THE IRPA GUIDANCE ON CERTIFICATION OF A RADIATION PROTECTION EXPERT

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ABSTRACT

One of the major goals of the International Radiation Protection Association (IRPA) is 'to promote excellence in radiation protection professionals'. In line with this goal, many of IRPA's Associate Societies (AS) are actively involved in schemes which assess and certify the competence of individual radiation protection practitioners to undertake safety-related work. There is also a growing pressure, largely from a regulatory perspective, to enhance this approach, and several AS are considering introducing such schemes in the future. The move towards a more formalised approach to the certification of radiation protection expertise is evidenced through the most recent updates of both the IAEA and the European Basic Safety Standards. Both place great emphasis on the appointment of a professional-level person having the knowledge, skills and competences through training and experience needed to give radiation protection advice in order to ensure the effective protection of individuals, and whose competence in this respect is recognised by the competent authority. Sensitive to this need, IRPA created a Working Group to develop a guidance document on the development and implementation of a certification process for a Radiation Protection Expert (RPE), which was finally published in 2016.

Key attributes discussed in the Guidance document are: the certification scheme management and governance; the scope of the role to be certified; the main requirements for certification of an RPE in terms of knowledge and skills, minimum educational and experience requirements, competences to be assessed and assessment methods; renewals of certifications and continued professional development for a period of years; code of conduct consistent with the IRPA Code of Conduct; appeals, disciplinary aspects or withdrawal of certification; insurance cover; accreditation of the program by an appropriate accrediting organization; and reciprocity to RPEs certified in another scheme. The document is complemented by several annexes containing the relevant aspects of the IAEA and EU Basic Safety Standards; the IRPA Definition of RPE; a model of RPE knowledge and skills syllabus; the RPE training scheme from the ENETRAP projects; the IRPA Code of Practice; some accreditation standards for certification boards and several examples of certification schemes from up to ten countries provided by their respective AS.

1. Introduction

One of the major goals of the International Radiation Protection Association (IRPA) is 'to promote excellence in radiation protection professionals'. It is essential that radiation protection practitioners at all levels are appropriately equipped in terms of knowledge, skills, competences, and experience to discharge their responsibilities and ensure safety.
In line with this goal, in October 2011 IRPA created a Working Group (see table 1) with the objectives of: (1) reviewing the various certification processes being used by the IRPA's Associate Societies (AS) and their respective countries and (2) developing a draft document of guiding principles for the development and implementation of such a certification process. The guidance document would be applicable internationally and useful to IRPA AS that would like to initiate such a certification process or improve an existing process in their countries.
The work was done mainly by e-mail, with only meeting during the IRPA Regional European Congress in June 2014. After a fist draft document, mainly based on UK, USA and Canadian certification schemes, it was decided to get input from a larger base, and all AS were asked to participate in a survey in 2014, with 36 replies received. After reviewing the survey conclusions, a second draft document was prepared and distributed for comments; it was presented and discussed at the IRPA International Congress in Cape Town (May 2016) and the final IRPA Guidance on Certification of a Radiation Protection Expert [1] (see fig. 1) was released after endorsement by the IRPA Executive Council in November 2016.

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Table 1. Members of the IRPA Working Group on Certification

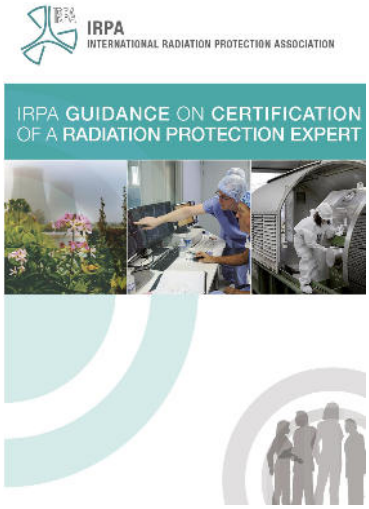

Fig. 1. Cover page of the IRPA Guidance on Certification of a Radiation Protection Expert [1]

Experience has shown that there is no common, unique 'best practice' approach to the certification of expertise. Existing schemes differ in many dimensions –for example in scope of application, knowledge and experience requirements and assessment methods– in part due to the need for alignment with national regulatory requirements and also due to established regional/national practices. The objective of the IRPA Guidance is not to offer a single template of how to establish a certification scheme, but rather to explore and describe the different options and approaches, to identify their respective strengths and weaknesses, and to outline the key considerations which must be taken into account when introducing and establishing such schemes.
In the following sections, an overview of the main aspects of the IRPA Guidance document [1] is included, following the same scheme of the document.

2. Underpinning basis of a certification scheme

Historically, many certification schemes have been established on the responsibility of the profession itself, through an AS acting as a professional body recognising the need to ensure and protect professional standards in radiation protection. This has also served to provide a service to employers to help give them the confidence that key employees have been judged by their peers as having appropriate knowledge, skills, competences and experience to undertake safety-related tasks.
In some cases, such schemes have directly supported a regulatory requirement for employers to have competent employees nominated for specific key roles. This has often involved employers having to provide the regulator with the name of specific employees covering identified roles, following which the regulator has the option of refusing to accept such a nomination if it sees fit. Schemes for the certification of competence operated by AS (and other parties) on a voluntary basis have made a great contribution to giving both employers and regulators confidence in the qualities of individual practitioners.
However, increasingly there is a trend (as outlined in the next section) for a more formal approach to certification, whereby the regulatory body is required to ensure that persons undertaking specific key radiation safety roles have been assessed and certified as competent by an approved scheme. Such an approved scheme could either be directly under the control of the regulatory body, or operated by a non-governmental organization, such as an AS, under an approval from the regulatory body. The advent of this trend and direction is leading to many AS considering the need to develop such a certification scheme, and hence the timeliness of this IRPA Guidance.

3. The international regulatory background

The move towards a more formalised approach to the certification of radiation protection expertise is evidenced through the most recent editions of both the IAEA Basic Safety Standards [2] and the European Basic Safety Standards [3]. Both place great emphasis on the appointment of a professional-level person having the knowledge, skills and competences through training and experience needed to give radiation protection advice in order to ensure the effective protection of individuals, and whose competence in this respect is recognised by the competent authority. Under the IAEA BSS this role is termed a **Qualified Expert** (QE), and the EU BSS uses the term **Radiation Protection Expert** (RPE).
This role has been recognised for many years within the profession as a key role for ensuring radiation safety. In 2008 IRPA proposed to the International Labour Organisation (ILO) that the role of RPE be formally registered under the ILO system for the International Standard Classification of Occupations (ISCO). This was agreed, with the RPE being registered within the group of Environmental and Occupational Health and Hygiene Professionals [4].
Under both the IAEA and the EU BSS there is a requirement for regulatory bodies to have a system for the formal recognition of the competence of the QE/RPE. This is a new requirement for the IAEA BSS, although the previous EU BSS [5] had a similar provision which was newly introduced at that time. In practice, the rigour of application of this requirement by regulatory bodies has increased over time, moving from 'passive acceptance'

of nominations (e.g. refusing appointments by exception) towards the requirement for formal certification schemes.
Both the IAEA BSS [2] and the EU BSS [3] also require the appointment of a **Radiation Protection Officer** (RPO), who is technically competent in radiation protection matters to oversee, supervise or perform the implementation of the radiation protection arrangements. The BSS do not require any formal scheme for the recognition of competence for this role, although of course this is an option for national authorities or indeed for professional bodies such as the AS to pursue if they so choose.
Given the above international background, the prime focus for the formal recognition of competence within radiation protection is the professional role outlined above as QE/RPE. This role is the principal focus of the Guidance Document [1], in **which the term 'Radiation Protection Expert' (RPE) is used with a generic meaning**. Although it is possible, but much less common, to apply certification schemes to the different role of Radiation Protection Officer (RPO), this is not covered in any detail in the Guidance Document.

4. Key attributes of an RPE certification scheme

4.1 Scheme Management and Governance

An RPE Certification Scheme should be established as a specific legal entity. This could be as part of an AS, thereby using the AS as the established parent organisation, or as a separate body. The mechanism of appointing to the controlling Board of the scheme must be clear, as should be the scope of authority of that Board. The scheme must have formally defined procedures for applications, assessment and all related issues, including the appointment of assessors. In most schemes, assessors are volunteers who are themselves certified RPEs whose competence and experience is widely regarded by their peers.
When initially establishing a scheme it will not be possible to appoint persons who are already certified, but the first appointed assessors must be persons who are regarded as leaders in their field and who are widely respected by their peers. The requirement for fees covering application, renewal and annual registration (if appropriate) must be clearly defined.

4.2 Scope of the role to be certified

The first step in developing a scheme is to have a clear understanding and definition of the scope of the role being considered. There is much variation in current certification schemes, and the nature of the scope of the role is one of the key reasons for differences.

4.2.1 Radiation Protection Expert (RPE)

It is essential that the scope of the role to be covered aligns with any regulatory requirements, where they exist. If the scheme requires regulatory approval, it is quite likely that the regulator will have published requirements or guidance which the scheme must take into account. Where the scheme is voluntary, whether or not it indirectly supports a regulatory requirement for competent employees, it is good practice to discuss the development of the scheme with relevant regulatory bodies.
There are many approaches to the certification of RPEs, but in the main they can be considered in two categories as follows.

(a) Generic RPE Certification
(b) RPE Certification differentiated by Field of Application

Several existing certification schemes are based around giving certification limited to specific fields of application, for example: sealed sources, medical applications, nuclear power plants, other nuclear facilities, etc. Most such schemes recognise that there is a common core of knowledge, skills, competences and experience across all fields, but in this approach the assessment can focus on practical application in the specific field. Some schemes acknowledge that some fields are less complex and require less knowledge, skills, competences and experience than others – an example of a proportionate, graded approach to certification. The fields of application can even be grouped together and graded, for example as Level 1 to Level 4 as the complexity of the role increases. The output from such

schemes would take the form of a certificate clearly stating the field of application or the level of competence endorsed.
If the generic approach is adopted, there is a need to be able to ensure that a certified RPE is appropriate for a given practical situation. At a first level it seems that the generic scheme is simpler and may be more appropriate for those AS beginning their consideration of certification, especially for smaller societies and for countries with a limited range of applications. However, the importance of ensuring the 'suitability' of RPEs for their specific role must be addressed within the overall national framework.

4.2.2 Certification for other roles

Certification processes can be applied to roles in radiation protection other than that of the RPE. This would depend on the relevant legal requirements and on the perceived demand from professionals within the country. Options could include specialist roles at a professional level which support the work of the RPE, such as shielding assessor, criticality assessor, internal dosimetry specialist, instrumentation specialist, environmental modelling and assessment specialist. These roles could be regarded as 'narrow but deep', in the sense that there is a need for very specific technical knowledge, skills, competences and experience within a well-defined but relatively narrow field.
Certification could also be applied to the role of Radiation Protection Officer (RPO), especially if the regulatory body supports this approach.
The field of non-ionising radiation usually has a completely separate regulatory basis to ionising radiation, and the detailed nature of the hazards and controls is also different. However, the same issues regarding competence in advisers are relevant here, and there is also a growing regulatory interest in this approach. Therefore, schemes can be established on either a voluntary basis or, where there is clear regulatory role, a scheme could operate under regulatory approval.
For any such schemes, it would be necessary to apply the same approach and principles outlined in the Guidance.

4.3 Requirements for certification as an RPE

The objective is to ensure that there is a clear specification of the requirements so that a candidate knows what must be demonstrated to achieve certification, and that assessors have clear guidance on what is the acceptable standard. The requirements must take account of regulatory provisions and guidance, where these exist. Where the scheme is differentiated by field of application, then the requirements must be focused around each specified field, although it is likely that many basic requirements will be common across all fields.
There are four principal components to the requirements for certification – Knowledge, Skills, Competences and Experience.

4.3.1 Knowledge and skills

The first aspect to be considered is educational attainment. The RPE role is regarded as a college graduate-level appointment and profession, and as such a normal requirement would be a college degree, usually in science or engineering, including specialized fields such as radiation protection, medical physics or industrial hygiene. According to national approaches, this would normally be a three or four year degree course. Some current schemes may require a Master's or other postgraduate degree, and some may require specific radiation protection content. However, the intent of these additional requirements may alternatively be met by requirements for demonstrated knowledge and/or experience as below.
Whilst a college degree would be a normal requirement, it is important to consider whether to provide a route for non-graduates to achieve certification. If non-graduates are allowed to achieve certification, there needs to be compensatory measures identified, usually including enhanced experience requirements and demonstrated learning via other routes.
All schemes should have detailed requirements for radiation protection knowledge and skills. These would cover underpinning science, radiation protection philosophy and principles, management, organisation and practical application techniques and knowledge and skills of

applicable legislation and guidance. It can be helpful to specify the level of knowledge required, for example in terms of general awareness, basic understanding and detailed understanding. This allows the assessment process to be prioritised and graded.
One option is to specify specific examinable courses which must be attended and assessed. However, such courses do not always exist, and the approach may be unnecessarily restrictive given the alternative approach of a specified syllabus.

4.3.2 Competence

All certification schemes are ultimately aimed at ensuring that a successful candidate is able to act independently in all relevant practical situations and give authoritative and effective advice. Whilst this clearly requires a necessary level of knowledge and skills, as discussed above, there is also a need to be able to have confidence that the candidate is capable of applying this knowledge, skills and experience in real practical situations, making appropriate judgements, and that he/she can communicate effectively with, and influence, the organisation.
As such, providing evidence of examined courses covering the knowledge and skills requirement, plus evidence of working for a period of time in a relevant facility, is not in itself evidence of the capability to act in an independent and effective manner. This aspect of performance is often termed 'competence to act', or simply 'competence', and implies a step further than just knowledge, skills and experience. Assessment of competence is not straightforward, and is discussed in the next section, but this dimension is increasingly recognised by both regulators and professions as being a fundamental requirement. As an example, it is noted that both sets of BSS [2, 3] refer to 'competence' repeatedly, and the term is becoming increasingly common in national regulations.

4.3.3 Experience

It is self-evident that candidates for certification as an RPE must have relevant practical experience in at least the type of activities relevant to the role. A review of experience requirements within existing schemes shows a range from two to six years, and it is considered here that relevant experience over at least a three to five (3-5) year period would usually be acceptable. There is an interaction between length of experience and the type (or level) of experience. Where a significant part of the experience is of a limited or lower level nature, then longer time periods may be necessary. Because many years of the same experience does not necessarily add significantly to learning and competence, the candidate for certification should show progressively higher levels complexity over the experience period.
It would be possible to specify minimum timescales for experience which would be an absolute requirement for successful certification. Alternatively, the statement of experience requirement could be a guide as to how long it would take a good candidate to assemble the necessary evidence in order to satisfy the assessment regime of the necessary competence across all required areas.

4.4 **Assessment methods**

The certification scheme must define the processes for the assessments of candidates. Firstly, this would require a clear identification of what the candidate must submit, including whether there is a need for the candidate to attend for a written examination or interview. The process would also usually involve the engagement of at least two assessors from its Assessment Panel (or equivalent), chosen to have experience relevant to the candidate's field, who would be responsible for reviewing the candidate's overall submission.
Assessment processes can be considered against each of the four components identified in section 4.3 above.

4.4.1 Assessment of knowledge and skills

Educational attainment can be assessed by the provision of certificated evidence, for example degree certificates. There are several options for assessing radiation protection knowledge and skills:

- The most direct assessment route is a requirement to attend for a specific written examination. This approach results in a clear assessment of the candidate's knowledge and skills, although care must be taken in assembling the question set to ensure that the required range of knowledge and skills are tested, and that the 'pass' level is appropriately set. The approach is potentially quite resource-intensive in terms of examination development and marking.
- Candidates are asked to provide evidence of satisfactory completion of courses, which cumulatively cover the required scope of knowledge and skills. Ideally these courses would be examined, and where this is not the case some additional method of gaining confidence that the candidate has assimilated the knowledge and skills should be considered (see below).
    - Course content should be assessed and the course approved by the certifying organization or other cognizant authority preferably prior to submission as evidence of knowledge and skills.
    - The required scope of knowledge and skills should be defined.
- Candidates are asked to submit transcripts of their college education.

These approaches can be replaced or supplemented by the assessment of competence discussed below.

4.4.2 Assessment of Competence

This is perhaps the most challenging aspect of assessment, and there is a wide variation of approaches in existing certification schemes.

- Written examinations can be designed to make the applicant demonstrate their approach to specific practical situations. This extends the assessment of knowledge and skills towards the notion of competence.
- Testimonials from line managers/supervisors, and/or, certified RPEs familiar with the candidate's work performance can provide a third party view on competence to perform the role in real life situations.
- A requirement to submit a portfolio of evidence, taken from the practical work experience of the candidate, to demonstrate competence against each of the fundamental requirements of the scheme.
- A requirement to undertake an interview with a panel of assessors, who would directly explore the ability of the candidate to apply knowledge, skills and experience to practical situations.

There are clear advantages and disadvantages of each method and a combination of these assessment methods may also be used.

A written examination can be very objective, but it requires significant effort to develop and grade the questions. Testimonials can be very subjective and should not be used alone to determine competence. There is a considerable time commitment for the panellists to conduct thorough reviews of the candidates' background and to conduct in-depth interviews of the candidates. There is the very real possibility to introduce bias (social, political, personal) into the approval process. Traveling to the interview site may be difficult for geographically large countries or where the transportation infrastructure is not well developed.

4.4.3 Assessment of Experience

Every candidate must submit a comprehensive work history detailing relevant experience. The experience statement should be verified by an independent person, for example the employer, line manager of referee.

This should aim to provide a good picture of the length, depth and scope of each period of experience. A more detailed approach would be to require the candidate to provide a link from each section of experience to the detailed scope of requirements.

If the individual's responsibilities (and thus their experience) are specified by regulation based on their title/position (e.g., the RPE in an EU country), then evidence of holding this position could be used to demonstrate relevant experience.

4.5 Renewals

Most Certification Schemes have a renewal system, with a time-limited Certificate. Most re-certification processes are less onerous on the applicant than the original process. Options include:

- Requirement to demonstrate Continuing Professional Development for a period of years, on the order of 5, to show that the certificate holder has kept up-to-date their competence in appropriate legislation and technological advances in Radiation Protection.
- Requirement to state to the Assessing Body that appropriate Continuing Professional Development is being undertaken. A random sample of renewals is then audited.
- Re-assessment of competence – usually applied if the Certificate expires or the certificate holder fails an alternative renewal process.

4.6 Code of Conduct

Certificated RPEs must follow a Code of Conduct, linked to the IRPA Code of Ethics [7]. Particular emphasis should be given to the requirement that RPEs should not undertake professional obligations that they are not qualified, or do not believe themselves to be competent, to carry out (see section 4.2.1 above).

4.7 Appeals, Disciplinary Aspects, Withdrawal of Certification, Insurance Cover

Processes within the certification scheme should define mechanisms for candidates to appeal against decisions made by the scheme.

The possibility of disciplinary proceedings against certificated RPEs, including the withdrawal of a certificate, should be considered in the procedures, for example where there is a *prima facia* case that an RPE has not acted in accordance with the Code of Conduct or has repeatedly given inappropriate advice.

Consideration should also be given to the possibility of arranging insurance cover to protect the scheme from the costs of potential litigation.

4.8 Accreditation

Consideration should be given to review of the scheme by a third party accrediting organization. In an annex, the Guidance provides example accreditation standards in different countries. These standards also provide additional considerations albeit not specific to RPE certification.

4.9 Reciprocity

The scheme should take into consideration the RPE certification attained in another scheme, for example, attained in another nation or AS.

5. Conclusions

As noted above, there is an increasing need for certification schemes to meet both regulatory and professional expectations for the demonstration of expertise in radiation safety. Experience has shown that there is no common, unique ‘best practice’ approach to such certification. Existing schemes differ in many dimensions, for example in scope of application, knowledge, skills, competences and experience requirements and assessment methods. The objective of this IRPA Guidance Document is not to offer a single template of how to establish a certification scheme, but rather to explore and describe the different options and approaches, to identify their respective strengths and weaknesses, and to outline the key considerations which must be taken into account when introducing and establishing such schemes.

6. References

[1] IRPA Guidance on Certification of a Radiation Protection Expert. November 2016. (Available at the website: www.irpa.net).

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