our belief that the development of a common European radiation protection and safety culture and, based on that, the mutual recognition of radiation protection courses and the acquired competencies of radiation protection experts is a real need. The harmonization of E&T is a requisite starting point and will furthermore help and promote the mobility of workers and students throughout the European countries.

ENETRAP is a study programme, with the aim to gather information on several key-issues with regard to E&T in RP. The results of the ENETRAP project will be transferred to the umbrella organization EUTERP, which was launched in April 2006. The main objectives of this Platform are to better integrate education and training into occupational radiation protection infrastructures in the Member, Candidate and Associated States of the European Union, to facilitate the transnational access to vocational education and training infrastructures, to harmonise the criteria and qualifications for and mutual recognition of RPEs and to remove obstacles for the mobility of these experts within the European Union.

The collaboration from almost all European countries to the ENETRAP questionnaire and the positive response to the first EUTERP workshop confirm the European need and interest to a harmonized approach of E&T in RP in all domains where ionising radiation is used.

Acknowledgements

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[4] ETRAP conference declaration: www.etrap.net