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(Contract Number: 604974)

DELIVERABLE (D-N°2.6)

Description of training and education coordinated platform

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Reporting period: 01/06/2016 – 31/05/2017

Date of issue of this report: 31/05/17

COMET date of project: 01/06/2013

Duration: 48Months





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Project co-funded by the European Commission under the Seventh Euratom Framework Programme for Nuclear Research & Training Activities

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Executive Summary

The Radioecology Education and Training Platform (E&T platform), incorporated on the Radioecology Exchange website, is a focal point for students and professionals interested in radioecology. The platform presents an overview of education and training course modules within radioecology/environmental radioactivity presently offered by the COMET consortium. Information on course curriculums and learning outcomes is provided, with recommended pathways to obtained academic merited education (MSc, PhD). The Radioecology E&T platform also provides links to other E&T platforms, such as those within Radiochemistry, Radiobiology and Radiation Protection. This is an important outreach mechanism for the Radioecology E&T platform, as – for example – many of the basic course modules within radioecology are also relevant for other nuclear science students, and vice versa. The E&T platform contains a number of distinct items:

- The EU MSc in Radioecology is a tailored two-year MSc programme, Bologna accredited, consisting of obligatory and voluntary stand-alone course modules. As for any EU MSc, students are free to obtain credits by fulfilling European Credit Transfer and Accumulation System (ECTS) accredited courses at collaborating universities and institutions.
- Radioecology MSc Course Modules – descriptions of the modules currently offered as part of the EU MSc, including the COMET flagship course module Experimental Radioecology. These modules are open to MSc students also from other programmes.
- Other MSc courses offered by COMET partners – this covers relevant courses that are not currently part of the formal Radioecology MSc Programme, but might be relevant to any radioecology student.
- PhD courses – ECTS courses aimed primarily at PhD students. Most European PhD students are expected to follow accredited courses as part of their PhD training. These courses are often relevant and attractive for professional training as well as for some MSc students.
- A Cotutelle agreement between University of Seville, Spain and Norwegian University of Life Sciences (NMBU) has been signed, allowing a PhD student to take a joint PhD degree.
- The Radioecology Research School - a networking forum aimed primarily at PhD students in radioecology and other relevant to nuclear sciences.
- Training courses aimed primarily at professionals. No formal credits such as ECTSs are given, but the courses can be relevant for both workers and students. Vocational credits can be implemented in the future.
- Training Materials – published articles as well as educational websites and films, and links to materials from COMET Training courses.

The present deliverable report details the background and strategy behind the development of the E&T platform, and its various components.

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1. Introduction

Education and Training are essential ingredients in the COMET project. The Radioecology Education and Training Platform (E&T platform), incorporated on the Radioecology Exchange website, is a focal point for students and professionals interested in radioecology. The platform presents an overview of education and training course modules within radioecology/environmental radioactivity presently offered by the COMET consortium. Information on course curricula and learning outcomes are provided, with recommended pathways to obtained academic merited education (MSc, PhD) or relevant competence building and training for professionals. The platform also contains links to other E&T platforms that offer course modules of relevance to radioecology candidates.

The E&T platform contains a number of distinct items. These are described in more detail in the following sections, but are briefly summarized below.

The MSc in Radioecology is a tailored two year MSc programme, Bologna accredited (120 ECTS¹), consisting of obligatory and voluntary stand-alone course modules which are accepted at all European universities following the Bologna model. At present, the only MSc in Radioecology in Europe is hosted at the Norwegian University of Life Sciences (NMBU), Norway, where students can fulfil all necessary courses if needed. EU MSc students are free to make up credits by taking ECTS accredited courses at other collaborating universities.

Information of the individual Radioecology MSc Course Modules currently offered as part of the EU MSc is provided on the website. These modules are also open to MSc students from other programmes, inclusive the EU COMET supported course: Experimental Radioecology that represents a flagship of the COMET E&T effort and is an integral part of the MSc in Radioecology. Most modules are intensive 2 or 3 weeks courses, allowing easy access for foreign students.

Information on other MSc courses available at different COMET partners is also available at the website. These are covering relevant courses that are not currently part of the official Radioecology MSc Programme, but might be relevant to any radioecology student.

A series of PhD courses can be accessed i.e., ECTS credited courses aimed primarily at PhD students, but also open to MSc. Most European PhD students are expected to fulfil some accredited courses as part of their PhD training. These courses are often relevant and attractive also for professional training.

The Radioecology Research School is an international networking forum aimed primarily at PhD students in radioecology and other relevant nuclear sciences. A Cotutelle agreement between collaborating universities, allowing a PhD student to take a joint PhD degree, represents an important collaborative mechanisms.

A series of training courses aimed primarily at professionals are available. Although ECTS credits are not provided, the training can be highly relevant for both workers and students. Training Materials

¹ The European Credit Transfer and Accumulation System (ECTS) under The Bologna Process (ministerial agreements between European countries) designed to ensure comparability in the standards and quality of higher education qualifications. ECTS makes teaching and learning in higher education more transparent across Europe and facilitates the recognition of all studies. The system allows for the transfer of learning experiences between different institutions, greater student mobility and more flexible routes to gain degrees. It also aids curriculum design and quality assurance.

such as published articles, educational websites and films, and links to materials from COMET Training courses can also be found at the website

The Radioecology E&T platform also provides links to other E&T platforms, such as those within Radiochemistry, Radiobiology and Radiation Protection. This is an important outreach mechanism for the Radioecology E&T platform, as many of the basic course modules within radioecology are also relevant for other nuclear science students, and vice versa.

The present deliverable report details the background and strategy behind the development of the E&T platform, and its various components, as well as the actual E&T website development and production during COMET WP7.

2. Background to the E&T Platform

Already in 2000, the OECD/Nuclear Energy Agency's report: "Nuclear Education and Training: Cause for Concern?" reported that many nations were probably training too few scientists to meet the needs of their current and future nuclear industries. Additional studies undertaken within different European projects (i.e., EURAC, ENEN-II, FUTURA) and international organisations (IUR) confirmed the OECD/NEA findings; decreasing student interests, decreasing course numbers, ageing faculty members and ageing facilities. Consequently, the European educational skill base has become fragmented to a point where universities in most countries lack sufficient staff and equipment to provide education in all, but a few, nuclear areas. Of particular concern to the stakeholders (EU Commission, authorities, industry and professionals) are the significant and persistent needs for post-graduates with skills in radiochemistry, radioecology including environmental modelling, and radiation protection including radiobiology and dosimetry. These needs were reiterated at a stakeholder workshop held in 2011 during the EU STAR NoE project (see STAR Deliverable 6.1).

Given this spectrum of requirements, it was suggested (EURAC, ENEN-II) that the needs identified would be most efficiently met by developing a platform where the MSc degree programmes with course modules open to international BSc, MSc and PhD students, sharing teaching expertise and, facilities. Thus, the first MSc in Radioecology in Europe was initiated at the Norwegian university of Life Science (NMBU), Norway.

Within STAR NoE, the suggested E&T platform in Radioecology was initiated, and a series of course modules were offered by the STAR NoE consortium. Furthermore, links to other EU education and training initiatives such as CINCH-II (Nuclear chemistry) and DoReMi (Radiobiology) was established, expanding the list of possible courses available for students and enabling a more cost effective use of the resources already invested in on-going courses and facilities in Europe. Within COMET, the E&T platform initiated within STAR NoE was maintained and further developed.

3. Realisation of the E&T Website Platform

The Education and Training pages on the Radioecology Exchange website, first developed by STAR NoE, has been further developed within COMET. First, the layout of the platform was improved and redesigned and the E&T content periodically updated. Secondly, the platform currently contain information on a series of education and professional development courses developed by COMET (Fig. 1). These courses have expanded the portfolio of those available within radioecology, giving students and trainees more courses to choose from to build their expertise.

In the future, either a new dedicated website will be created or the current wiki pages will be further developed with new courses and workshops relevant for radioecology. The webpages will summarise the information on, and provide hyperlinks to, courses available, not only in radioecology, but also those on radiochemistry, radiobiology and the radiation protection given by CINCH-II, DoReMi, etc.

Welcome to the Radioecology Exchange Protecting Humans and the Environment from Radiation

Home Training & Education Information Exchange SRA Virtual Laboratory Observatories News & Careers

Workshops STAR COMET Events 2017

Home

Training & Education

The ultimate aim of the education and training aspects of STAR and COMET is to ensure a sustainable workforce in radioecology. To do this we are dependent on interactions with the wider radioecology community, through outreach out to students, teachers, employers and employees, and other stakeholders outside of our networks.

Since radioecology is a multidisciplinary science, students on MSc or PhD projects in radioecology have a wide range of future carrier opportunities, and one of our goals is to put students in contact with potential employers and research projects, as well as to ensure that training and education in radioecology meets the needs of those employers.

STAR & COMET will hold a number of courses during the lifetime of the projects, ranging from MSc and PhD courses to workshops and professional development. The majority of these courses will be open to participants outside of the STAR & COMET projects. The education and training work packages are also responsible for running the Radioecology PhD network.

Please click on the links in the boxes below for more information about different aspects of education and training.

Education and Training

- Radioecology
 - PhD
 - PhD Courses
 - MSc
 - Research School
 - MSc Courses
 - Training
 - Training Courses
- Radiobiology
- Nuclear & Radiochemistry

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PhD position in Modelling at CERAD
15th May 2017

PETRUS-ANNETTE PhD Conference
9th May 2017

June field course Chernobyl 1st announcement
8th May 2017

Training course: From nuclear data to a reliable estimate of spent fuel decay heat, October 25, 2017. SCK•CEN. Mol, Belgium
5th May 2017

17th EJP-CONCERT – AIR2 Bulletin
5th May 2017

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Figure 1. The current EU COMET Education and Training webpages

When entering the Education and Training platform, students can access information on relevant courses available under all the different areas of nuclear and radiation protection science, either through a dropdown menu or through clicking on the relevant parts of the diagram shown in Fig. 1. The MSc and PhD courses give credits according to the Bologna model, while training courses may in the future give vocational training credits. At some universities (e.g. NMBU), the MSc/PhD courses are already open to professionals and there is a potential to open for giving both ECTS and vocational training credits simultaneously. The MSc course modules at NMBU are intensive (2-3 weeks) to allow easy access for foreign students and professionals.

As well as information on education and training courses, the E&T platform includes information on the PhD Research Network (see section 6) and some training materials. In addition, the E&T platform will include some interactive tools for student interaction and learning where available.

4. Radioecology MSc Programme - Course Structure and Modules

The only MSc in Radioecology in Europe is presently organized at NMBU. The education is estimated to 2 yrs (120 ECTS), 60 ECTS education (6 course modules and 10 ECTS each) and usually 60 ECTS (1 yr) for the research project. According to the plan, four of six ECTS credited courses (10 ECTS each) can be fulfilled at NMBU, while 2 (10 ECTS each) are optional (at NMBU or elsewhere) and should fit for purpose of the MSc student (related to the research project). Thus, the students can choose course modules being relevant for their future interest of work (Fig. 2). The MSc courses, PhD courses and training courses are given intensively and open to students from all over the world.

The initial course module: Radioactivity and Radiation Protection, organised annually in August, is essential for all students and professionals as introduction to the field of radioactivity. When the course is fulfilled (exam), a certificate (passport) allowing the use of open radioactive sources is provided. Such certificate is needed in order to work with open radioactive sources (e.g., tracers). Secondly, the COMET flagship on Experimental radioecology organised annually in January, covers radioactivity in terrestrial and aquatic environments, and includes a series of COMET scientists as teachers. A COMET Chernobyl field course, organised September 2016 with almost 30 students, mostly internationally, will be organized annually, and the next course takes place in June 2017. Additional MSc course modules includes Research planning, Environmental radiobiology, as well as Risk assessments including the Erica tool.

Welcome to the Radioecology Exchange Protecting Humans and the Environment from Radiation

The screenshot shows the website's navigation menu with options: Home, Training & Education (selected), Information Exchange, SRA, Virtual Laboratory, Observatories, and News & Careers. Below the menu, the breadcrumb trail reads 'Home » Training & Education'. The main heading is 'MSc Courses'. The content area features three sections: 'European Radioecology MSc Programme' (describing a two-year Bologna accredited program), 'MSc course in Experimental Radioecology' (intended for students with environmental science backgrounds), and 'MSc course in Experimental Radioecology' (currently held at NMBU). A sidebar on the right titled 'Latest News' lists several events: 'PhD position in Modelling at CERAD' (15th May 2017), 'PETRUS-ANNETTE PhD Conference' (9th May 2017), 'June field course Chernobyl 1st announcement' (8th May 2017), 'Training course: From nuclear data to a reliable estimate of spent fuel decay heat, October 25, 2017, SCK•CEN, Mol, Belgium' (5th May 2017), and '17th EJP-CONCERT – AIR2 Bulletin' (5th May 2017). Social media sharing icons and a 'Follow Us' section are also visible.

Figure 2. The presentations of MSc courses

[COMET]

5. Training Courses

During COMET, a number of courses have been organized, aimed at professionals, although PhD and Masters students were also welcome to participate. These included refresher courses at conferences (e.g., the ICRER conference in Barcelona, 2014), a professional development course in Radiological Protection of the Environment run by CEH-Lancaster in the UK, and two new field courses, the Chernobyl field course related to a nuclear accident (Kiev) and the NORM field work course in Poland, specifically developed within and by COMET. Full course details and downloadable course materials are available through the 'Training Courses' part of the E&T platform.

6. The Radioecology Research School - the Radioecology PhD Network

The Research school is organized as a virtual forum – the COMET PhD Network - to increase networking and interaction between international students working within radioecology. The network was formally launched in 2012 during the EU STAR NoE project, but has been further developed during COMET (Fig. 3).

Welcome to the Radioecology Exchange Protecting Humans and the Environment from Radiation

Home » Training & Education

Radioecology PhD network

What is it?

The Radioecology PhD network is a virtual forum intended to promote networking and interaction between students and scientists and the rest of the radioecology community. It is organised by the EU project COMET, but is open to PhD students worldwide. The COMET project arranges courses, events and discussion forums for PhD students, and helps students, scientists and employers to get in touch with each other. It was formally launched on the 5th September 2012 at a special session of the International Symposium on Environmental Radioactivity, Plymouth University. The presentations and a summary of the discussion on postgraduate needs can be downloaded [here](#).

What is in it for me?

- Priority for places on COMET-organized student and training courses
- Networking with students and employers
- Opportunities for PhD exchange visits and work placements

Who can join?

Any PhD student engaged in radioecology research or any of its related sciences, such as radiation protection, radiation biology, ecotoxicology, environmental chemistry or nuclear engineering. You do not need to be a member of COMET, or the EU. Just send the following information to **Clare Bradshaw**: name, project title, expected date of completion, university at which you are registered, email/personal web page.

Current PhD students

Here are some of our **current and past students**: please contact them to find out more about their studies. Some of our current students will soon begin to blog about their studies, you can find links to their blogs from the list of [students](#).

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Figure 3: Screenshot of the present COMET PhD Research School webpage.

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The research school - the PhD network - is open to PhD students worldwide, and the intention is to extend to MSc students in the future. Benefits include priority for places on COMET organized student and training courses and visibility for their research projects through a online list of participants with project titles, contact details and possibilities to link to students' own webpages, as well as opportunities for PhD exchange visits and work placements.

7. Future Plans

As to the future of the E&T platform in Radioecology, it is believed that the ALLIANCE will continue to support the work. Furthermore, the new CONCERT project CONFIDENCE and TERRITORIES projects include E&T activities and will add to what is already achieved. The MSc in Radioecology organized by NMBU, Norway, will continue in the years to come, but a challenge is to establish additional MSc in Radioecology in Europe that probably would need external funding. The need for competence in radioecology is still valid; more nuclear power stations are under planning or construction, a series of old installations will be decommissioned and problems with waste and NORM will increase.

The course modules provided by COMET, as well as courses available within the COMET consortium provide the students more specialized courses to choose, building their specialized Radioecology MSc. To be able to build a MSc in Radioecology, if course modules follow the Bologna convention standards, a joint degree ([Cotutelle agreement](#)) between collaborating universities would boost the EU MSc program and student access throughout Europe.

Student migration funds are essential and several universities have stated their interests in application to the EU (Erasmus Mundus). National funding at universities for staff is also important for maintaining teaching competence within EU. Furthermore, mutual acceptance of course modules utilized within radioecology, radiochemistry, radiobiology and radiation protection is a cost efficient way to cover the educational needs. The training and education collaboration between universities and other institutions should be based on a Memorandum of Understanding, and should include E&T (relevant course modules) as well as the possibility to develop Joint degrees.

In the future, education and training in radioecology will most probably be promoted by the ALLIANCE, where the E&T platform of the Radioecology Exchange is maintained by the E&T WG lead. An ALLIANCE E&T working group is already in place and currently comprises nine organisations (UB, NMBU, CEA, IST, IRSN, UP, HZDR, SCK•CEN, CIEMAT). This working group also connects to E&T WP of EJP CONCERT (European Joint Programme for the Integration of Radiation Protection Research) and to other platforms (e.g. MELODI-Multidisciplinary European Low Dose Initiative), consortia and projects (e.g., PETRUS III). Thus, it is believed that the effort performed on E&T within COMET will be maintained and further developed in the future.