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Improved expertise in radiation protection, nuclear chemistry and geological disposal

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Introduction

- Global concern: have sufficient and adequate resources for
 - Current and future **safe operation of existing** nuclear installations
 - **Development of new** nuclear technologies for wellbeing of society
- To cover need for resources:
 - **Attract people** to the different domains of nuclear applications
 - Maintain **high level of competences** (knowledge, skills, attitudes)
- This means:
 - Attract → **provide correct and objective general information**
 - Generate knowledge → **research and education**
 - Develop competences → **education and training**

In this presentation

- To prevent decline in expertise and to meet necessary future demands:
 - Education and training
 - General awareness through information and communication
- Focus on
 - Competences in nuclear chemistry, geological disposal, radiation protection
 - CINCH, PETRUS and ENETRAP project series + CONCERT + EAGLE project



Radiochemistry - CINCH I + II (2010-2016)

- CINCH I + II aimed at mitigating the skill-based deficits within nuclear chemistry at masters and doctorate levels and the decline of number of staff qualified
- The projects were built around the SAT approach for training (Analysis, Design, Development, Implementation, Evaluation); while CINCH-I dealt with the first three phases, CINCH-II concentrated on implementation and evaluation (pilot courses).

RESULTS

- Optimal curriculum for MSc and PhD level were proposed
- 3 specialized courses were delivered
- A wiki was produced
- Towards a quality label for master in nuclear and radiochemistry
- In total about 20 students benefited from the initiatives of CINCH I and II

Radiochemistry - MEET CINCH

- Safeguarding and improving/extending results of CHINCH I + II
 - To pro-actively bring the results achieved so far to their end-users (CINCH VET e-shop)
 - Significantly contribute to attracting new talents and increasing the nuclear (chemistry) awareness by developing a MOOC – Massive Open On-line Course
 - Investigate the applicability of the modern Flipped (Inverted) classroom concept in the nuclear chemistry teaching and training field
- RESULTS
- After 18 months (50% of the project) teaching concepts (basic course, radiochemistry lab course, ca 20% of the MOOC) developed and tested for evaluation. Pre-version of course for regulators is evaluated; final version under development

Geological disposal – PETRUS (2006-2018)

- During 12 years, PETRUS built a network of trust, mutual support and knowledge transfer among European universities, research centres, and RWM organizations
- Assessment of **needs of end-users** and establishment of basket of knowledge that students need to fulfil these needs
- **Implementation of a European Master's** curriculum through collaboration of different European universities
- **Pioneering on ECVET**: job profiles created and associated LOs defined
- **Organization of PhD event** to bring together young academics and professionals
- **Integration of PETRUS in ENEN** in order to guarantee continuation beyond project duration
- In total more than 200 students have enjoyed PETRUS activities (130 hours of courses have been prepared, 4 PhD events have been organized)

RESULTS

Radiation protection - EJP CONCERT (2015-2020)

- Interlinks research in all areas of application of ionising radiation throughout Europe
- Develops a joint European strategic research agenda (SRA) in the field of radiation protection that is expected to be:
 - multidisciplinary in science
 - tailored to societal needs
 - make full use of newly gained knowledge in all disciplines of life sciences and humanities
 - fully **integrate E&T especially for the young generation** to build up and maintain competences needed for a successful and sustainable radiation protection regime in Europe today and in the future.

Radiation protection - CONCERT (2015-2020)

RESULTS

- CONCERT WP7 deals with E&T:
 - Support junior scientists with travel grants
 - 10,000 euro per year; 59 grants up to now spread over 16 EU MSs
 - Calls for proposals to organize scientific short training courses
 - 49 courses funded up to now, about 850 students participated
 - Coordination and collaboration on E&T policy and strategy
 - Outreach towards related networks (EURADOS, ALARA, NERIS, ALLIANCE, EUTERP, ...) and their E&T initiatives
 - Dedicated session or booth at RPW conference, some bilateral initiatives
 - Career development
 - Junior scientist briefings and training at EURATOM platform meetings and European conferences

Radiation protection - ENETRAP (2005-2018)

- Series of three projects dealing with policy and implementation of E&T in RP, based on Council Directive 96/29/EURATOM and its revision 2013/59/EURATOM (Basic Safety Standards)
- Focusing on professionals more than students
- ENETRAP I+II:
 - Developed a European Master in Radiation Protection (≈200 students since 2007)
 - European survey on national needs and capabilities
 - Propose ENETRAP training scheme for RPE, that could serve as basis for mutual recognition
 - Develop and implement European pilot courses (e-learning and face-to-face ≈50 students)
 - New definition of RPO and RPE (replacing the confusing QE) definition

RESULTS

- Guidance document for implementation of E&T programmes for RPEs and RPOs → based on BSS, offers help to MSs
- Develop and implement ENETRAP training scheme for RPEs
 - Curriculum + LOs
 - Pilot courses specialized modules for RPE in NPP and RR, geological disposal, healthcare (≈30 students)
 - Attempt for European “label”/endorsement by HERCA
- Demonstration of possibility mutual recognition of RPE
- ENETRAP train-the-trainer (job profile defined, LOs, 3 sessions, 40 participants)
- Capacity building platform: website with information+ database with courses, internship and job opportunities
- Collaboration with HERCA, Art 31 GoE, IAEA, IRPA, ...
- Sustainability through EUTERP Foundation

Information and communication - EAGLE (2013-2016)

- Need for better communication with the public on radiation and its benefits/risks
- Enhance public understanding, facilitate informed decision making (associated to risk)
- Establish two-way communication and joint problem solving
- Main specific recommendations for E&T and information
 - Support science correspondents and journalists with courses and “science media centre”
 - Stimulate citizen science
 - Start in school (low ages)

Conclusions

- Actions to maintain an exemplary record in nuclear activities:
 - Inform the public
 - Educate students
 - Train professionals
- EC supports many project to achieve this goal, we have discussed those focusing on geological disposal, nuclear chemistry and radiation protection
- Recommendations – points of attention:
 - E&T of high quality: connection E&T with research/legal + attention for TTT
 - Ability to adapt to target public and address all stakeholders
 - Sustainability and retrievability of project outcomes and deliverables
 - Information exchange / collaboration between projects should be stimulated