

 **3rd Int'l Conference on Education and Training in Radiological Protection (ETRAP-2005)**
Brussels, Belgium, 23-25 November 2005


Towards a European strategy for nuclear knowledge management
(common qualification, mutual recognition and mobility of scientists)

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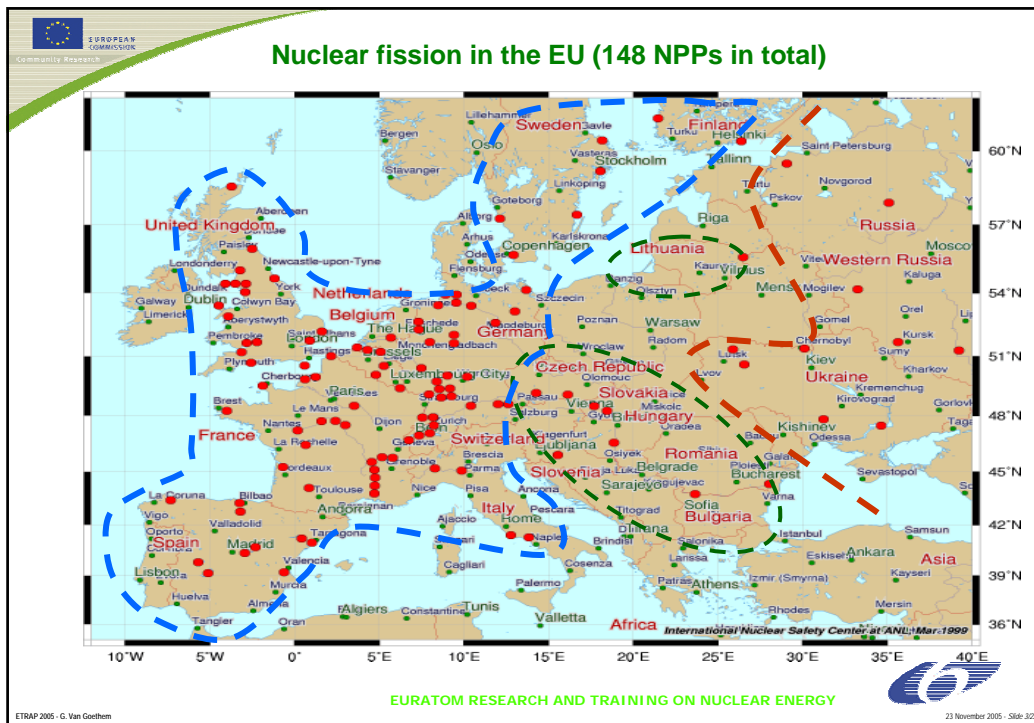
ETRAP 2005 - G. Van Goethem 23 November 2005 - Slide 1/22

 **Table of contents**

- 1. Objectives of EU research and training**
- 2. EU integration of nuclear research and training**
- 3. Education and training in nuclear fission**
- 4. Innovation (prospects for Euratom FP-7)**
- 5. Conclusion (“factor 10 in EU research”)**


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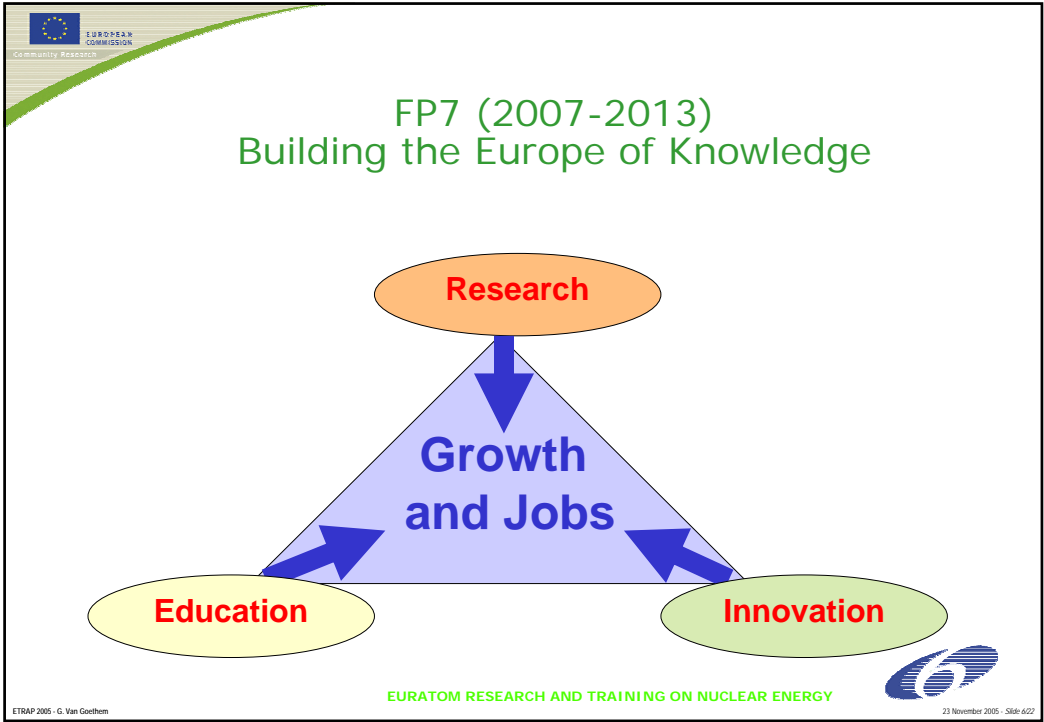
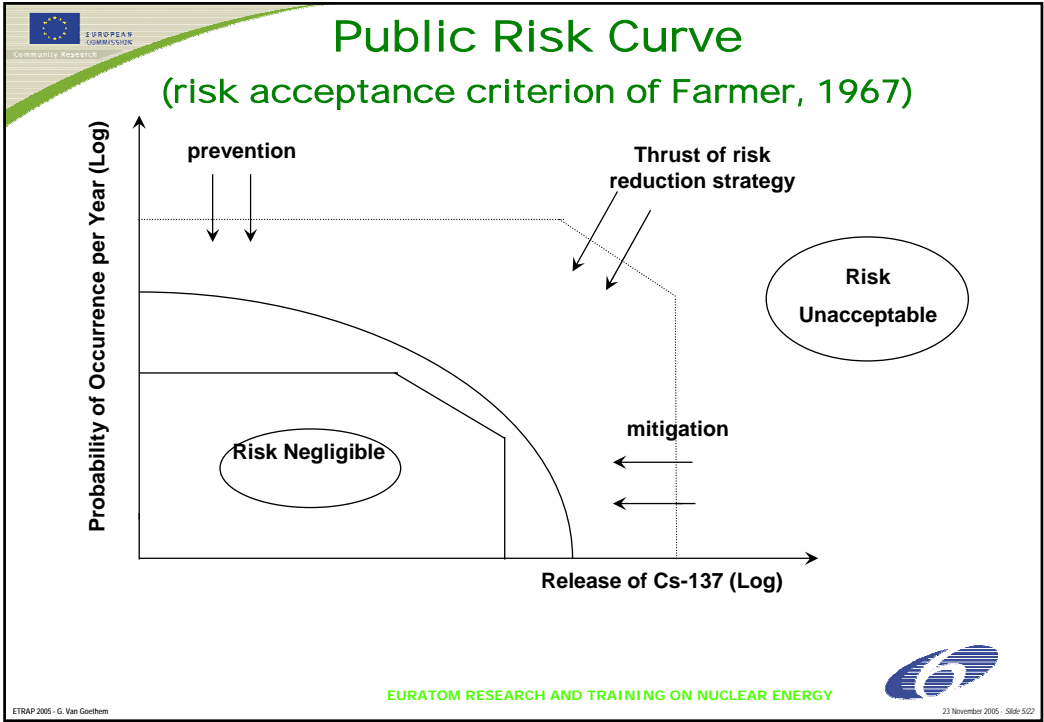
EUROPEAN COMMISSION
Community Research

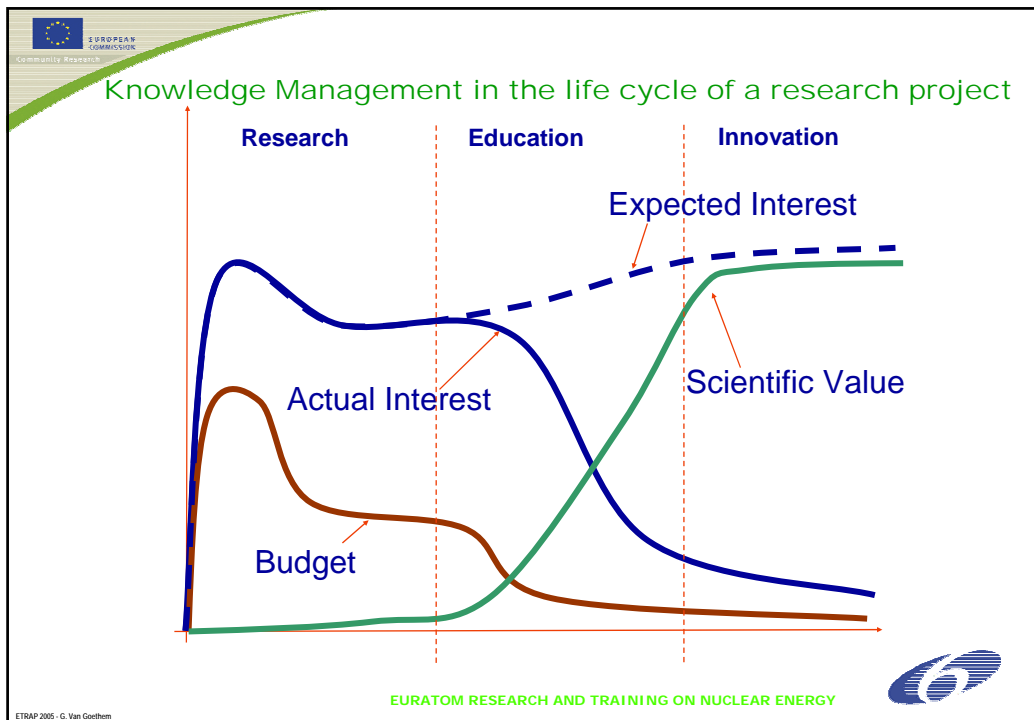
1. Objectives of EU research and training

- Euratom Treaty (March 1957)
- Lisbon European Council (March 2000)
- Treaty establishing a Constitution for Europe (October 2004)

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Community Research
EUROPEAN COMMISSION

2. EU integration of nuclear research and training

EU criteria: common needs, a shared vision and European implementation instruments

Common needs put forward by “end-users”

- **public at large:** e.g. public perceptions of radiation risk and expectations regarding health, safety and security
- **industry:** e.g. increase further the safety and the performances in line with the regulatory and internal market requirements
- **regulatory bodies:** e.g. “towards convergence of technical nuclear and radiological safety practices in Europe” (plain level field)
- **S/T community:** e.g. fill the gaps in basic and applied knowledge and share experts and large test facilities.

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23 November 2005 - SRA-822


 2. EU integration of nuclear research and training

EU criteria: common needs, a shared vision and European implementation instruments


A common vision shared by “integrators”

- **industry:** develop an objective, consistent and predictable environment to secure stable electricity prices
- **vendors:** develop innovative nuclear fission technologies (economical, safe, minimal waste, and no proliferation)
- **regulators:** agree on commonly accepted safety criteria (“reference levels”) for current and future technologies
- **EU research:** “growth, competitiveness and employment”, ⇔ “social and environmental sustainability”.



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 2. EU integration of nuclear research and training

EU criteria: common needs, a shared vision and European implementation instruments

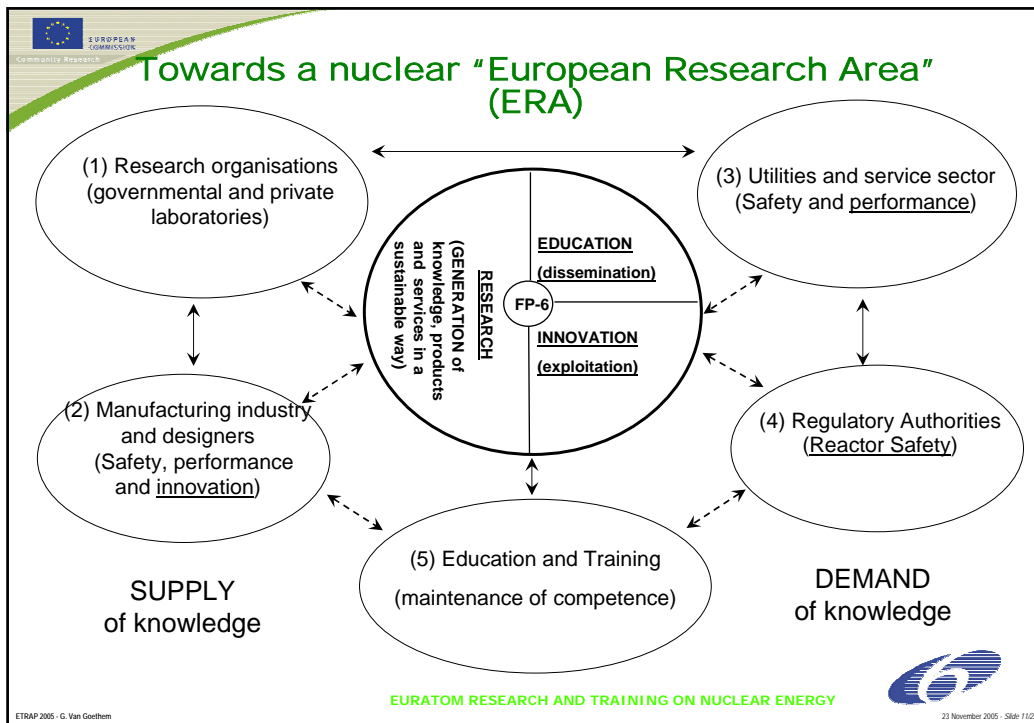
Common instruments made available by the EU

- **political instruments:** e.g. Barcelona 2002 (“overall R&D in the EU to be increased until 3% of the GDP by 2010”)
- **financial instruments:** loans from EIB or from EU “Structural and Cohesion Funds”, fiscal incentives, risk capital
- **juridical instruments:** international Euratom cooperation agreements, EU patent, European Economic Interest Group
- **mobility instruments:** accreditation methodology for exchange of students and teachers (Bologna 1999, ECTS)



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3. Education and training in nuclear fission and radiation protection
Scientific, administrative and financial challenges

- **1 – Common qualification framework**
(i.e. ensure top level quality for each E&T module)
- **2 - Mutual recognition (Bologna 1999 process / ECTS)**
(i.e. the European dimension of the modular approach)
- **3 - Mobility of scientists (instructors and students)**
(i.e. ensure the feasibility and the financial viability)

"European Master of Science in Nuclear Engineering" (EMSNE)

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23 November 2005 - Slide 12/22



Education and training:
 possible synergies between 2 worlds ?

Definition of education:
 Education = basic or lifelong learning process
*(knowledge driven:
 usually, stakeholders = academic world / end-users = students)*



Education is broader than training and encompasses the need to maintain completeness and continuity of competences across generations

Definition of training:
 Training = learning a particular skill required to deliver a particular outcome
*(application driven:
 usually, stakeholders = research organisations / end-users = industry)*

Training is about schooling activities other than the regular academic education schemes



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23 November 2005 - Slide 13/22

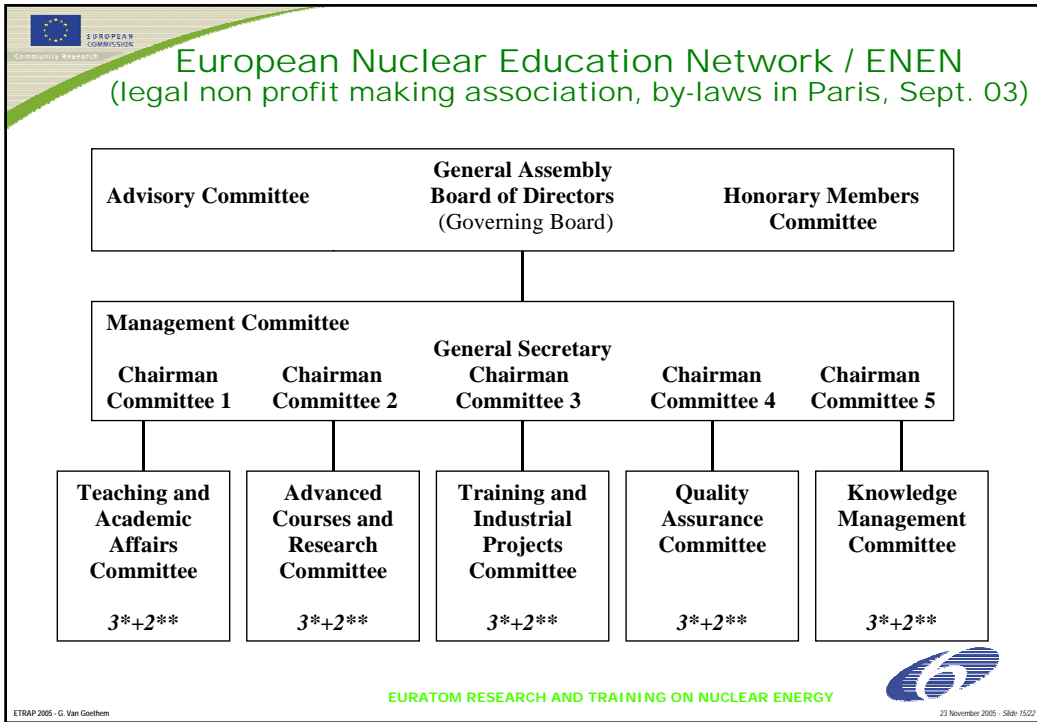



Aims and strategy of the legal association ENEN (by-laws setting the roles of general assembly and governing board, Paris, Sept. 03):

- ◆ Promote and further develop the collaboration **in nuclear engineering education of engineers and researchers needed by the industry and the regulatory bodies**
- ◆ Ensure the quality of **nuclear academic engineering education and training**
- ◆ Increase the attractiveness **for students and young academics.**


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23 November 2005 - Slide 14/22




Belgian Nuclear Education Network (BNEN)
5 universities = KUL, UG, VUB, UCL and Ulg
Distribution of key lectures and teaching tasks

	<i>Total ECTS</i>	<i>KUL</i>	<i>UG</i>	<i>VUB</i>	<i>UCL</i>	<i>Ulg</i>
Nuclear energy : introduction	3	3				
Introduction to nuclear physics	3			3		
Nuclear reactor theory and experiments	8	2	3		3	
Nuclear thermal-hydraulics	6				6	
Operation and control	3		3			
Reliability and safety	3	3				
Nuclear fuel cycle and applied radiochemistry	3					3
Nuclear materials I	3					3
Nuclear materials II	3	3				
Radiation protection and nuclear measurements	6		4	2		
Advanced topics	6					
Project and internship	13					
TOTAL	60					

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FP-6 projects in nuclear Education and Training


NEPTUNO (CA)
 “Nuclear European Platform of Training and University Organisations” (nuclear engineering) – continuation of FP-5 project ENEN

CETRAD (CA)
 “Co-ordination Action on Education and Training in Radiation Protection and Radioactive Waste Management”


EURAC (CA)
 “Securing European Radiological Protection & Radioecology Competence to meet the Future Needs of Stakeholders”

MSCRB (SSA)
 “European Master of Science Course in Radiation Biology”

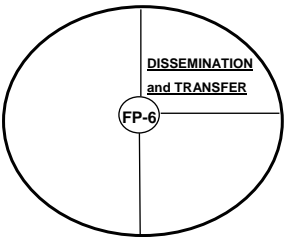
ENETRAP (CA)
 “European Network on Education and Training in Radiological Protection ”


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Dissemination and transfer of knowledge : a contractual obligation under FP-6

Cost categories in the contractual forms (A3.1)



IP :


1. RTD or innovation related
2. Demonstration
3. Training
4. Consortium management

NoE :


1. Joint programme (integrating, jointly executed research, spreading of excellence)
2. Management

CA :

1. Coordination
2. Training
3. Consortium management



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Integration of nuclear Education and Training
 (links between research and training: work packages in FP-6 projects)

NEPTUNO “Nuclear European Platform of Training and University Organisations”
 (CEA-INSTN Paris + 34 partners, co-ordination action, 2 years since January 2004)
 and legal association ENEN = driving forces for a EU approach to nuclear E&T

- **RISC-RAD (IP):** « quantitative radiation risk modeling » and « ethics in biological experiments »
- **EURANOS (IP):** « real time on-line decision support RODOS » (emergency management and rehabilitation strategies)
- **PERFECT (IP):** irradiation damage numerical modeling (“virtual reactor”: reactor pressure vessel and internal structures)
- **EUOTRANS (IP):** transmutation techniques (17 universities represented by ENEN / at least 5% of the budget assigned to PhD students, doctoral school)


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4. INNOVATION IN FP-7 (2007-2013)
 “Science and technology, the key to Europe’s future”
 COM(2004)353 / 16 June 2004

Collaborative research

Technology initiatives new


Basic research, competitive funding new

Human resources


Research infrastructures

Coordination of national programmes


6 axes


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6. CONCLUSION (« factor 10 in EU research»)
 Towards a « European Research Area » in nuclear fission and radiation protection

- ◆ **Nuclear energy continues to supply 35% of electricity in the EU-25 :**
 - ensure a continuation of Europe's outstanding safety record, to efficiently manage the treatment and storage of waste, to maintain the high standards of radiation protection and to maintain efforts to avoid proliferation.
- ◆ **Political/economical challenge** to Euratom research and training: de-fragmentation and integration of centres of excellence (not assistance)
- ◆ **European strategy for nuclear research, education and innovation**
 - main stakeholders: research, academia, manufacturers, utilities, regulators
 - common needs, vision and instruments : common vision still weak !
 - "value for money" assessment of participation in EU research (gain = 10 !)
- ◆ **Commission Proposal for FP7 (2007 – 2013):** e.g. develop "joint technology platforms" and relaunch knowledge-driven research


23 November 2005 - Slide 21/22

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Thank you
for your attention


23 November 2005 - Slide 22/22

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