Development and application of a mechanism for the evaluation of training providers

IH van Elsäcker-Degenaar[1], FS Draaisma[1], M Sutmuller[1], PGR Ruiter[1], J Stewart[2], P Livolsi[3], E Fantuzzi[4], S Möbius[5], PP d Regge[6], JP Vaz[7], M Ceclan[8]

[1] Radiation and Environment, Nuclear Research and consultancy Group (NRG), P.O. Box 25, 1755 ZG Petten – the Netherlands
[2] Radiation Protection Division, Health Protection Agency (HPA), Hospital Lane, Cookridge, Leeds, LS16 6RW – UK
[3] Institut National des Sciences et Techniques Nucléaires, CEA/INSTN, 17 rue des martyrs 38054 Grenoble Cedex 9 - France
[4] ENEA Radiation Protection Institute, Via dei Coli, 16, Bologna - Italy
[5] Karlsruhe Institute of Technology (KIT-FzK), Weberstrasse 5, Karlsruhe, 76133, Germany
[6] ENEN Association, 91191 Gif-sur-Yvette, France
[7] ITN, Radiological Protection and Safety Unit, Estrada Nacional 10, 2686-953 Sacavém – PORTUGAL
[8] Polytechnica University of Bucharest (PUB), Splaiul Independentei 313, Bucharest 0600042, Romania

ABSTRACT

To maintain a high level of competence in Europe regarding radiation protection and to facilitate harmonisation and (mutual) recognition of Radiation Protection Experts (RPEs) and Officers (RPOs) quality assurance and quality control procedures play an important role. The European Network for Education and Training in Radiation Protection II (ENETRAPII) project (FP7-EURATOM) aims at developing European high-quality 'reference standards' and good practices for education and training in radiation protection. In Work Package 5 (WP5) the quality issue is addressed. Therefore, WP5 deals with the development and application of mechanisms for the evaluation of training material, training events and training providers by means of a transparent and objective methodology. The results can be used by regulatory authorities to benchmark their national radiation protection training programme and will be communicated to other networks, e.g. EUTERP. This paper addresses the methodology and quality assurance protocol for the comparison and evaluation of training providers.

With the proposed comparison methodology we encourage to have a "good practice" standard amongst training providers. Apart from that it is encouraged to adopt the reference standards and provide an indication to customers, employers etc. where appropriate training can be obtained.

The comparison methodology exists of sixteen requirements on which training providers can 'score'. The sixteen subjects are the most important subjects in the quality assurance of training providers. With the descriptive system (fulfilled, not fulfilled) one can evaluate a training provider against a standard.

Keywords
Mobility, evaluation, training, provider, quality

1 Introduction

Today's challenge in the field of radiation protection involves measures to make the work in radiation protection more attractive for young people and to provide attractive career opportunities. In addition, young students and professionals should be supported in their need to gain and maintain high level knowledge in radiation protection. These objectives can be reached by the development and implementation of a high-quality European standard for initial education and continuous professional development for Radiation Protection Experts (RPEs) and Radiation Protection Officers (RPOs).

The FP7 project European Network for Education and Training in Radiation Protection II (ENETRAPII) is a specific tool for EURATOM policy for E&T implementation in the radiation protection field. For the purpose of this project the Radiation Protection Expert can be defined as:
"An individual having the knowledge, training and experience needed to give radiation protection advice in order to ensure effective protection of individuals, whose capacity to act is recognized by the competent authorities."
and the Radiation Protection Officer as:
"An individual technically competent in radiation protection matters relevant for a given type of practice who is designated by the registrant or licensee to oversee the application of the requirement of the Standards".
These are the definitions as proposed during the second EUTERP workshop in Lithuania in 2008. These definitions became part of the draft EURATOM BSS directive [1].

Within Europe there is free transportation of good, material and persons. Therefore one can choose to follow their education and training across Europe instead of in their own country. When one wants to follow a course or training one wants to know which training provider is most suitable. One of the criteria to choose amongst the available providers is to look at the quality assurance.
In this paper the methodology and quality assurance protocol for the evaluation of training provider is presented. The protocol can be used for training providers that give vocational education and training in radiation protection on different levels, given as independent courses or as a component of professional education. When the tool is used shortcomings in the quality of training providers become clear.

1.1 Boundary conditions for the comparison of training providers

Three boundary conditions were set to build an evaluation system for training providers. These boundary conditions are given and explained below.

- An evaluation system of training providers cannot lead to the conclusion good / bad provider. It will be only an evaluation of quality criteria.
- The evaluation system will not be time consuming.
- The evaluation mechanism will not oblige a standard with an obligated auditing system, like ISO/IEC 17024:2003.

2 A mechanism for the evaluation of training providers

The comparison methodology has as main goal to try and encourage training providers to settle to a "good practice" standard. Apart from that it is encouraged to adopt these standards and provide an indication to customers, employers etc. where appropriate training can be obtained. To know which standards are already available a survey has been done amongst a few known quality standards and systems.

Within Europe there are different quality assurance systems for vocational education and training. There are international standards like ISO 9001, ISO/IEC 17024 [2], a system recommended by the European Commission (EQAVET [3]) and some national, regional or field quality assurance systems. The mentioned quality systems are reviewed below.

2.1 Standard from the International Organization for Standardization

The International Organization for Standardization (ISO) was established in 1947 and is (currently) an association of 162 members, where each represents its own country. ISO employs a system of Technical Committees, Sub-committees and Working Groups to develop International Standards. Besides the National Standards Bodies, ISO permits other international organizations that develop standards to participate in its work, by accepting them as Liaison members. ISO works in accordance with an agreed set of rules of procedure, the *ISO/IEC Directives*, which also include requirements on the presentation of standards.
Standards for the same subjects were developed in different countries around the world. Since doing business becomes more international, it is decided to have an international institute for standards. On different subjects and fields the ISO provides publications ('standards') to make mutual comparison easier. Another objective is that when companies use an ISO standard, customers know which minimum requirements the company has to meet to get an ISO certificate.
The company or training provider can ask to be audited on the standard when a company or training provider fulfils all requirements. When the audit is positive, the company or training provider gets a certificate. Each few years the training provider has to be re-audited to keep the certificate.

2.1.1 ISO 9001:2008

ISO 9001 specifies the basic requirements for a quality management system (QMS) that an organization must demonstrate in its ability to consistently provide products (which include services) that enhance customer satisfaction and meet applicable statutory and regulatory requirements. There are approximately 25 documents in the collection altogether, with new or revised documents being developed on an on-going basis.
The ISO 9001 standard is a member of the ISO 9000 family. The ISO 9000 standards are a collection of formal International Standards, Technical Specifications, Technical Reports, Handbooks and web based documents on Quality Management. The standard can be used for certification/registration and contractual purposes by organizations seeking recognition of their quality management system.

2.1.2 ISO/IEC 17024:2003

ISO/IEC 17024:2003 [2] specifies requirements for a body certifying persons against specific requirements, including the development and maintenance of a certification scheme for personnel.
Since training providers are certification bodies for the RPE, RPO and the Radiation Worker (RW), the publication can be seen as a guide. The issues that ISO 17024 tackles can be summarized as:

- Defining what you are examining (the competencies[1])
- Knowledge, skills and personal attributes
- Examination must be independent
- Examination must be a valid test of competence

The publication gives 25 requirements on certification bodies, 6 requirements for the employees of the certification bodies and 16 requirements on the certification process. Some of these requirements are split into sub requirements.

2.2 EQAVET

EQAVET is an acronym for the European Quality Assurance in Vocational Education and Training (EQAVET). EQAVET [3] brings together the EU Member States, the Social Partners and the European Commission to develop and improve quality assurance in European VET systems within the

[1] Where competency is typically described as: "The demonstrated ability to apply knowledge, skills and attitudes"

context of the implementation of the European Quality Assurance Reference Framework. (Reference Framework) This reference Framework is designed to promote better vocational education and training by providing authorities with common tools for the management of quality. The Reference Framework forms part of a series of European initiatives which aim is to recognize qualifications and competencies received by learners across different countries or learning environments, thereby promoting modernization, mutual trust and mobility in vocational education and training (VET). Developed by Member States in cooperation with the European Commission, the Reference Framework has now been adopted by the European Parliament and the Council. It is a key element in the follow-up of the Copenhagen Declaration and the on-going work in renewing Europe's education and training systems. The adoption and implementation of the Framework in the participating countries is voluntary.
Working group 1 has been working on the development of guidelines for the introduction and monitoring of a quality system. Phase 1 (2010-2011) focuses on developing guidelines at the system level that support National Reference Points in implementing the EQAVET Reference Framework and its quality cycle of indicative descriptors and indicators. It offers a wide range of case studies illustrating national practices in relation to implementing aspects of the EQAVET Reference Framework. An interactive on-line resource was produced as a result of Phase 1.
This online tool uses indicative descriptors for each part of the cycle and informs how to build a quality system, but does not treat the subjects that have to be described in the quality system. A lot of examples are given for a lot of Member States of the European Union in the different stages of the cycle, mostly about the VET of pupils between 5 and 18 years.

2.3 National, regional or field quality assurance systems

2.3.1 Dutch system

At the moment there is no mandatory quality assurance system for the Dutch training providers. The Dutch training providers in radiation protection must be acknowledged by the Regulatory Authority for each level of training they give in radiation protection. When asking to be acknowledged they have to submit their training programme, training material, learning objectives and exam regulations.
In 1984 the Regulatory Authority wrote down the learning subjects, which have to be taught in the different courses, but the quality criteria are never written down. The Regulatory Authority will change the law in which the education and training of RPEs and RPOs is addressed, probably in 2012 or 2013. Therefore in 2010 quality criteria were drawn up by the training providers themselves, but still have to be approved by the Regulatory Authority.
The fourteen requirements are organized in three categories:

- General criteria and criteria concerning the content of a course
- Organizational criteria
- Criteria for courses and refresher courses with examination

2.3.2 French quality system

The French quality system for the training of the RPEs is quite strict. First of all, a ministerial order [4] specifies the requirements on the training of the RPE, as well as its contents, defining three sectors of work:

- the medical sector;
- the nuclear sector related to nuclear power plants;
- the industry and research sector related to the other establishments.

The trainer in the education and training program of the RPE has to be certified by an accredited organism (CEFRI), as described in [5].

2.3.3 Qualitätsverbund Strahlenschutzkursstätten in Germany

In Germany several ministerial guidelines specify the necessary competence in radiation protection in terms of knowledge and skills in the different working areas. Included are the learning objectives,

minimum time duration, minimum practical part, assessment and requirements for training providers, see [7]. The training events have to be acknowledged by the regulatory authority by submitting a detailed programme, training materials and qualification of lecturers.
About twelve radiation protection training providers have joined the Qualitätsverbund Strahlenschutzkursstätten, which is in English: Quality Association for Training Course providers in Radiation Protection. This association surveys the correct implementation of the guidelines and promotes a quality assurance system through mutual audits. All their members are either accredited or follow ISO standards.
Each institute has its own quality handbook, but the minimum requirement for the training providers is to have a registration of ISO 9001.

2.4 Discussion of the existing quality criteria standards

The ISO standard 9001:2008 is useful for the description of general management systems and can also be used for the traceability of documents, like training material, exam results, etc. It is not a suitable tool to use for the comparison and quality assurance of training providers, since it has too many requirements and is also not detailed enough in the description of specific requirements for the quality training providers.
The ISO/IEC standard 17024:2003 describes a lot of specific requirements for training providers. All together it consists of 47 main requirements, almost all subdivided. These requirements can be used to compare the quality of training providers, but it takes a lot of time to fill out the form.
The EQAVET project has no real requirements for vocational education and training in an occupational field, but is concentrated at primary education up to university.
The Dutch system has no quality requirements at the moment, but there is a document with quality criteria that will be formalized in near future. This document consists of a fourteen requirements that has to be met by a training provider. For the three categories the requirements represent the most important matters in the field of the quality of a training provider.
The French system is very strict and gives a lot of information about the learning objectives to be taught in the training of an RPE. The requirements for the trainer are described, but the requirements of a training institute are not described.
The German system provides requirements for training providers and training courses to be acknowledged. Most recognized training providers are associated as Qualitätsverbund Strahlenschutzkursstätten which surveys the implementation of the guidelines and oblige its members to follow a fixed quality system.
After consultation the WP5 partners the conclusion was that some of the quality criteria were not clear and that others were not appropriate. All quality criteria were rephrased according to the comments received. This has led to the final list of sixteen quality criteria, which are explained in XXX.

3 Testing the developed mechanism for the evaluation of training providers

The evaluation system for training providers consists of two parts. One part is a list of quality criteria that training evaluators should meet (appendix). The other part is a tool for the evaluation of the quality criteria. The evaluation of training providers uses the descriptive system as can be found in Table 1.

Table 1 Descriptors whether the quality criteria for training providers are met.

Descriptor	Description
+	Fulfilled
-	Not fulfilled

The list with quality criteria was sent to all WP5 partners. At this time it was not needed to give proof that the criteria were met.
Six training providers filled in the table for the evaluation, as can be seen for some criteria in Table 2.

Table 2 An excerpt from the filled in list of quality criteria.

Training provider →	A	B	C	D	E	F	ENETRAPII
7. Teachers and practical tutors have demonstrable competences with regard to the topic of their lessons.	no	no	yes	yes	yes	yes	yes
9. Each event is subject of a written evaluation by the participants. Items for evaluations are organisation, teachers, content, materials and facilities.	no	yes	yes	yes	yes	yes	yes
11. Complaint procedures are present.	no	yes	yes	no	yes	yes	yes
12. There is a participant registration associated with a document control system (list of participants, score lists, archive of distributed diplomas and certificates).	no	yes	yes	yes	yes	yes	yes

The quality criterion of the standard set by the WP5 partners (last column, ENETRAPII) is met, if the descriptor is at least the same as that in the last column or higher, i.e. in this case the descriptor has to be yes. The descriptor of the ENETRAPII column is yes, because we defined these quality criteria to be important.
If using other quality criteria it is possible that the criterion used is not preferred by the ENETRAP. In that case the descriptor in the column of ENETRAPII is no. Than the criterion is met, when in the column of the comparing provider is yes or no.
For all providers it was concluded, by comparing the descriptors of the providers with the defined quality criteria, that there are some shortcomings. All providers meet about fourteen of the final sixteen quality criteria (Table 2 only shows four of the criteria). Some of the providers stated that much of the quality system was not written down, but however was functioning informally.

3.1 Self-assessment

The evaluations showed that the proposed mechanism is very useful instruments. To make the evaluation as efficient as possible, we suggest performing the mechanism as a self-assessment. However we than have to take into account that one can fill in the list arbitrarily or choose the wrong descriptor.
Self-assessment cannot be done without a certain random auditing of an independent organisation or institute. This organisation can randomly, depending on the time available, judge whether the description of the quality criteria is carried out at the right way and if there is a certain conformity.
The organisation should exist of different education and training experts in radiation protection, mastering different languages to understand the content of the training material or the training course. Since the consequence of this auditing is far-reaching one should not do this task as a volunteer, but one needs to be assigned to carry out this task.

4 Conclusion and discussion

Quality criteria are defined by the WP5 partners. The list takes not much effort to fill in. The descriptive system can be used to evaluate training partners. Shortcomings can be noticed and given back by an assessment team to the training provider.
Point for discussion is the self-assessment.

5 Acknowledgement

This research was carried out under the 7th framework program of the European Union, number 232620.

6 References

[1] Draft EURATOM Basic safety standards directive, Version 24 February 2010, final.
[2] NEN-EN-ISO/IEC 17024:2003, IDT; Conformity assessment-General requirements for bodies operating certification of persons, June 2003.
[3] EQAVET; http://www.eqavet.eu/gns/about-eqavet/welcome.aspx
[4] Arrêté du 26 octobre 2005 relatif aux modalités de formation de la personne compétente en radioprotection et de certification du formateur; Journal official de la République Française; Paris; 23-11-2005.
[5] Procédure générale de vérification de formateurs de la personne compétente en radioprotection; CEFRI/PRO-C-0318 indice 2; CEFRI; Paris; 2006.
[6] WP4: 1st interim report, July 2011, Define requirements and methodology for recognition of RPEs; P. Livolsi; CEA / INSTN France; 2011.
[7] Richtlinie über die im Strahlenschutz erforderliche Fachkunde vom 18.06.2004, GMBl. 2004, Nr. 40/41, S. 799 und GMBl. 2006, Nr. 38, S.735.
[8] ECVET; http://www.ecvet-team.eu/

Appendix Final quality criteria

General criteria and criteria concerning the content of a course

1. Each course or refresher course formulates its learning outcomes on the level of knowledge, skills and attitude. The learning outcomes are level or target group focused.

The definition of learning outcomes is: “Learning outcomes are statements of what a learner knows, understands and is able to do on completion of a learning process”. These Learning Outcomes are defined in terms of knowledge, skills and competence (as within ECVET [8]).
Learning outcomes are the basis of all education. Before one starts with designing a course or training the learning outcomes should be clear. Learning outcomes can be defined as proposed in WD 4.1 [6].
A course can be targeted for a special public, e.g. reactor operators. Learning outcomes have to be focused on this public. This implies that for each public one can have different learning outcomes.

2. The courses should reflect the requirements of national legislation.

Everybody should obey the law in a country. If there are requirements stated in European or national legislation, a training institution should meet them.

3. For each course a program with table of lessons, subjects, teachers and methods is available.

For all stakeholders in the education and training process it should be clear which lessons and subjects are trained in which course. Some future candidates prefer one trainer over the other, as well as one method (theoretical course, practical course, workgroup, and discussion sessions) over the other. So for the stakeholder the information described is important in the process of choosing the right event.

4. The responsibility with regard to the course is in the hands of a person whose competence level on radiation protection is at least equivalent to the level that has to be achieved by the course.

The content of the course should be well defined and well-tuned. To oversee the content of the course and fine tune the subjects, the responsible person should have enough competence to oversee the content of the course.

5. The content of the course program is kept under review, so that learning outcomes are always appropriate. This review includes consideration of didactic methods, new scientific insights, adapted legislation.

Before the preparation of each course or training one should reflect whether the content of the course should be updated. Are there new recommendations? Is there new legislation? Is another educational method more suitable than the one earlier used?

6. The content of a course should match reference syllabi drawn up for Europe, at least for RPO/RPE courses. Where appropriate the requirements of a learning agreement as meant in ECVET [8] must be considered.

Within the ENETRAPII project training schedules are developed for RPO (WP 3) and RPE (WP 4). The content of the training for an RPO/RPE should match these training schedules, otherwise the course and the provider cannot meet this criterion.
Agreement about the content of a course and the learning outcomes is laid down in a learning agreement between the training provider and the employer of the participant or between the training provider and the learning centre where the participant originates from.

7. Teachers and practical tutors have demonstrable competences with regard to the topic of their lessons.

When teaching or tutoring a subject, one should have enough knowledge and skills to pass on their knowledge/skills to the participants.

Organizational criteria

8. The management of the training provider is involved in the quality assurance and provides the necessary interest, support and resources.

Quality cannot be an issue of the course director or training provider alone, but should be embedded in its organisation and at least be supported by its management. When problems arise the management should support the training provider and give resources to solve the problem.

9. Each event is subject of a written evaluation by the participants. Items for evaluations are organisation, teachers, content, materials and facilities.

One of the important subjects in quality is the reviewing. In this criterion the review is carried out by the participants. To show what should be subject of a good evaluation some items are mandatory.

10. The system of evaluation should be stable to achieve continual improvements.

For quality one needs more than reviewing alone. There has to be a cycle of reviewing, deciding for an improvement proposal, implementation of the proposal, testing the implemented objects and reviewing again.

11. Complaint procedures are present.

A participant or its employer has the right to complain about a training / course. In a complaint procedure is written down how to deal with a complaint.

12. There is a participant registration associated with a document control system (list of participants, score lists, archive of distributed diplomas and certificates).

Participants sometimes lose their certificate for a lot of reasons. They ask a copy of their certificates at the training institute. The training institute has to assure that a copy of the certificate is given to a person who has passed all requirements.

13. The identity of the participant is determined before the distribution of diplomas or certificates of participation. The course provider is responsible for distribution of the diploma or certificate to the right person.

To be sure that the requirements are passed by the person the certificate is given to. To be sure one has to determine the identity of the participant.

Criteria for courses and refresher courses with examination

14. There is an examination regulation, describing at least the exam procedure, marking scheme, the marking procedure.

The way of examination has to be written down in a procedure, describing whether the examination is practical or written. Another consideration is which learning outcomes to test in an examination. In advance of the exam (course or training) the number of supervisors during the exam, the number of correctors (e.g. 2 correctors, blind correction), as well as minimum grade to pass the exam should be known.

15. There is a procedure to maintain the quality of the examination.

The questions in a written or practical examination are periodically reviewed, whether they are clear for participants. This can for instance be done with a statistical review of a multiple choice examination.

16. The examination methodology should take into account the learning outcomes and the national regulations properly.

The goal of the course or training is laid down in written learning outcomes. The examination should be about the learning outcomes. If the examination methodology is prescribed in European or national legislation, this should be followed (e.g. number of questions, written exam, etc.)