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# E&T in Radioactive Waste Disposal

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**IGD-TP EXCHANGE FORUM MEETING. Paris, February 8, 2011.**

# Motivation

Ensuring the continuation, renewal and improvement of the professionals skills in the field of radioactive waste disposal needs

anticipation ⇒ **suitable framework and networks for implementing and delivering sustainable E&T programmes.**

*"To maintain and develop EDF's leadership in the nuclear field the company needs to recruit 5,000 engineers over the next 10 years, or 4 times its previous level."*

***Michel Bonnet,* EDF.**

**Special Event by ENEN. Prague, Czech Republic, 2008**

# Challenges in Education and Training and **Euratom response**

**Education and Training (E&T) are defined as follows:**

- **Education is a basic or life-long learning process**: education is broader than training and encompasses the need to maintain completeness and continuity of competences across generations (it is essentially a knowledge-driven process, involving academic institutions as suppliers, and students as customers).
- **Training is learning a particular skill required to deliver a particular outcome**: training is about schooling activities other than regular academic education schemes (it is essentially an application-driven process, involving industrial training organisations as suppliers, and professionals as customers).

**Two EU programmes for E&T during 2007 - 2013 :**

- Lifelong Learning Programme (agency EACEA under DG EAC)
- FP-7 RTD Programme PEOPLE (DG RTD)

# Euratom E&T objectives:
# maintain an adequate skills base and keep the nuclear option open

## Euratom policy for Education and Training (E&T) 2007-2013

- MODULAR COURSES AND COMMON QUALIFICATION APPROACH – (offer a coherent E&T framework and ensure top-quality for each module)
- ONE MUTUAL RECOGNITION SYSTEM ACROSS THE EUROPEAN UNION – (e.g. European Credit Transfer and Accumulation System of ERASMUS /ECTS/)
- MOBILITY FOR TEACHERS AND STUDENTS ACROSS THE EU – (improve the "internal market" for free circulation of nuclear experts)
- FEEDBACK FROM "future employers" TO ENSURE SUSTAINABILITY – (involve the "stakeholders" in the qualification process and get funding).

## "European Nuclear Education Network" (ENEN, spin-off of Euratom FP-5)

- A legal association (=> sustainability of objectives + capacity to contract)
- December 2007: ENEN Association = 46 members from 19 Countries
  - 37 universities (effective members)
  - 6 research centres + 1 system supplier + 2 MoU (associated members)

# Towards "**Euratom Fission Training Schemes**" **/ EFTS /** based on Public – Private Partnerships

**EFTS proposed in Work Programme 2008 of Euratom FP-7**

- a significant development from a pure training and mobility programme to one dedicated rather to structuring research training across the EU
- target public = research workers and industrial experts at post-graduate or equivalent level, i.e. from doctoral students to senior visiting scientists.

**Objectives:**

- **address life-long learning and career development,** with emphasis on top-quality training, mutual recognition of internships and mobility
- **maximise transfer of higher level knowledge** with emphasis on multidisciplinarity and/or inter-sectoral mobility, through **public – private partnerships**
- **define a methodology for structuring research training** across the EU and test the different steps (e.g. Systematic Approach to higher level Training of IAEA)

⇒ **ultimate goal = develop European passports for CPD**

# IGD-TP Strategic Research Agenda

Version December, 2010

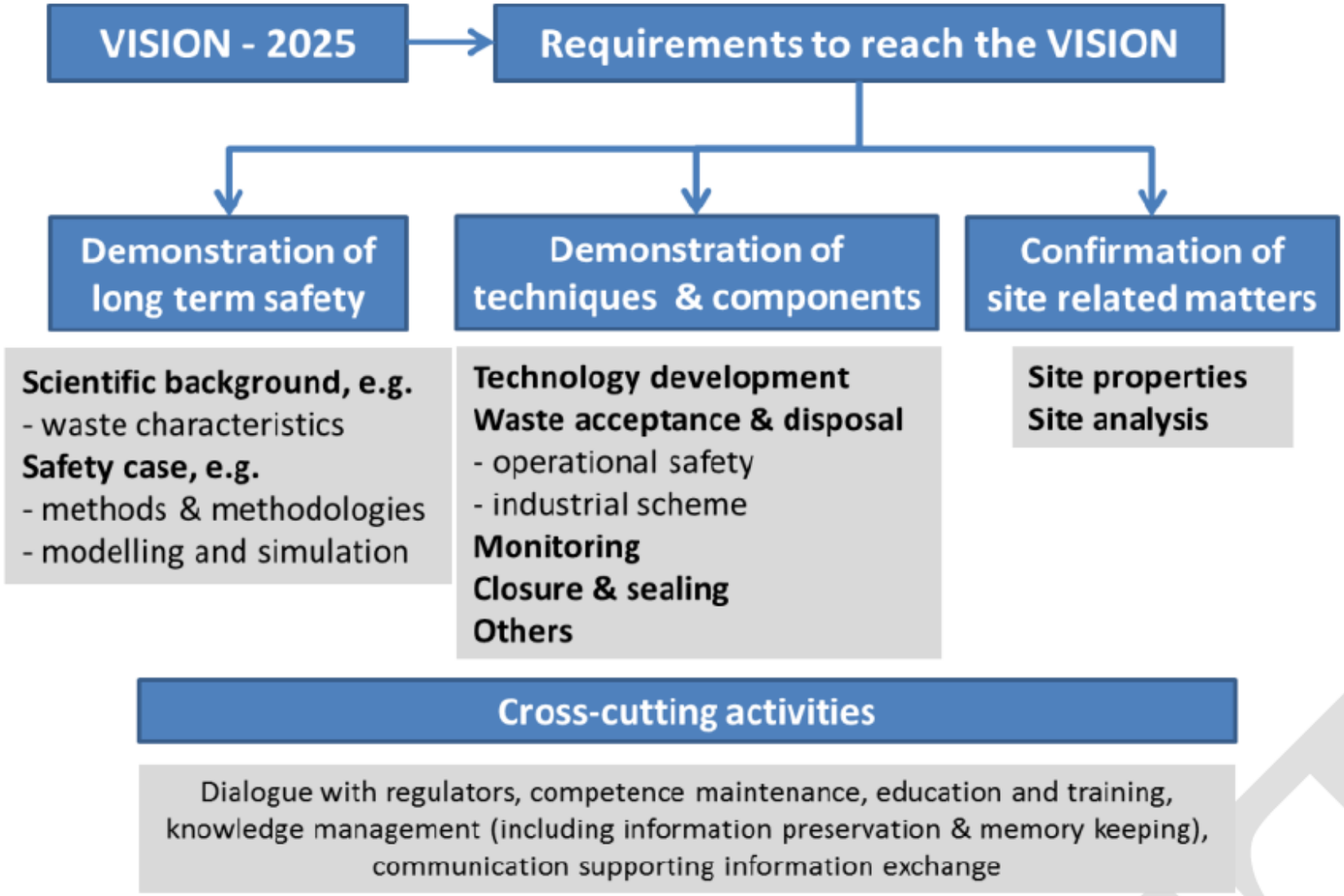



**Figure 2.2.1** Main issues to be considered in the SRA.

**CETRAD: Coordination Action on E&T in Radiation Protection and Radioactive Waste Management (FP6-2005)**

## Conclusions: General

- 3600 RWM specialist staff are currently employed.
- A minimum of 200 specialist staff are to be recruited in the next five years.
- However, if national RWM programmes are activated, the numbers of staff required will sharply increase.
- The survey confirms the emergence of a generation gap. Clearly this is an issue of concern.
- There are no strong legislative drivers for education and training in RWM (as there are in radiation protection).

## Conclusions: E&T Requirements

- Education: New and replacement staff educated to MSc and PhD level are required to meet the target of 200 new staff listed above.
- Education: However, if the upturn mentioned above takes place, these numbers will increase significantly.
- Training: There is a strong demand for internally and externally sourced training provision which is experience and role dependant.
- Training: On-the-job training is common practice enabling the transfer of tacit knowledge and experience of older generations.

## Conclusions: E&T Provisions

- Absence of co-ordination of education and training needs and provision at European Level.
- Absence of mechanisms to allow recognition and accreditation of training provided.

# Five Euratom FP-7 projects of the EFTS type

Examples of competencies required by stakeholders, concerned with specific societal and industrial challenges:

- TRASNUSAFE: health physics sector (e.g., ALARA principle)
- ENEN III Training schemes : nuclear systems suppliers
- ENETRAP II: nuclear safety authorities (e.g., Radiation Protection Expert)
- **PETRUS II: radwaste community (e.g., repository and engineered systems)**
- CINCH: nuclear and radio-chemistry (e.g., chemistry of nuclear fuel cycle)

# PETRUS II / Geological Disposal Education and Professional Development

## FP7 Euratom Fission Training Schemes

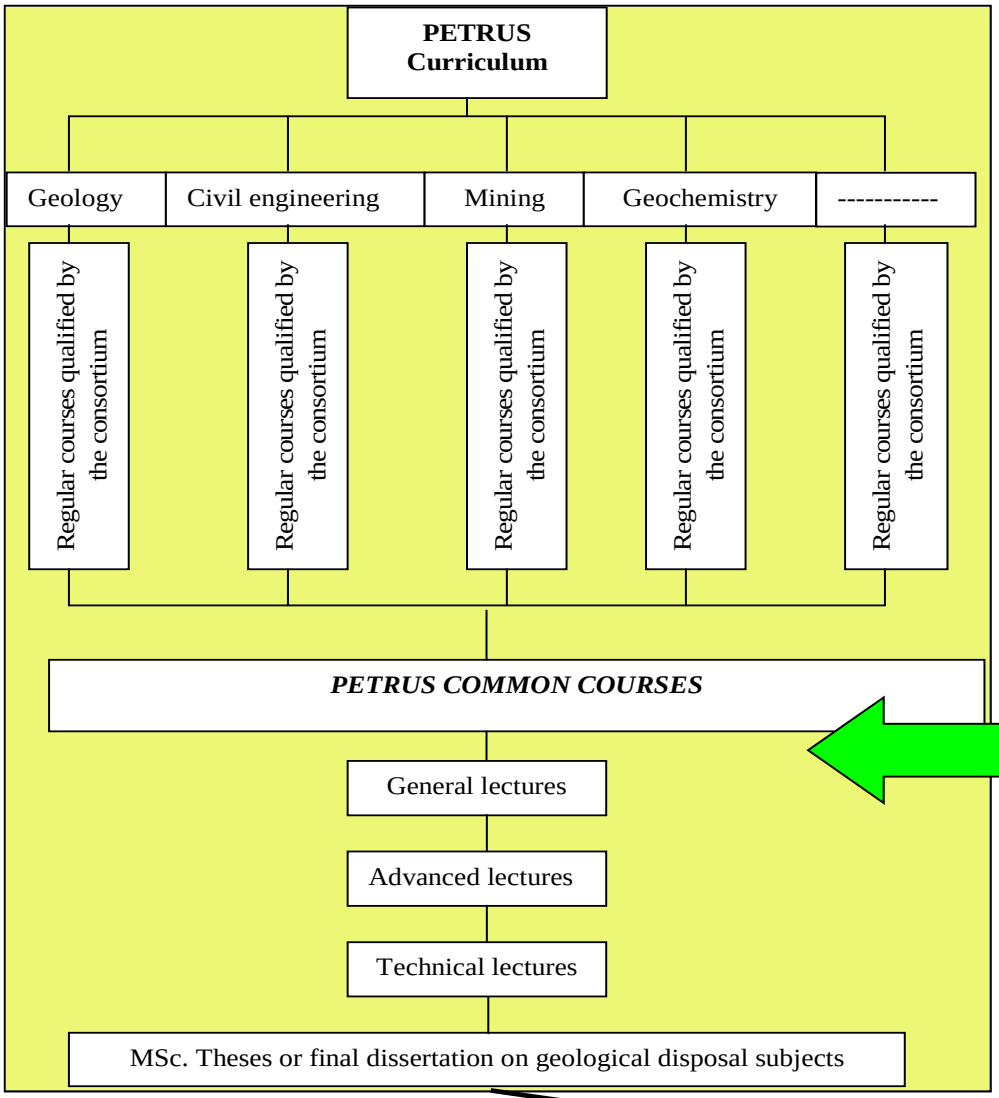
- **Education and Training schemes**
  - Training Schemes for Professional Development in Geological Disposal of Nuclear Waste

- **Features**
  - Master Course components and Professional Development
  - Pilot sessions
  - Evaluation and Validation of components
  - Knowledge Management

- **Partners**
  - **INPL, CU, TUC, ENSMN, Linnaeus Univ., Micans, ENEN (UPM, CTU, TKK, BME), ITC, POSIVA, ANDRA, ARAO, RAWRA, ENRESA, GRS, ITN, NDA, IAEA**

- **Specifics**
  - 3 years duration, budget 1,9 Mio €, EC grant 0,8 Mio €

# Structure of the PETRUS scheme(s)




## EDUCATION

- Modularity
- Mutual recognition
- Mobility

## TRAINING

**Professional Development Scheme**

Introductory Courses

Other training courses

Modular Course 1

Modular Course 2

Research or development project

***PD Diploma***

**RD&D (PhD Studies,……)**

# Conclusions

- *The experience in all the nuclear sectors shows that requirements for high level of expertise and human resources in the field of radioactive waste disposal have to be **anticipated** through adequate E&T initiatives.*

- *The objectives of PETRUS II are to support, through a variety of measures, the spreading of scientific competence and know-how throughout the RADWASTE sector in the different Member States.*

- *PETRUS II measures aim to guarantee the earliest possible availability of suitably qualified staff, through joint training activities and improved coordination between different EU educational institutions, WMOs and industries in order to ensure qualifications are equivalent across all Member States, or by facilitating the training and mobility of students and scientists.*

- ***The sustainability of such initiative at European Level implies clear "expression of interest", support and feedback from end users.***

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