

# Education and Training in Radiation Protection in Portugal: Present Situation and a Project for the Future

C. Oliveira <sup>(1)</sup>, A. N. Falcão <sup>(1)</sup>, R. Trindade <sup>(1)</sup>  
M. C. Lopes <sup>(2)</sup>, M. C. de Sousa <sup>(2)</sup>  
P. Rosário <sup>(3)</sup>

(1) **Nuclear and Technological Institute**  
*Estrada Nacional 10, 2686-953 Sacavém*



(2) **Portuguese Institute of Oncology – Regional Centre of Coimbra**  
*Av. Bissaya Barreto, 3000-075 Coimbra*



IPOFG-CROC, SA

(3) **Directorate-General of Health**  
*Alameda D. Afonso Henriques, 45, 1049-005 Lisboa*



## Outline

### Radiation Protection Education and Training – **Present situation:**

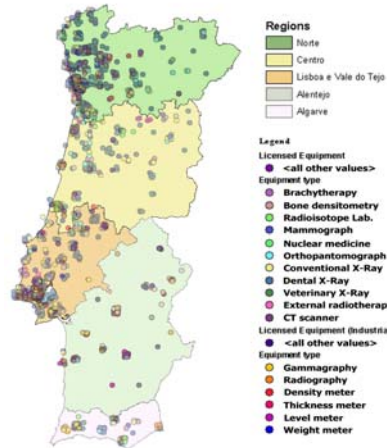
- Installed equipments
- Education and training (ET) programmes
- Legal framework
- Recognition

### Radiation Protection Education and Training – **Proposed:**

- ET infrastructure
- Levels of qualification adequate to the Portuguese reality
- Human resources required (RPE and RPO)



## Portugal: Geographic Distribution of Equipments



	CT scan	Vet. X ray	Denta X ray	Conv X ray	Orth	Nucl. Med.	Mam.	Lab	Bone dens	Brach	Ext. radio	Indus Rad.
Total	140	81	894	432	208	31	224	43	185	26	18	365



## Portugal: Installed Equipments (licensed)

Region	CT scan	Vet. X ray	Denta X ray	Conv X ray	Orth	Nucl. Med.	Mam.	Lab	Bone dens	Brach	Ext. radio	Indus Rad.
Norte	55	45	317	140	79	14	92	8	68	8	3	103
Centro	15	6	91	58	30	7	23	9	25	4	3	66
Lisboa Vale-Tejo	51	24	419	189	87	9	84	22	76	14	11	181
Alentejo	10	6	30	19	6	0	14	2	10	0	0	6
Algarve	9	0	37	26	6	1	11	2	6	0	1	9
Total	140	81	894	432	208	31	224	43	185	26	18	365

The numbers are most probably under-estimated



## Present: ET

- 1 day to 1 week courses are available for professionals dealing with radiations:
  - Civil Protection officials,
  - Firemen
  - Technical operators of nuclear gauges
  - Radiologists
  - Health technicians.
- ET programmes (including On-the-Job Training) for the higher educated professionals (doctors, physicists and technologists) working with radiations on the Health sector.
- There is no common approved and recognized ET programme so the existing ones vary from institution to institution without superiorly structured control, evaluation or recognition

**There are no ET courses available for RPEs**



## Present: Regulatory requirements / recognition

### Regulatory requirements:

#### Health sector

there is a legal framework imposing ET for a sub-set of the professionals involved.

#### Industry and research sector

there is no legal framework imposing ET

**None of them mentions the RPE**

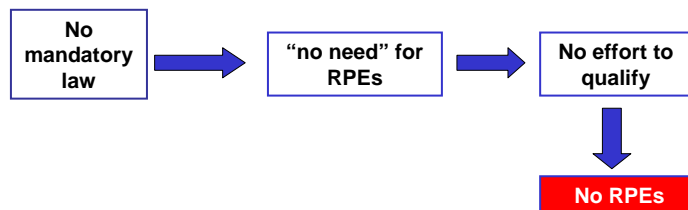
### Recognition:

there is no independent structure with the competence/authority to deal with the issue of ET in Radiation Protection



## Present in brief

- The Radiation Protection Education and Training infrastructure is very insipient (in practice non-existent)
- In addition, there is no collaboration/support from any reference international body (Ex: IAEA, ...)



**But there is an increasing awareness that the situation will have to change**

The IST (Engineering Faculty) introduced last year, in collaboration with ITN, a masters course in Radiation Protection.



## Present : Conclusion

**Education and training in RP needs clear improvement in Portugal**  
in what concerns:

- infrastructure
- regulatory and recognition requirements

**This contribution is focused in:**

- defining levels of qualification adequate to the Portuguese reality;
- outlining adequate ET programmes;
- defining training entities;
- estimating the number and geographic distribution of RPEs and RPOs

Fine details of the regulatory requirements and recognition are not addressed here



## Proposal : Levels of qualification

Several EU countries have professionals of RP with different degrees of qualification, requiring different levels of ET

Taking into account the present Portuguese situation, a system with three qualification levels are proposed :

- **Qualified Expert** in Radiation Protection (QERP) (higher level);
- **Qualified Technician** in Radiation Protection (QTRP) (intermediate level)
- **Operational Technician** in Radiation Protection (OTRP) (lower level).



## ET for the 3 qualification levels

	QERP LEVEL 1	QTRP LEVEL 2	OTRP LEVEL 3
Background required to access the ET level	University degree in Physics	University or Polytechnic Inst. degree in: Physics, Chemistry; Health, Engineering	High school: (All exposed workers must attend a ET course)
Duration	300 h in class + Internship (6 mon)	100 h in class ≥10% practical	≥ 1 day
Programme	IAEA course and EU syllabus	Adapted from that of level 1	Fitting the working environment
Training entity	ITN + Central Hospital + Int. Body (ex: IAEA)	ITN+Central Hospital +(Int. Body, ex: IAEA)	Any entity certified by a competent authority
Certification	Regulatory authority or equivalent	Regulatory authority or equivalent	Regulatory authority or equivalent



## Estimating the National needs in RPEs

Staffing needs were estimated from the number of equipments installed.

The man/equipment ratios used for the health sector were adapted from published tables for the ratios physicist/equipment (DL 180/2002)

Equipment	QERP	QTRP
Linear accelerator	0.37	4
Conventional X-ray	0.03	2
Brachytherapy	0.18	0.4
Gamma Camera	0.2	2

The following additional assumptions were made:

CT scanners, mammography, bone densitometers and veterinary x-ray units: same personnel needs as conventional x-ray units

Radioisotope lab: same personnel needs as nuclear medicine units

Dental x-ray and orthopantomograph units: 1 QERP to supervise 40 facilities (0.025/unit)

Industrial needs: 1 QERP to supervise 20 facilities (0.05/unit)

1 QTRP to supervise 20 facilities (0.05/unit)



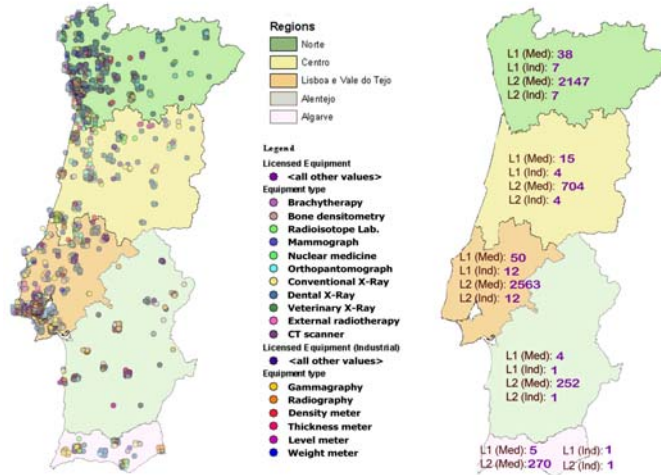
## Estimating the National needs in experts

Region	QERP Health	QTRP Health	QERP Industry	QTRP Industry
Norte	38	2147	7	7
Centro	15	704	4	4
LVT	50	2563	12	12
Alentejo	4	252	1	1
Algarve	5	270	1	1
Total	112	5936	25	25

These numbers provide an estimate of the effort required to upgrade the present situation.



## Estimating the National needs in RPEs



## Legal aspects

Full implementation of this proposal **requires an improvement of the legal framework:**

- Defining ET programmes
- Defining pre-requisites of training centres
- Imposing that all operation of equipment that uses radiation sources must have the supervision of a QERP.
- Attributing competences at the levels of certification, recognition and inspection to a competent independent regulatory body.

Very recently an embryo of a Regulatory Authority has been created by Decree-Law nº. 139/2005 dated of 19<sup>th</sup> August.

Developments of this legal framework are necessary and expected.



## Conclusions

A project to raise the level of qualification of professionals dealing with ionizing radiation and to upgrade the overall Portuguese safety standards has been outlined.

The project proposes both a new legislative package, and specific education and training programs for professionals dealing with health and industrial radiation applications.

The success of this plan depends on the success of the creation of a Regulatory Body with effective power.

