PETRUS

Education and training for a better world.

November 2016

Newsletter #5

Contents

What is PETRUS?

PETRUS III is a Euratom programme for nuclear research and training. The Consortium includes representatives from twelve different countries all over Europe who work in the nuclear domain at universities and different education and training institutions as well as established companies and agencies in the nuclear sector.

The essential objectives of the project are:

- the practical implementation of an accredited training programme following ECVET principals, leading to a recognised qualification in geological disposal
- the creation and design of a multidisciplinary training and research framework for PhD students
- the development of strategies and frameworks for maintaining the PETRUS initiative long-term.

Editorial

Welcome to our fifth edition of the PETRUS III newsletter !

Prof. Behrooz Bazargan Sabet
Coordinator of the PETRUS project - Mines Nancy, France

As we reach the end of the lifetime of the PETRUS III project, I'm pleased to present this last issue that concludes the adventure we began in 2004 to improve education and training in the field of radioactive waste disposal. Indeed, 12 years ago, when faced with a possible shortage of human resources, of which early warning signs started to emerge at the end of the 1990s, we launched the PETRUS initiative. We understood at that time that the power of the radioactive waste community to pool efforts and resources was essential in overcoming the loss of knowledge and skills that could contribute to reduced safety and security in our countries.

With that insight, it was a natural step to build a network of trust, mutual support and knowledge transfer between the major players of the community. Together, European universities, research centers and radioactive waste management organisations have collaborated in the frame of FP6 and FP7 EURATOM projects and shown that, through better cooperation, the European effort for safe waste disposal can emerge stronger and better prepared for the future. In the last 12 years, we have seen contributions from motivated partners who have given their best to develop E&T means and create a framework for sharing reliable and sustainable knowledge. Within the PETRUS initiative, a strong bond has been created between knowledge providers and end users, encouraging mutual understanding.

I am most proud of our numerous accomplishments over all these years. Among other success stories, we have effectively implemented the European Master's curriculum, based on common courses given in several partner universities, by using synchronous distance teaching. This year, we tested this programme for the seventh consecutive time with an average of 10 to 12 students. We established the PETRUS end-user's council and created the framework for a professional development (PD) scheme. We were pioneers in introducing the European Credit system for Vocational Education and Training (ECVET) principles in our projects, starting with the elaboration of training modules defined in terms of learning outcomes in a "Competency-Based Curriculum". We elaborated multidisciplinary lectures for PhD students that were taught in an innovative format during the PETRUS PhD Conferences held in Nancy in 2015 and in Delft in 2016. Around seventeen participants attended each of these events where a set of high quality lectures on radioactive waste disposal presented by outstanding international experts was combined with oral presentations and poster exhibitions of on-going research work by PhD students. We launched this newsletter which acts as a platform for communication of the project results to all those who wish to support education, training and research in the area of radioactive waste disposal. But above all, the methodologies we initiated that were once perceived as utopian or unrealistic are now seen as a source of inspiration and a solution for other European projects.

While the PETRUS project itself has come to an end, the good news is that the PETRUS initiative will continue through its integration within the ENEN Association. Under the umbrella of the ENEN, a dedicated Working Group will continue to work in order to reap the full benefits of the efforts and accomplishments achieved so far. We are, of course, well-aware that much remains to be accomplished in the spheres of education and training in radioactive waste disposal. We can now rely on an extended network that will assure the sustainability of our initiative. I would therefore invite all of you to join the ENEN Assocciation as a member in order to continue this exciting experience.

To conclude, I should like to thank all of the PETRUS Consortium partners who contributed to the success of this initiative. I look forward to new exciting collaboration opportunities with you.

I wish you much inspiration!

Testimonial

My experience in Delft

Isabel Paiva recounts her experience at the second annual PETRUS PhD Conference

Isabel Paiva
IST ID

I had the pleasure to be a part of the working group, thanks to Prof. Behrooz Bazargan-Sabet (the coordinator of PETRUS), at the 2nd Petrus Opera PhD Conference 2016, organized by another "Petrunian", Prof. Phil Vardon, at Delft University. Our job was to analyse the students' presentations and/or posters and classify them according to PETRUS excellence parameters. Prizes for the best presentation and poster were at stake.

I was lucky enough to listen to excellent conferences given by the best experts in radioactive waste, not only due to the variety of topics that touched all the main points of the issue but, mainly, due to the passion the lecturers put into the presentations! I praise all of them for the clear link shown between research and the real life problems that all countries with radwaste have to face.

Of course, we were all there to listen to the main actors, the students that had finished or were starting PhD or Post-Doc research. Young researchers presenting their last years of research in many different universities and institutions showing that much has been done and that the future in radwaste research is strong.

Enthusiasm, brilliance and strong knowledge were a common denominator in all of the students' presentations and questions put to them by the audience showed how these young generations of students are getting ready to fly higher.

A poster session was also on the cards where students were asked to explain their work, another opportunity to see to what extent they are involved and how deeply they understand the results of their work and the consequences for the future.

These students are not only the professors, researchers and workers of tomorrow, they are also the future decision makers. Their role is far more important than most of them can envisage at this moment in time but it is something that they will understand soon enough.

Attributing the prizes was not so easy…excellent presentations made the task difficult and a tie emerged. After consultation, the working group decided on two prizes: one for the best female presentation and one for the best male presentation. A prize for a poster was also attributed.

I am grateful for all that I have learnt with the students and lecturers in this PETRUS/OPERA Conference and I am reassured that our universities and research institutions are preparing knowledgeable people, not only scientifically and technically, but also with a strong sense of the main social interest of finding and implementing solutions for radwaste issues. This was clear to me in the conversations I had with the students and lecturers during the breaks.

This common goal in solving problems that affect all countries, regardless of their status is, with no doubt, one of the most important objectives of the PETRUS initiative. I wish for a good and long life for this enterprise as a forum for young generations to let us know that the future is bright for radioactive waste.

www.petrus-opera2016.eu

ANNETTE Survey on E&T and VET initiatives in nuclear

You are kindly invited to participate in the ANNETTE survey on European E&T and VET initiatives.

Tom Clarijs
SCK-CEN

The ANNETTE (Advanced Networking for Nuclear Education, Training and Transfer of Expertise) project aims at enhancing the Europe-wide efforts initiated in the past decades by different organisations belonging to academia, research centres and industry to maintain and develop education and training in the different nuclear areas. The main aim of this action is to consolidate and better exploit the achievements already reached in the past and to tackle the present challenges in preparing the European workforce in the different nuclear areas, with special attention to continuous professional development, life-long learning and cross border mobility.

You are kindly invited to participate in the ANNETTE survey on European E&T and VET initiatives, which can be accessed via the following link: https://survey.app.sckcen.be/fs.aspx?surveyid=c66e3aa1e3a4468ab3daadcd9d8a18d

By participating in this survey, you help shape the future of education and training in the nuclear field.

The ANNETTE project receives funding from the EURATOM Research and Training programme under grant agreement No. 661910.

Read more about the ANNETTE Project by using the following link: http://www.enen-assoc.org/en/training/annette.html

Tom Clarijs introduces us to the MIND project.

MIND – exchange opportunities

Tom Clarijs
SCK-CEN

The Microbiology In Nuclear waste Disposal (MIND) programme is a unique multidisciplinary project which brings together a broad range of leading research institutions and stakeholders in the field of radioactive waste disposal to address the Euratom 2014-2015 Work Programme topic NFRP 6 – 2014: Supporting the implementation of the first-of-the-kind geological repositories.

In the domains of microbiology and nuclear waste, the MIND project partners offer unique exchange opportunities on a Master, PhD or professional level.

Visit the MIND project website to learn more about these exchange opportunities: http://www.mind15.eu/exchange_table/

The MIND project receives funding from the EURATOM research and training programme under grant agreement No. 661880.

WP SUMMARIES

WP #1

Elaboration of the PD training program using the ECVET model

Abdesselam Abdelouas
Mines Nantes, France

1. Objectives of the Memorandum of Understanding

The final task of WP1 was the establishment of the Memorandum of Understanding (MoU), which is a voluntary partnership agreement where E&T mobility is concluded between competent bodies. The purpose of the MoU is to set the general framework of cooperation between training providers and agencies to provide training for the qualification of learners. Also, the MoU aims to set the framework for credit transfer including training contents and Units of Learning Outcomes (ULO) as well as the mutual acceptance of the partners' respective criteria and procedures for quality assurance, assessment, validation and recognition of Learning Outcomes (knowledge, skills and competences).

The period of eligibility of the MoU is decided by the parties for at least 1 year with a basic tacit renewal as long as the agreements set down in the MoU do not significantly change. In case of significant modifications, a new MoU must be prepared.

New organizations could join the MoU upon the acceptance of the founding parties.

For each mobility period a Learning Agreement (LA) involving two or more partners and the mobile learner is required to specify the arrangements.

2. Identification of the organizations signing the Memorandum of Understanding

The organizations signing the MoU are Education & Training providers (higher education institutions, vocational training agencies) and requesting agencies (waste management organizations, ad interim agencies).

3. Qualification covered by the Memorandum of Understanding

Country	
Title of qualification	Safety Engineer – Assessment and Performance Analysis for construction license of a selected site
EQF level	5-6
Units of Learning Outcomes	Unit 1: Basics Unit 2: Foundation for radioactive waste disposal Unit 3: Safety and performance analysis for radioactive waste disposal
See Annex 1	Description of Units of learning outcomes

4. Assessment, validation and recognition

The process undergone by the learner, from learning to certification, is given below. The assessment of the Learning Outcomes could consist of written, practical or oral tests.

The validation could be done through a transcript of assessed Learning Outcomes (KSC) for each Unit. The procedure of validation must be agreed on within the MoU and detailed in the Learning Agreement (LA).

The recognition of the Learning Outcomes is then the process of awarding Units or Qualification.

WP SUMMARIES

WP #2

Actual implementation of the PD training program

Jussi Leveinen
Aalto University, Finland

The key objective of the Petrus III project has been the preparation of a professional development program that builds on the ECVET philosophy allowing students to build up their professional qualifications in the geological disposal of radioactive waste, utilizing means of formal academic training and informal vocational learning activities.

The tasks of WP2 of the Petrus III project have included the preparation of the documents that would be needed for the accreditation of the program. Accreditation of an educational program refers to a continuous quality assurance process whereby procedures and services carried out by educational institutions will be frequently evaluated by an external body or agency to determine if applicable standards are met. Implementation of the process is mandatory for all European institutions of higher education that have joined the so-called Bologna-process.

An essential part of the accreditation process is a self-evaluation carried out by the institutions participating in the program. Transparent and consistent self-evaluation requires planning and documentation of the evaluation process itself. Furthermore, the materials to be submitted to the external evaluation agency should include the description of key elements of the educational program, including the resources available for the practical implementation and administration. Comparisons carried out in the WP2 suggested that, as a whole, the work packages 1 and 2 of the Petrus III-project prepared the essential documentation for the accreditation process. In WP2 deliverable reports were prepared so that they would function as draft documents for future implementation and could be adapted as draft templates for internal evaluation. The description of the program and the underlying needs of stakeholders as well as descriptions of the administrative procedures were already completed in WP1.

In order to be able to utilize the available courses in consortium universities, the WP2 was to develop a model on how the professional development program could be combined with academic studies and accredited following the ECTS-system applied in European IHEs. Some methodologies tackling the same issue have already been proposed in previous projects, such as the BETWIN-project. However, these procedures were considered to require a systematic harmonisation of the descriptions of course curricula in the universities willing to take part in nuclear education. A flexible approach that relies, on the one hand, on the relative weighting of units of the program and, on the other, on the estimated student workload was prepared. Utilization of the program could be possible in one of the partner countries and, at Aalto, practices exist on how to combine informal learning outcomes with academic training. However, with the present legislation concerning higher education and Aalto University, the recognition of the program as an equivalent to a Master's program can involve legal obstacles. If a large number of nuclear organizations were to be involved, there is no reason why the collaboration could not lead to an EU-wide recognized qualification.

WP SUMMARIES

WP #3

PETRUS-OPERA PhD conference review

Phil Vardon
Delft University, Netherland

The PETRUS-OPERA PhD Conference was the second annual event organised within the PETRUS III project, following from the first event held in Nancy, France. The location of this event was the Delft University of Technology (TU Delft) and was held in conjunction with the completion of the national research programme in geological disposal OPERA (http://www.covra.nl/disposal/opera-disposal). The conference was organised by TU Delft, with support from the Université de Lorraine.

The PhD conference website (http://petrus-opera2016.eu) has been updated and now includes the expert presentations and a link to the recordings of the presentations.

The conference aimed to build a community of promising doctoral students (and early stage researchers) and embed this community into the wider community of experts in the field. The conference had three main components: (i) a school – where expert lectures were given; (ii) a conference – where the participants could present their work and get feedback; (iii) field trips – where context for the work presented could be gained. The field trips took the participants to the research nuclear reactor at TU Delft, the radioactive waste storage site of COVRA in the Netherlands and the SCK-CEN's underground research laboratory HADES in Mol, Belgium.

A wide variety of lectures from world renowned experts were given alongside presentations and poster sessions from the participants. Two prizes were given to the best presentation and best poster. The winners were Biagio Zaffora from CERN, Switzerland for his presentation titled 'Radiological characterization of radioactive waste produced in particle accelerators'; and Anne-Laure Fauchille from the University of Poitiers, France, for her poster titled 'Relationships between cracking, strains and proportions of clay matrix and rigid inclusions in Tournemire clay rock'.

www.petrus-opera2016.eu

The prize winners having received their awards.

Mingling during a coffee break.

The participants of the 2nd PETRUS-OPERA PhD conference at TU Delft.

A snapshot from one of our field trips.

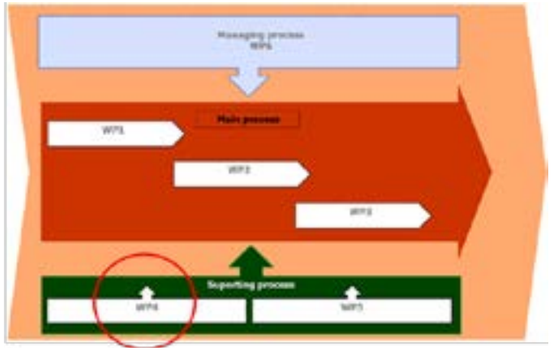
WP SUMMARIES

Think-Tank activities and link with the IGD-TP

WP #4

Bojan Hertl
Arao, Slovenia

The WP4 activities of the PETRUS III project have been focused on coordinating Consortium efforts to increase the effectiveness of European Cooperation in order to maintain a high level of expertise and human resources in the field of radioactive waste disposal and to encourage young generations to consider the nuclear field and particularly radioactive waste disposal as a career choice (Picture 1).



Picture 1: Process approach to PETRUS III project

The WP4 activities were organised through the PETRUS III steering board, PETRUS III End-users Council and in collaboration with the IGD-TP's CMET WG.

Steering board work was coordinated between WP1, WP2 and WP3 to use the "European Credit system for Vocational Education and Training" (ECVET) principles and to develop a "competence-based" curriculum for the elaboration of the radioactive waste disposal Professional Development training program that will be accredited for qualification at academic Master's level. The aim is to implement the PETRUS training programme in at least one of the partner universities and to extend this cross-board collaboration to the creation of training programmes and multidisciplinary research tasks for PhD students.

End-user Council (EUC) has played an important role in the success of the PETRUS II project and was instrumental in helping with the coordination of the following one. Therefore, it was agreed to maintain the End-user Council as a strategic structure with the aim of offering the E&T providers in the PETRUS III project advice on real end-user needs and to promote the development of E&T resources for the personnel in geological disposal. Objectives to provide advice, insight, input and vision for the strategic development of the project and to comment and review the project's products/outputs from the end-user perspective were achieved through the steps presented in Picture 2.

Communication channels with the "Competence Maintenance, Education and Training" Working Group (CMET WG) of the "Implementing Geological Disposal of Radioactive Waste Technology Platform" (IGD-TP) were opened to attract support and involvement of interested stakeholders to support the development of E&T in geological disposal.

Picture 2: End-user Council relations in the project towards IGD-TP's CMET WG

Two main proposals were supported during the final assessment of the PETRUS III project's activities. The first was based on the WP5 proposal to integrate the PETRUS Consortium into the European Nuclear Education Network (ENEN) to assure its long term sustainability and to prepare a certification similar to the European Master of Science in Nuclear Engineering (EMSNE) for the Geological Disposal sector and further the ENEN Petrus Doctoral School. The second was the continuation of the PhD conferences bringing together PhD students and young researchers, along with professionals and academics in radioactive waste disposal. Very successful networking of the EU young generation should be maintained in a PETRUS Consortium under the ENEN structure.

WP SUMMARIES

Sustainability, external collaborations and link with ENEN

WP #5

Pedro Dieguez Porras
ENEN

The integration process of the PETRUS Consortium within ENEN is being satisfactorily completed, per what was envisaged in Work Package 5, with the DoW stated as "Project Sustainability, external collaborations and link with ENEN".

Important steps have been carried out in order to host the PETRUS Consortium within the Association, in the existing structure. One of these crucial steps was the transformation of the Working Group, activated due to the participation of ENEN in the PETRUS projects, into a permanent working group, presently lead by the Coordinator of PETRUS-III, Professor Behrooz Bazargan-Sabet. His presence on the Board of Governors of ENEN, for a period ranging from two to four years starting in 2016, will also provide a sufficient time frame to shake-down and consolidate the operation of the Consortium within ENEN, in a climate of autonomy within coordination.

The PETRUS Consortium has also found its potential enhanced at different levels, including, among others:

• the increase of visibility of its actions in Education and Training on waste management and geological disposal in Europe;

• the involvement in the actions of ENEN beyond Europe, pursued through projects aimed at opening windows of cooperation with specific areas of the world in which nuclear education is developed;

• the involvement in the relations with IAEA and other regional networks which have been developed under its aegis.

In exchange, the ingress of the PETRUS Consortium brings to the ENEN Association its valuable contributions in terms of long lasting experience in the development of E&T actions on waste management and geological disposal, sharing its experience and learned lessons with the other technical communities

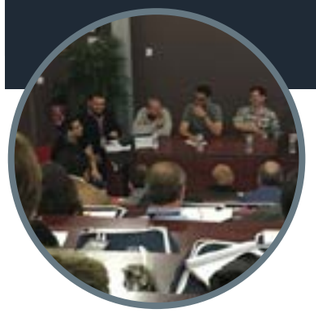
Indeed, the ANNETTE Project will introduce the PETRUS Consortium members, some of which are its beneficiaries, into a broader frame of international cooperation at the European level. The coordination with the fields of Nuclear Engineering / Safety and Radiation Protection will therefore be enhanced by the presence of PETRUS as a Working Group inside ENEN. This will be a considerable benefit, because the already existing contacts with major players in the field (e.g., the IGD-TP platform) will be included into a broader perspective in which all the different nuclear E&T fields will communicate with the respective end-users in a coordinated manner.

For the first time, all the deliverables of a EURATOM research framework project have been publicly published on the network website for transparency and sustainability purposes, making the outcomes available for public sharing and benefit. The PETRUS newsletter has also been distributed to the members of the ENEN as part of its dissemination approach. The combination of future PETRUS PhD conferences and the activities organized in the frame of ENEN-run projects or the yearly ENEN PhD event will be studied.

It must be remarked that the pattern proposed by the Association for the integration of the PETRUS Consortium within ENEN is similar to the one which is being put in place for the TRASNUSAFE Consortium, in order to ensure the sustainability of the courses developed and offered in the frame of the project. This represents therefore a paradigm of the way in which the ENEN association is presently providing longer term sustainability to actions set up by previous EU projects.

The ENEN association will support the development of an agreed strategy to secure a sustainable framework for the PETRUS initiative in the long-term. The members of the PETRUS consortium will therefore have an established body through which to develop E&T activities for different European initiatives and the Implementing Geological Disposal Technological Platform (IGDTP).

EVENTS



Training course in radiation protection

November 21 - 25, 2016
SCK•CEN Mol, Belgium

Target audience: Master or PhD students, or professionals working with radioactive materials or managing nuclear activities and requiring insight in fundamental and practical aspects of radiological protection.

academy.sckcen.be

RPW 2016
Radiation Protection Week

January 16 - 20, 2017
Karlsruhe, Germany

http://enetrap3.sckcen.be/

ETRAP Conference
6th International Conference on Education and Training in Radiological Protection

June 13 - 15, 2016
Stockholm, Sweden

Partners

PETRUS

Partners:

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