PETRUS Initiative

overview of Seven years E&T experience in geological disposal

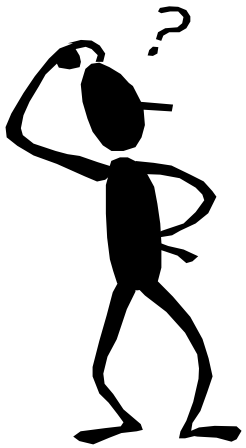
Behrooz BAZARGAN SABET and PETRUS Consortium

PETRUS

(**P**rogramme for **E**ducation, **T**raining and **R**esearch on **U**nderground **S**torage)

Observations

Fail in knowledge transfer from "research activities" to the academic education on geological disposal



- **Smallness of the radioactive waste community**
- **Narrowness of the job market at the national level**
- **Reluctance of academia to launch objective-oriented curricula**
- **Lack of institutional support and funding mechanisms**

Objectives

Ensuring the continuation, renewal and improvement of the professional skills in the field of radioactive waste disposal by building suitable frameworks for implementing and delivering sustainable E&T programs in both formal (Master degree) and non-formal (Professional Development) sectors.

Cooperative approach to fill the gap between growing demand for structured education and training programmes and the offering that is fairly limited.

PETRUS Initiative

Since 2005 PETRUS coordinates Universities, Radioactive Waste Management Organisations, Training Providers and Research Institutes efforts to develop cooperative approach to education and training (E&T) in the geological disposal

FP6 **FP7**

ENEN II (PETRUS I) → **PETRUS II** → **PETRUS III**

EURADWASTE '13

8th EC Conference on the Management of Radioactive Waste

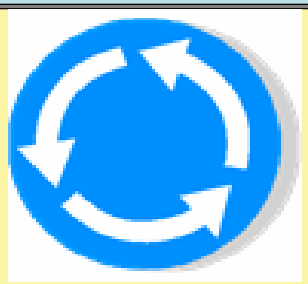
14-16 October 2013, Vilnius, Lithuania

Co-organised by

European Commission · EU2013.LT · EDUCATION SCIENCE RESEARCH

Planning
Planning
Identification of needs
and evaluation of resources

Evaluation/Validation
Evaluation/Validation
Accreditation, recognition
and training Pass



Implementation
Implementation
Training schemes
Prof. development
European Masters'
Common courses

Management
Management

Support
Support
Networking
Knowledge management

EURATOM

PETRUS

PETRUS Education Programme Accreditation and mutual recognition (Master degree)

The use of ECTS instrument is unanimously agreed by the PETRUS consortium.

Mutual recognition of the PETRUS Educational programme is more a matter of *complementarity* rather than standardization of curricula, diploma or institutions' practices.

The creation of a set of common courses mutually recognised and specifically dedicated to the geological disposal is the most relevant way to achieve harmonisation objectives.

Integration of the common courses to the existing various master programmes is the best way to foster the collaboration among a broad range of disciplines and creates the minimum disturbance in national accreditation rules

Accreditation and mutual recognition (Master degree)

- 130 hours of courses already available

The PETRUS educational programme is operational since 2011 with two full weeks of courses taught through "synchronous and live e. learning course delivery" and 2-3 weeks of practical training in Josef underground facility (CZ).

PETRUS Syllabus

Minimum 10 ECTS

Overview of Nuclear Power
Basic concepts of Nuclear physics, Nuclear plants, Nuclear fuel cycle, …

Radioactive Wastes
Sources of nuclear waste, Principles of radwaste management ,Treatment, Transportation, storage and disposal, …

Geological Disposal
Concepts of geologic disposal, Site selection, Disposal performance, Natural analogues, …

Social issues
Energy Debate and radwaste disposal, Public concerns, Culture and ethics, Regulation and control, …

Safety assessment practices in radwaste management
Objectives and scope, International rules, Safety requirements and performance assessment, Risk analysis, …

Synchronous e.learning

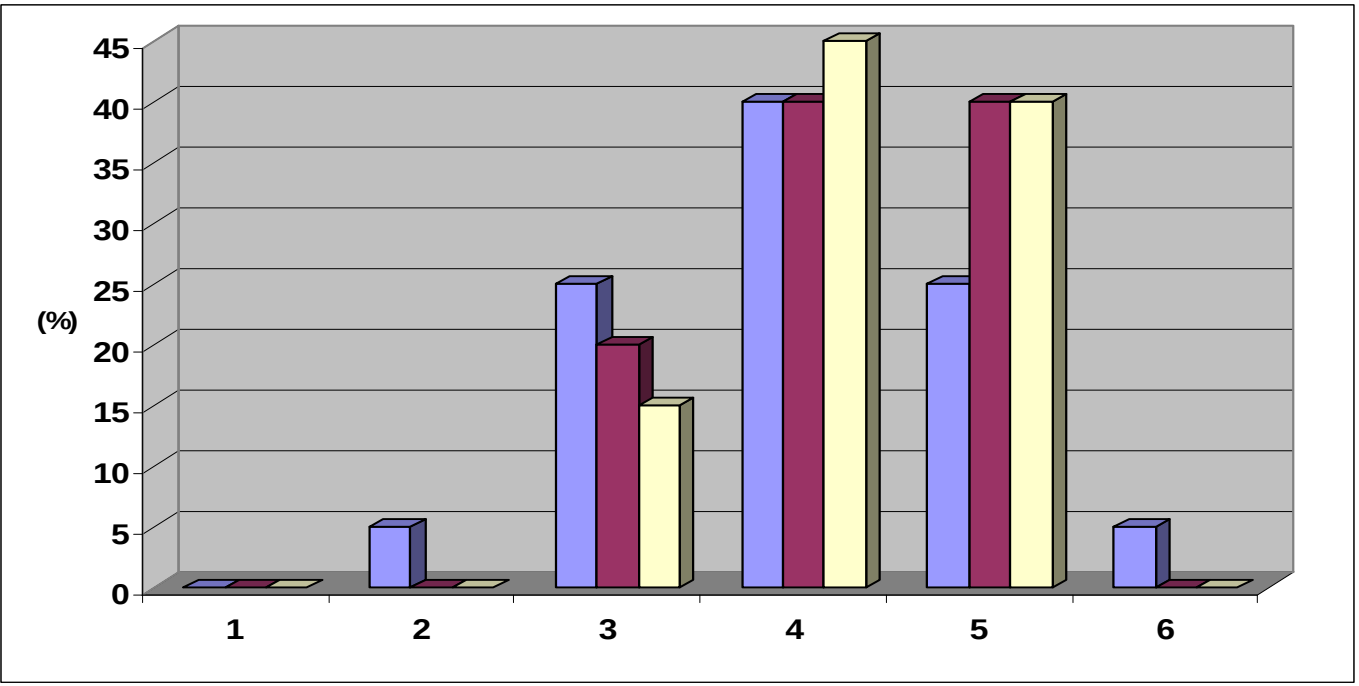
Live broadcast

Virtual Classroom

Virtual Classroom

Quality of the presentations

- (**1**)Boring – (**6**)Stimulating
- (**1**)Poorly conducted – (**6**)Well conducted
- (**1**)Too condensed – (**6**)Well spaced out



Remaining difficulties:

Number of students

Number of universities

Harmonization of the time schedules in different universities

A coherent approach to training

Which kind of training is needed ?

Training on attainment of qualifications compatible with academic degrees

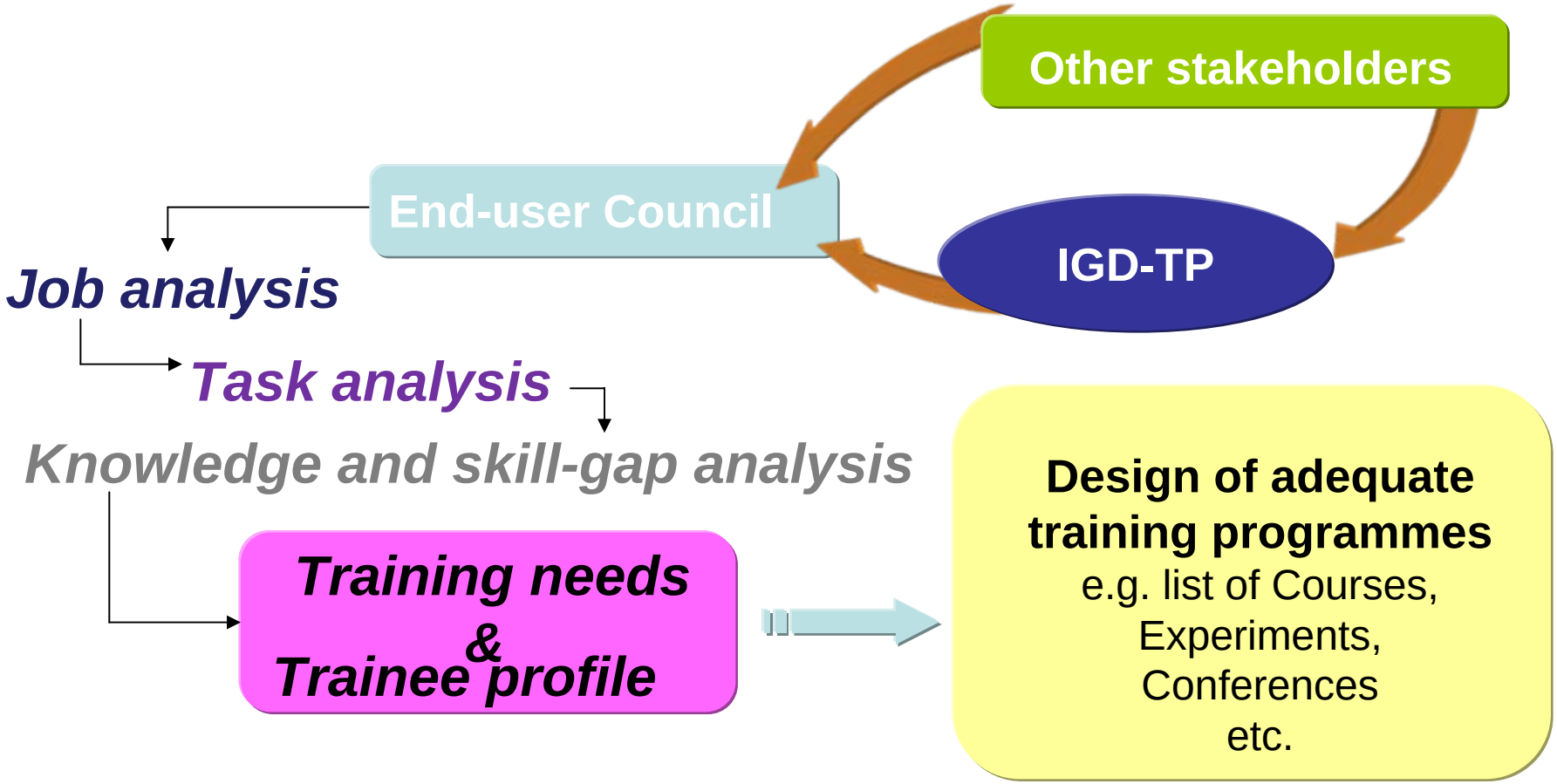
On-demand training targeting particular skill development

Training framework must be qualification oriented and at the same time be enough flexible to fulfil the particular demands for specific skills

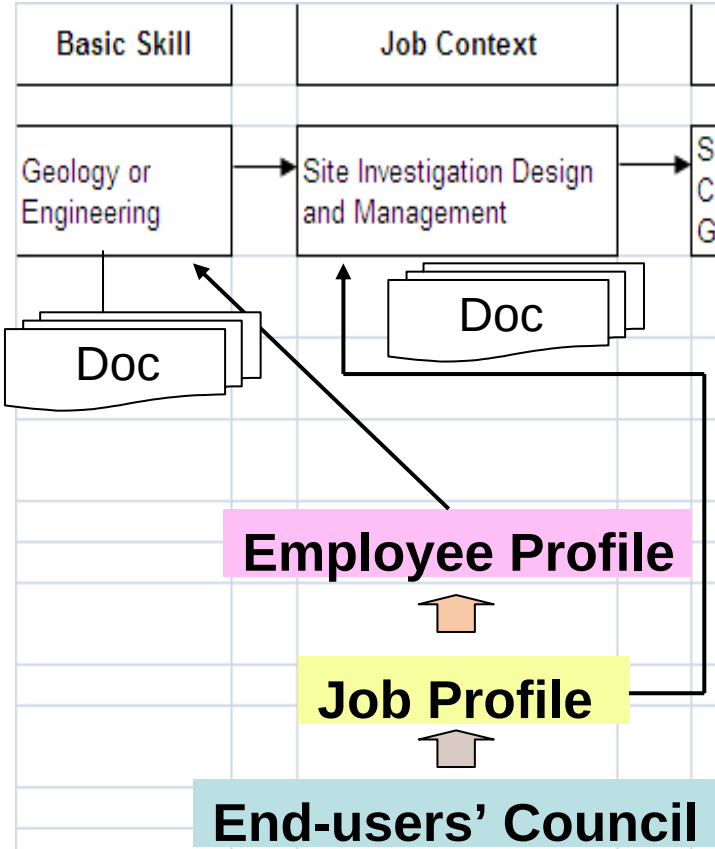
A modular curriculum allowing an individual to complete either a given module or the whole programme

PETRUS Professional Development Programme

Steps in building training programme



Example of a Job Context and Training Scheme



Basic Skill	Job Context	Training Track	Training Courses Available / Gaps in Training Course	Current Course Facilitor
Geology or Engineering	Site Investigation Design and Management	Site Investigation, Characterisation and Geosynthesis	DGR in Sedimentary Environments	ITC School
			From Surface Based to Underground Site Characterisation	ITC School
			Siting of Deep Geological Repositories	ITC School
			Introduction to Practical Environmental Radiochemistry	ITC School
			Siting Procedure for DGR	RAWRA
			Numerical Modelling	Cardiff University
			Petrology and Geochemistry of rocks relevant for final disposal	TU Clausthal
			Natural Analogues	Ecole des Mines de Nancy
			Underground Storage and Geo-modelling	Ecole des Mines de Nancy
			Palaeohydrogeology and Transport Modelling	
			Site Investigation and Site Descriptive Modelling	

accreditation and mutual recognition of the PD programme

European Credit system for Vocational Education and Training (ECVET)

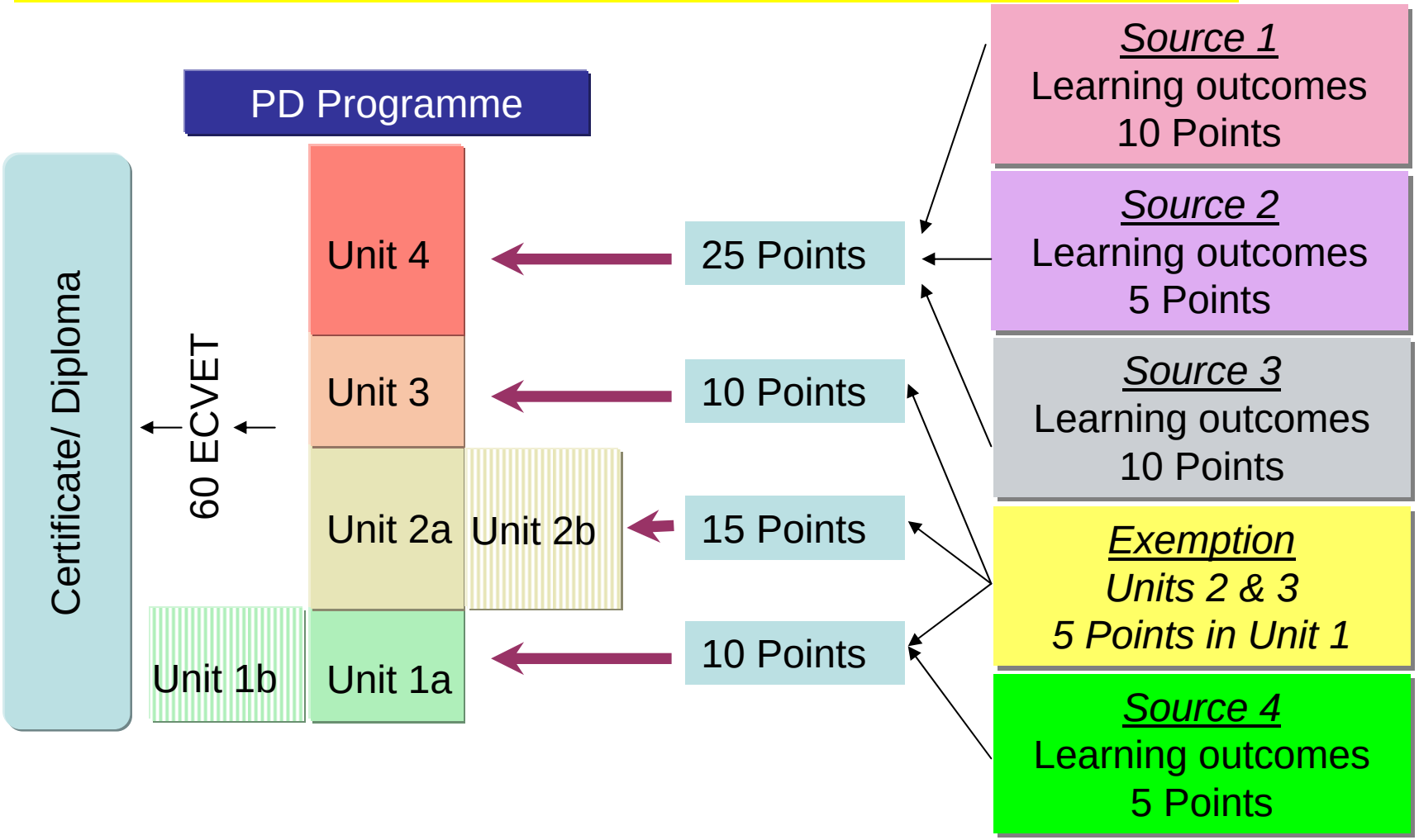
- Training programme is divided into a number of "***units***"
- Each unit encompasses a certain number of "***credit points***"

Qualification = Completion of the total number of units

Learners can accumulate credit points in different countries, and in different learning situations (e.g. modular courses, practical training, academic or non-academic training providers)

- ECVET is fully compatible with ECTS (***has not yet established !***)

Example of qualification process in Professional Development using ECVET instrument



Evaluation of PETRUS PD programme

Heterogeneity ⇒ Is training equally beneficial for all participants?

"customer satisfaction" effectiveness and usefulness

1st step: Trainee profile

2nd step: Trainees' feedback

3th step: knowledge evaluation

4th step: transfer evaluation

5th step: outcomes evaluation

Pre-Test

Post-Test

Formative

summative

TOTEM Model*

Brinkerhoff "SCM" model

Validity & Reliability

PD Curriculum improvement

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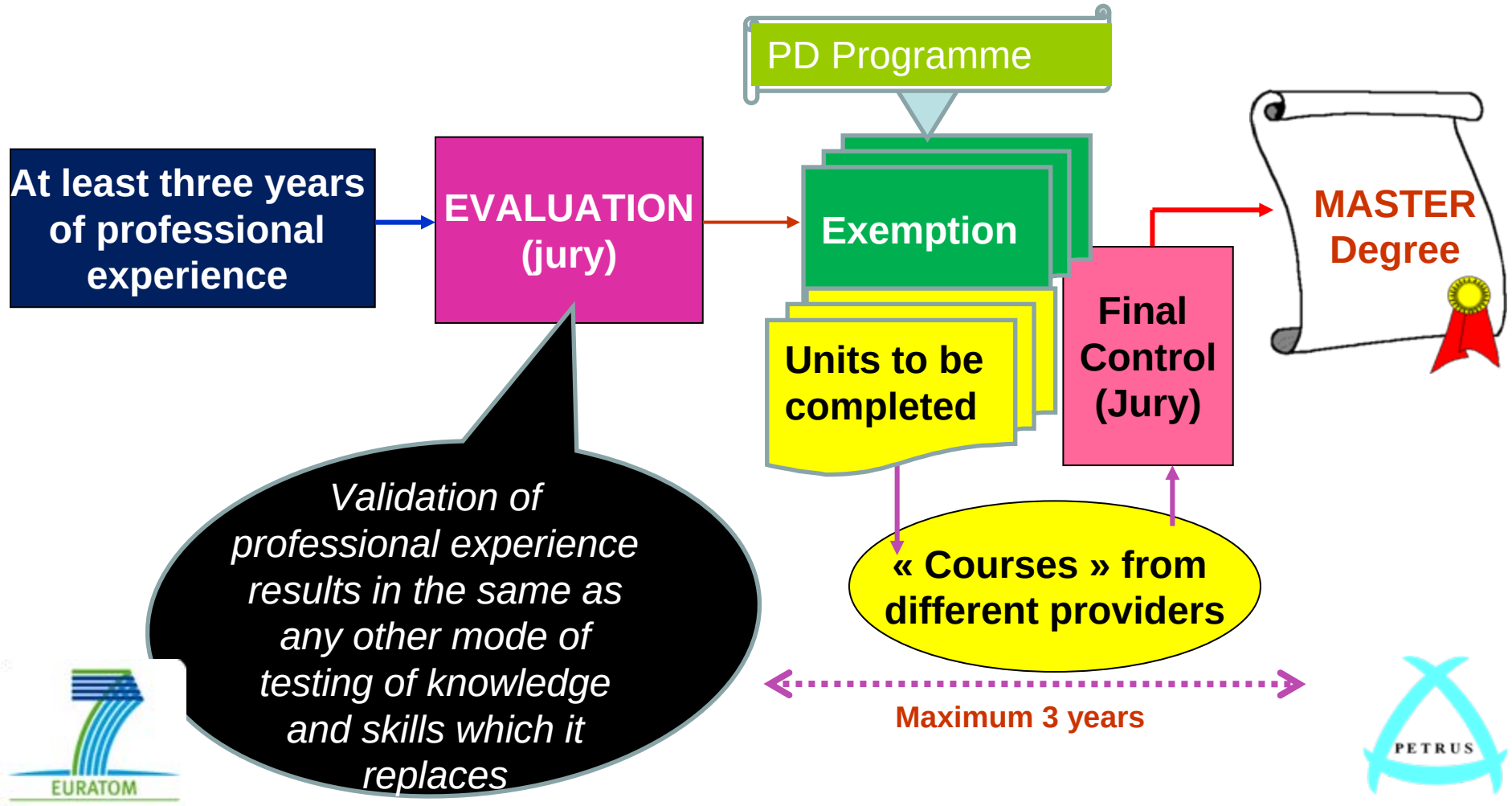
PETRUS model »» Qualification by steps



PETRUS III MAIN OBJECTIVES

Practical implementation of PETRUS training programme following ECVET principles (WP1 and WP2).

- Set up qualification in geological disposal that can be achieved, accredited and recognised both through formal and PD training programmes

Elaboration of multidisciplinary training and research framework for PhD student (WP3).

- Organize periodic PhD events
- Favour the emergence of multidisciplinary researches.

Development of strategies and frameworks for maintaining PETRUS initiative over the long-term (WP4 and WP5).

- Collaborate with the IGD-TP's Competence Maintenance Education and Training (CMET) Working Group
- create framework for the integration to the ENEN structure

Conclusion

Sharing common frameworks for education and training (E&T) would better secure the overall provision and reduce the risk of training shortage especially in countries with modest nuclear facilities.

Sustainable E&T in geological disposal are of central importance and requires significant participation of the parties involved and also perennial structure for management and organisation.

End-users have not only to determine the objectives of the training programme but also have to contribute to its content by bringing practical activities, real case studies and technical skills. They are not only “customers” of the programme but also it “providers”.

Thank you for your attention