

Stakeholder views on scientific competences needed for future university-trained postgraduates within the field of radiological protection

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Abstract

This paper describes the findings of a survey of European stakeholders that was undertaken to identify the nature and level of scientific competences needed for future university-trained postgraduates in the broad field of radiological protection. The study forms part of an EU programme, EURAC/ F160-CT-2003-508839, and will help inform recommendations for actions / initiate actions to be taken within the EU to help meet the postgraduate education needs identified. The views of a wide range of European stakeholders, including government authorities, industry, the research community and professional bodies, were canvassed using an e-mail questionnaire in conjunction with consultations through personal contact. Data was obtained from these on employment, training and research needs, in radiological protection. Early results indicate a sizeable future demand for personnel trained to Masters-level and beyond in radiochemistry, radioecology and radiation dosimetry. Over 75% of employers expressed some difficulty in recruiting appropriately trained individuals. Specific skills' gaps over the next 5 and 10 years have been identified. These will be discussed.

1. Introduction

A number of studies over the past five years, by different European governments, identified that probably too few scientists were being trained to meet the needs of their current and future nuclear industries, with decreased student interest, decreased course numbers, aging faculty members and aging facilities. Consequently, the European education skill base has become fragmented to a point where universities in most countries lack sufficient staff and equipment to provide education in all, but a few, nuclear areas. Of particular concern appeared to be special skill-base deficits within nuclear radiological protection, radioecology and radiochemistry at masters and doctorate levels.

The EURAC Project is consultative/consensual and aims to assess the current and potential levels of postgraduate provision in selected linked disciplines associated with radiological protection and radioecological competence within universities and other higher education institutes (HEIs) of the EU and new entrant nations in the context of demand. Based on consultations with European stakeholders EURAC will propose those actions that could be taken by European Institutions and relevant organisations in Member States to secure the future of nuclear radiological protection, radiochemistry, and radioecology postgraduate education in an expanded EU.

The objective of the work package presented here is to identify the scientific competence needed for future university-trained postgraduates, at masters- and doctorate-level, within radiological protection, radioecology and radiochemistry through the involvement of key European stakeholders.

2. Methodology

The survey methodology was as follows:

1. Review of existing literature
2. Creation of agreed questionnaire framework for use by all partners
3. Identification of key stakeholders by partners
4. Phase one survey of stakeholders through e-mail questionnaire
5. Consultation of stakeholders through face-to-face networking and/or telephone dialogue

6. Follow up to questionnaire responses through telephone dialogue
7. Compilation of data into a summary spreadsheet
8. Presentation of broad findings at partner meeting
9. Agreed criteria for analysis and clustering of data
10. Analysis and reporting of survey

3. Results

A total of 72 formal questionnaire responses were received from 18 European countries. The division of the respondents among the different sectors was as follows: 29 respondents from government bodies, 20 from research institutes, 21 from the industry and 2 from other organisations. The majority of respondents employed nuclear-trained staff, and undertook training programmes for their staff. Over three-quarters engaged in research.

The stakeholders were asked to indicate the approximate numbers of new recruits per annum for positions at different professional levels: manager, technical advisor, professional expert or other (Table 1). The numbers to be recruited per annum per company vary from less than 1 to greater than 20, depending on the size and remit of the company or organisation, with a total of 253 among the 72 respondents. Two-thirds indicated that at least masters-level qualification were required for recruitment of professional experts, while over half required masters-level qualifications for technical advisors.

Professional level	Total recruited annually (in fte)	Percentage of employers that required \geq MSc level
Manager	13	80 %
Professional expert	103	70 %
Technical advisor	59	50 %
Other	78	40 %
Total	253	

Table 1. Total numbers of staff recruited annually in radiological protection (in full time equivalents (fte)) and education requirements at each professional level

In addition, the stakeholders were asked to tick all areas of specialisation that are of interest to them. Figure 1 clearly indicates that radiation dosimetry and radiochemistry are in high demand. Areas of expertise preferred for recruitment showed some sectoral differences: radiochemistry, radioecology, radiation dosimetry and environmental modelling were the subjects that received the most interest from both government organisations and research institutes, while industrial respondents showed interest mostly in recruiting specialists in radiochemistry and radiation dosimetry. It should be noted that the majority of industrial respondents were power generation companies. A particularly interesting finding from the survey was the apparent difficulty that most respondents indicated they had in recruiting the right people. Over half of the respondents rated the recruitment difficulty at 4 or 5 on a scale from 1 to 5.

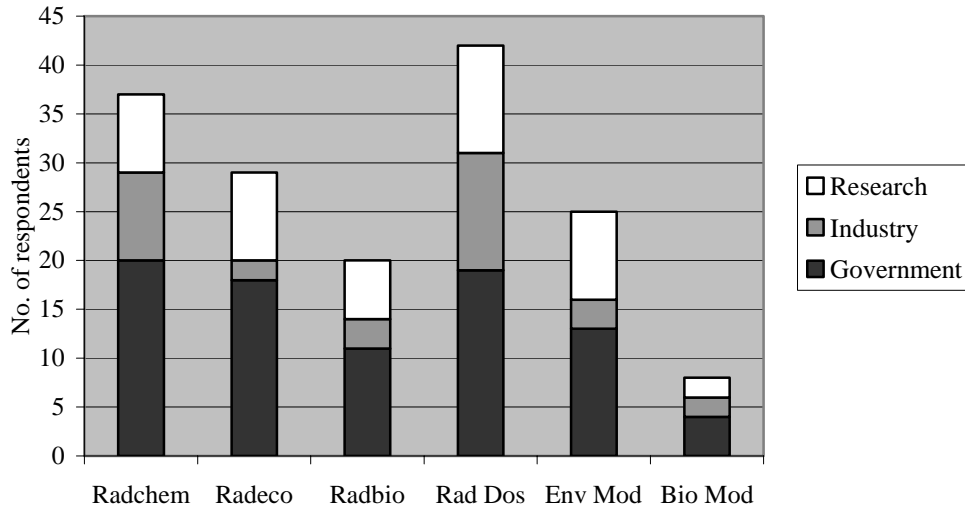


Figure 1. Areas of expertise preferred for recruits in radiological protection

The stakeholders were asked to identify in which particular skills further training was needed within their company. The responses show that technical (radiological protection) training was undertaken across all sectors and countries. In probing the provision of training outside the specific technical areas, analytical skills and project management skills were identified by nearly half of the respondents, while the government sector also shows interest in training in general, leadership, and language and writing skills (Figure 2).

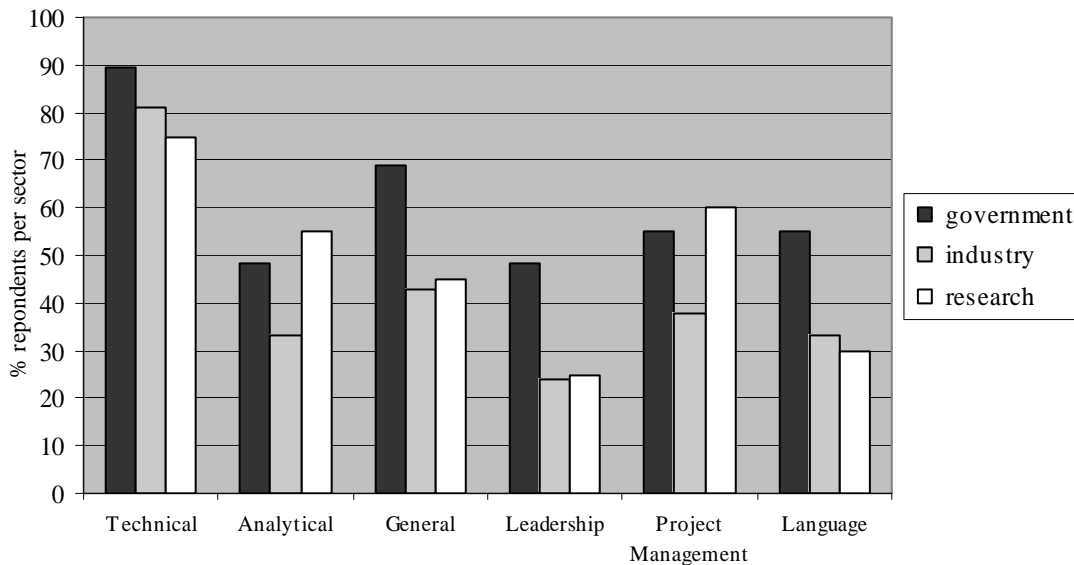


Figure 2. Training needs per sector

All but a few of the stakeholders indicated that they provide either in house training or send staff to training courses. Across all sectors company trainers from within the establishment are used most, but other types of training provision are also common, particularly in the government sector. Educational establishments are utilised by over 40 % of all respondents, across all sectors, but there is a clear regional preference for this type of training, with the Nordic and Baltic countries and Great Britain making more use of educational establishments than elsewhere in Europe. In terms of academic level of the training provided, over half of the respondents indicated that they provided training at masters-level and beyond.

The survey further attempted to identify specific training needs, both currently undertaken and gaps envisaged in the future. Current skills gaps were recognised by 19 respondents, gaps within the next 5

years by 26 respondents, and in the next 10 years by 9 respondents. A breakdown of the 'curriculum' areas that are currently addressed in training and/or identified as a future need are presented in Table 2. The four areas that are of most interest to the stakeholders both as current as well as future training needs are radiological protection, radiation dosimetry, radiochemistry and measurement and analysis.

Over three quarters of the respondents answered that they undertook or supported research in the area of radiological protection whilst 60% of the respondents indicated that they were actively involved in research training of students. Of those 60% of the organisations engaged in research training, 90% indicated that the research was done at masters- or doctorate-level. A third of respondents indicated that they were able to provide research facilities for students, and this applied across most countries but mainly in the government and research sectors. Over 40% of the respondents provided research projects and/or supervision of postgraduate students, and this applied across most countries and all sectors. The industry sector is mainly engaged in in-house research programmes and the provision and supervision to research students, while most of the financial support comes from the government sector. Financial support to students tends to be more prevalent in Northern Europe.

Training Subject Areas	Current Gaps			Future Gaps				Comments
	G	I	R	G	I	R	T	
Radiation Protection	13	3	6	3		4	29	Broadly
Radiochemistry		2	3	5	2	2	14	
Radiology	1	2	1	1			5	
Dosimetry	3	4	3	4	1	2	17	Mainly in Scandinavia
Radiobiology/Radioecology		1	2	4		2	9	
Environmental Awareness	1		1				2	
Environmental behaviour/modelling				2			2	Greater interest in NEN
Measurement and Analysis	4	1	3	4		2	14	
Emergency/Accident	3	2	1				6	
Radiation Physics	1	2	1				4	
Decommissioning	2			2	1		5	
Waste Management	2			3			5	
Risk	1		1				2	
H&S	6	1	1				8	
Safety Case Writing	1						1	
Leadership	1				2		3	
Project Management	3						3	
Legal	2	1	2				5	
Languages		1			1		2	
Technologies	1			1	2		4	
IT	2	2					4	
Geology				1			1	
General				1		1	2	

Table 2. Specifically identified training needs per sector. Sectors: G = Government, I = Industry, R = Research. T = Total.

4. Conclusions

The survey of European Stakeholders confirms that there is a significant latent and future need for personnel trained to masters-level and beyond in the broad area of radiological protection.

With regard to curriculum content for postgraduate qualifications, radiochemistry, radiation protection and dosimetry and analytical techniques were most commonly identified. However, environmental pathways, environmental impact and radioecology were also strongly indicated, particularly from the 'government' and 'research' stakeholders.

In many European countries, the national demand for experts in certain strategic subjects, for example radiation protection and radiochemistry, may be too small to maintain national education programmes. Increased international cooperation is therefore needed to maintain and enhance postgraduate education and research in these nuclear areas.

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