Evolution of the CHERNE network according to the new Erasmus+ program

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Overview

- Introduction
- What is the CHERNE network
- Strategic partnership: Blended learning in radiation protection and radioecology
  - Objectives
  - Implementation
  - Sustainability
- Conclusions
Situation of the Higher Education in Nuclear Sciences

- Decreasing of the global teaching offer due to
  - financial restrictions
  - lower interest of the young generation

- Important technological challenges
  - Development of new Nuclear Power Plant technology (Generation IV)
  - New European BSS related to radiation protection
  - Dismantling of old installations and waste management

- Need of well trained professional workers
  - high level of skills and competencies with important practical training
What is the CHERNE Network

- Open network bringing together academic institutions involved in education in Nuclear Engineering and Radioprotection (www.cherne.ntua.gr)
- 21 partners representing 10 countries
- Created in 2005
- Allows the sharing of large experimental devices and specific competences of teaching staff
- Organizing different learning/research activities:
  - Specific course of an Institution open to students of partners (increase the teaching offer)
  - IP courses (with the support of the European Lifelong learning program)
  - Erasmus exchanges
  - Access to PhD
New possibilities linked to Erasmus 2020 program

- Possibility to create large partnership including non academic partners

Strategic Partnerships aim to:

- develop initiatives addressing one or more fields of education training
- promote innovation, exchange of experience and know-how between different types of organizations involved in education, training and youth or in other relevant fields.
Strategic partnership: Blended learning in radiation protection and radioecology

Objectives:

- Development of a blended learning program in radiation protection and radioecology
- Continuous education program for people already involved in radiation protection
- Acquisition of specific competences in the nuclear field for those who were not involved in nuclear and radiological techniques during their studies
- Contribution towards standardization of the knowledge across Europe in radiation protection and safe use of radioactive materials
Partnership:

- Academic Partners (from the CHERNE network) representing 7 countries:
  - HAUTE ECOLE PAUL-HENRI SPAAK (ISIB) – BELGIUM
  - UNIVERSITEIT HASSELT (UHasselt) - BELGIUM
  - FACHHOCHSCHULE AACHEN (FH Aachen) - GERMANY
  - UNIVERSITA DI BOLOGNA (UNIBO) - ITALY
  - UNIVERSIDADE DE COIMBRA - PORTUGAL
  - CZECH TECHNICAL UNIVERSITY IN PRAGUE (CTU) – CZECH REPUBLIC
  - NATIONAL TECHNICAL UNIVERSITY OF ATHENS (NTUA) - GREECE
  - UNIVERSITAT POLITECNICA DE VALENCIA (UPV) - SPAIN

- Non-academic partners to add value to the partnership:
  - a research institute: NATIONAL RADIATION PROTECTION INSTITUTE (SURO) – CZECH REPUBLIC
  - a regulatory body: GREEK ATOMIC ENERGY COMMISSION (EEAE) - GREECE

The non-academic partners have been chosen according to their competence in a specific field and their possibilities to promote the program during and after this project.
Development of the project

What are we trying to achieve?

During the European funding: to increase student employability by offering a program that responds to the market needs:
- E-learning platform
- Real mobility
- Internships
- Certification (Europass Certificate Supplement and ECTS for students)

After the funding: in addition to the first aim, we also want to increase the qualifications of the people already involved in the work market by:
- Extending the e-learning modules to this specific audience

Duration of the funding: 2 years (from September 2015 to end of June 2017)
Ways to fulfil the objectives

- Blended means:
  - E-learning (= virtual mobility)
  - Training courses (= real mobility)

- For the students:
  - E-learning modules will be used as a preparation for advanced course modules, for selection of the students in the case of practical sessions (pre-requisite) and finally for the follow-up of the global program
  - Real mobility to access large experimental devices not present in each country and to be given the opportunity to do an internship in other EU countries.

- For the workers:
  - E-learning mobility to acquire new competences and for continuous education purposes
Intellectual outputs: deliverable proposed

- O1: Analysis of the present situation in radiation protection and radioecology within the European countries
- O2: Implementation of course modules on an e-learning platform
- O3: Training in Radiation Protection and Radioecology

For each output, we have defined
- A leading institution
- Partners, regarding skills of each participant
Project Deliverables

- Database/report on the market needs
- E-learning platform (including internship platform)
- Mobility trainings
- Certifications (Europass Certificate Supplement for professionals, Europass Certificate Supplement and ECTS for students) in the radiation protection field that can be recognized by the national authorities of the partner institutions.

- One partner (UNIBO) will be responsible of the global assessment of the deliverables
01: Analysis of the present situation in radiation protection and radioecology within the European countries

- Leader: U Hasselt
- Aim:
  - Evaluation of the present situation
  - Evaluation of the need of the labour market in terms of skills and competences
- Deliverable:
  - Report will be presented next week during the CHERNE annual workshop and published on the project website
O2: Implementation of course modules on an e-learning platform

- Leader: EEAE (Greek Energy Atomic Commission) (organizing the platform)
- Coordinator of contents: NTUA (Technical University of Athens)
- Leader of each module have to coordinate the contents with Athens
- Aim:
  - Accessibility for workers
  - Pre-requisite for training modules
- Deliverable:
  - 6 e-learning modules of 2 ECTS each
  - Uploaded on a Moodle platform; power point, small web film and on-line exercises
  - First modules 1, 2, 4 and 5 are in a finalization phase and will be proposed during the winter term of next academic year to the students of each partner
  - Others will be presented during the summer term.
## E-learning modules (1)

<table>
<thead>
<tr>
<th>Title</th>
<th>Basics nuclear and radiation physics</th>
<th>Basics of measurement and dosimetry</th>
<th>Radiation protection</th>
</tr>
</thead>
</table>
| Subject | • Radioactivity, radionuclides and ionizing radiations  
• Nuclear reactions  
• Applied nuclear physics  
• Interaction between radiation and matter  
• Description of a radiation beam | • Measurement of  
• gamma, neutron,...  
• Spectrometry  
• Dosimetry | • Basic principles of radiation protection  
• EU legislation  
• Shielding evaluation  
• ALARA principles |
| Participants | SURO, Coimbra | Athens, CTU | UPV, EEAE |
| Leader | CTU | FHAachen | SURO |
E-learning modules (2)

<table>
<thead>
<tr>
<th>Title</th>
<th>General safety principles</th>
<th>Basics radiochemistry</th>
<th>Medical applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subject</td>
<td>• European legislation</td>
<td>• Introduction (principles, industrial applications of radionuclides)</td>
<td>• Medical techniques for diagnostics and therapy</td>
</tr>
<tr>
<td></td>
<td>• Risk related to industry (chemistry, electricity, biology)</td>
<td>• radiochemical working techniques</td>
<td>• Quality assurance</td>
</tr>
<tr>
<td></td>
<td>• Risk assessment: methodology</td>
<td>• decontamination techniques</td>
<td>• R P for workers and public</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• R P for patients</td>
</tr>
<tr>
<td>Participants</td>
<td>ISIB</td>
<td>FHAachen, U Hasselt</td>
<td>Athens, (Unibo, FH Aachen) EEAE</td>
</tr>
<tr>
<td>Leader</td>
<td>UPV</td>
<td>ISIB</td>
<td>Coimbra</td>
</tr>
</tbody>
</table>
E-learning platform: use

- During the funded part of the SP, these e-learning modules will be used for:
  - the preparation of the training modules
  - the selection of the students in the case of practical sessions
  - the follow-up of the global program

- Afterwards, the modules
  - can be followed individually as continuous education for workers who need to develop specific skills (sustainability) with some fees
  - can become part of regular courses of academic partners
  - can be used for specific training in radiation protection (Radiation Protection Officer)
Training in Radiation Protection and Radioecology

- Mobility training will consist in 5 days of experimental work on real devices.
- The training modules will involve student mobility and staff mobility (from academic and non-academic partners).
- The institutions where the different modules will take place, will also be in charge of the development of each module.
  - These institutions have been chosen according to the experimental devices they can give access to.
  - But other partners can of course contribute to the development or the implementation of a part of the module.
- A total number of 16 students/module is foreseen.
  - The student selection is based on their knowledge in nuclear and radiation physics (developed in the distance learning module) and in English.
O3: Training in Radiation Protection and Radioecology

- Leader: CTU
- Aim:
  - Real mobility
  - Uses of large specific devices
- Deliverable: 6 training modules of 2 ECTS each
- A coordinator for each training activity have been defined
- Recognition
  - ECTS certificate to be used in the own institution
  - Europass Certificate Supplement delivered to increase participant employability.
# Training modules (1)

<table>
<thead>
<tr>
<th>Title</th>
<th>probability risk assessment.</th>
<th>Environmental measurements</th>
<th>Safe industrial applications of radiation and radionuclides</th>
</tr>
</thead>
</table>
| Subject | • Principle of risk assessment  
• Applications in nuclear industry.  
• Exercises on software for specific cases | • Introductive lectures  
• Field trip and sampling  
• Analyze of samples in the laboratory | • Introductive lectures  
• Radiation protection in industry: real manipulation on large devices  
• ALARA workshop |
| Participants | ISIB | ISIB, SURO, NTUA | SURO, Coimbra, NTUA, FH Aachen |
| Leader | UPV (01-2017) | Uhasselt (04-2017) | CTU (09/2016) |
## Training modules (2)

<table>
<thead>
<tr>
<th>Title</th>
<th>Radiochemistry</th>
<th>Radioactive waste management</th>
<th>Practical radiation protection in medical field</th>
</tr>
</thead>
</table>
| Subject | • Radiochemical techniques  
          • Safe handling of radionuclides  
          • Tracer applications  
          • Decontamination techniques  
          • Identification of radioisotopes:  
          • Evaluation of the activity, energy and efficiency calibration(experimental and/or MC calculation, Activity measurement in real samples)  
          • R P of the workers, patients and public  
          • Practical cases  
          • Measurement of doses  
          • Calculation of shielding | |
| Participants | EEAE, UPV | ISIB | Coimbra, CUT, GEAC |
| Leader | ISIB  
         FHAachen,(09/2016) | FHAachen, Uhasselt | Unibo |
Sustainability of the training modules: Development of local partnership

- Material developed for training modules during the first phase of the strategic partnership can be re-used by partners
- "Geographic partnership" can be created to bring together teaching staff and students with low travel cost
- Encourage collaboration between partners acting in the same geographical area
- One "Geographic partnership" already exists since more than 5 years
  - Uhasselt and ISIB have developed since 2009 a 2 week intensive program dedicated to measurements of radionuclides in the environment
- Others can be created in relation with the development of an e-learning or a training module
Conclusions

- Regarding future developments, it is essential to maintain a high level of competences and skills in the framework of safe use of nuclear facilities, radiation protection and waste management.
- European harmonization is going on with the new BSS.
  - Teaching and learning tools have to be developed within European collaborations.
- Erasmus + (2020) gives good opportunities to build a large partnership.
- Sustainability have to be achieved after European funding.