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Advanced Networking for Nuclear Education and Training and Transfer of Expertise

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Summary of Special Events and Advanced Networking

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ABSTRACT:

This report summarizes the four ANNETTE special events related to advanced networking, organized in the frame of WP 7.

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1 INTRODUCTION

Two special events have been foreseen by the grant agreement in the format of a half- or full day workshops discussing the advanced networking as developed and proposed within the ANNETTE (Advanced Networking for Nuclear Education and Training and Transfer of Expertise) project. Four events have been organized in the frame of WP 7 (two as in-kind contribution of ENEN to the ANNETTE project) as follows:

- ANNETTE Project Open Workshop at NESTet 2016 Conference in Berlin, Germany, May 25, 2016;
- Academic Session Celebrating 15 years of the ENEN Association, Koninklijke Vlaamse Academie van België, Brussels, Belgium, March 1, 2018;
- ENEN & ANNETTE Stakeholder Event, Stanhope Hotel, Brussels, Belgium, February 28, 2019, and
- FISA 2019 and EURADWASTE '19, E&T networking event, Nuclear Education: A Cause for Concern?, Pitesti, Romania, 4-7 June 2019.

The representatives of European Commission (DG RTD, DG JRC, DG ENER), technological platforms (SNETP, NUGENIA, MELODI, EUTERP), IAEA, OECD/NEA and other interested organizations including Energy for Humanity, Rosatom Tech, GEN-IV International Forum, ENS and FORATOM, were invited to present their views at these special events.

This report documents the aims and agendas of the events and summarizes the views presented and discussed at these events. Finally, some conclusions with respect to the sustainability of the ANNETTE Actions and the nuclear education and training in the future are given.

2 ANNETTE SPECIAL EVENTS

2.1 ANNETTE Project Open Workshop at NESTet 2016 Conference (2016)

The ANNETTE Project Open Workshop was organized as a side event of the NESTet 2016 (Nuclear Education and Training) conference organized by European Nuclear Society (ENS). It took part between 13:30 and 15:30 on May 25, 2016 in Berlin, Germany.

2.1.1 Purpose

The aim of the ANNETTE project open workshop was to provide a forum for the discussion between nuclear stakeholders on the current status, achievements, issues, challenges and some possible future directions and activities of the nuclear ETKM (Education, Training and Knowledge Management). The discussions and the outcomes of the workshop were used to focus the actions within the ANNETTE project.

2.1.2 Agenda

The format of the workshop was a moderated discussion, starting with opening statements of panellists and followed by the interactions with audience. The panellists were asked to focus their contributions towards possible answers to the question "How can nuclear stakeholders better work together to attract and develop (the best) talent?"

The distinguished panelists were (leaflet in Annex 1):

- **Prof. Walter Ambrosini**, University of Pisa, Italy, Past President of ENEN, coordinator of the ANNETTE project proposal;
- **Ms. Satu Helynen**, Vice President, Operations, VTT, Smart Industry and Energy Systems, Finland, Vice president of the NUGENIA Association,
- **Mr. Robert Geisser**, Manager Training Department Germany and Talent Sourcing at AREVA,
- **Dr. Michèle Coeck**, Head of SCK•CEN's Academy for Nuclear Science and Technology, Belgium,
- **Prof. John Roberts**, University of Manchester, UK, Chairman of the SNETP ETKM working group,
- **Prof. Pascal Anzieu**, Directeur, Direction des programmes et formations CEA/INSTN, France,
- **Mr. Keith Allen**, Manager, New Plant Training; Operating Plants Business, Westinghouse, USA,
- **Mr. Massimo Flore**, Scientific Project Officer, JRC EHRO-N, European Commission,
- **Mr. Roger Garbil**, Research Scientific & Technical Project Officer, Euratom Fission, European Commission, and
- **Prof. Leon Cizelj**, Head, Reactor Engineering, Jožef Stefan Institute, Slovenia, president of ENEN Association.

The discussion was moderated by Mr. Jean-Pol Poncelet, Secretary General of FORATOM and ENS.

2.1.3 Summary of discussions

The event attracted about 50 participants, mainly conference attendees.

The existing challenges of education and training are acknowledge widely by all nuclear stakeholders. The anticipated ways to resolve those challenges nevertheless differ significantly given the well-known differences in missions and strategies of stakeholders and the currently unfavorable market conditions, especially for the nuclear power applications. All of those may

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namely strongly influence the choice of careers by the coming generations and consequently also the quality and quantity of available education and training establishments.

The concept of the advanced coordination proposed by the ANNETTE project is seen by all stakeholders as an opportunity to further strengthen the nuclear education and training activities in cooperation with ENEN.

2.2 Academic Session Celebrating 15 Years of the ENEN Association (2018)

The event took place between 14:00 and 18:00 on March 1, 2018, in the Koninklijke Vlaamse Academie van België, Paleis der Academiën, Hertogsstraat 1, Brussels, Belgium.

2.2.1 Purpose

The primary purpose of this academic session was to celebrate the achievements of the ENEN association in the first 15 years of its activities. The invited speakers also provided excellent feedback discussing the opportunities and challenges of nuclear education and training within a wide network of EU and international stakeholders.

2.2.2 Agenda

Three sessions have been hosted at the Academic Session Celebrating 15 Years of the ENEN Association with the following distinguished speakers (leaflet in Annex 2):

- Role of education, training and knowledge management
 - The ENEN Association today and tomorrow
Leon Cizelj, President of the Board of Governors, ENEN
 - Human Resources for Low Carbon Economy.
Vladimir Šucha, Director General, JRC, European Commission
 - Fifteen years of successful cooperation between professionals and academia, as viewed by the European Nuclear Society
Alastair Laird, President, European Nuclear Society
 - The ENEN Association - From FP5 to Horizon 2020
Joseph Safieh, past president, ENEN
- Cooperation with nuclear stakeholders
 - The importance of education and training for the future of the nuclear industry
Yves Desbazeille, Director General, FORATOM
 - On the difficulty to address innovation in nuclear fission
Hamid Aït Abderrahim, Chairman of the Governing Board, SNETP
 - Training and skills management for creating value in nuclear industry
Michel Maschi, President, NUGENIA
 - Education and training activities in the radiation protection area
Michèle Coeck, member of MELODI E&T Working Group and EUTERP Board
 - Skills and trends in operational Euratom safeguards – are we fit for the future?
Stephan Lechner, Director Euratom Safeguards, DG Energy, European Commission
- Cooperation beyond EU
 - Innovation and education, a virtuous circle
Daniel Iracane, Deputy Director General and Chief Nuclear Officer, OECD/NEA
 - Knowledge management and networking activities of IAEA
Wei Huang, Director of the Division of Planning, Information and Knowledge Management, IAEA

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- Current status of Russian nuclear power development and cooperation with Europe: The issue of human resource development
Vladimir Artisyuk, Vice-Rector, Rosatom Technical Academy (RosatomTech)
- Generation-IV International Forum education and training initiatives
Konstatin Mikityuk, Co-Chair, Task Force on Education and Training, GEN IV International Forum

2.2.3 Summary of discussions

The event attracted about 70 participants from a variety of EU and international nuclear stakeholders.

The 15 years of intensive work of the ENEN association has contributed to the preservation and the further development of expertise in the nuclear fields by higher education and training and attraction and development of new nuclear talents in EU. This includes the efforts of the ANNETTE partners to enhance the coordination among the providers and users of nuclear education and training.

Support to the future activities of ANNETTE and ENEN has been indicated by all stakeholders present at the event, while the degree and forms of support will be clearly influenced by the missions, market conditions and public perceptions of related stakeholders.

2.3 ENEN & ANNETTE Stakeholder Event (2019)

2.3.1 Purpose

The dwindling education, training and knowledge management in many nuclear disciplines was interpreted as “a cause for concern” in 2000 by the OECD/NEA report entitled “Nuclear Education and Training: A Cause for Concern?” Many bottom-up initiatives have been started since then, resulting among others in preserving and further development of nuclear education and training. Nonetheless, the long-term sustainability of nuclear education and training seems to be exposed to higher risks than two decades ago.

The main purpose of the ENEN & ANNETTE stakeholder event was to discuss :

- How did this happen?
- What are possible bottom-up and top-down strategies to preserve and further develop the nuclear education and training for the future generations of nuclear workforce and reactors in Europe?
- How can we engage all nuclear stakeholders (including general public) to jointly promote the necessity of and support for nuclear education and training?

2.3.2 Agenda

The format of the workshop was a moderated discussion starting with opening statements of panellists followed by the interaction with audience. The distinguished panellists were (leaflet in Annex 3):

- Mr. Jacques Repussard, former Director of IRSN, France, former chair of MELODI;
- Mr. Yves Desbazeille, Director General, FORATOM;

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- Mr. Petros Papandopoulos, Vice Chair ENS YGN, ETH Zürich;
- Mr. Patrick Child, Deputy Director General DG RTD;
- Ms. Kirsty Gogan Alexander, Founder and CEO, Energy for Humanity, UK;
- Ms. Satu Helynen, Vice-president, NUGENIA, Vice President VTT;
- Mr. Leon Cizelj, President, ENEN, Head of Reactor Engineering Division, Jožef Stefan Institute.

The discussion was moderated by Prof. Joerg Starflinger, Member of the Board of Directors, ENEN, Director IKE, Universitaet Stuttgart, Germany.

2.3.3 Summary of discussions

The event attracted about 60 participants, mainly members of ENEN and other nuclear platforms.

From the presentations and discussions, it appears that the many past and existing bottom-up initiatives, including for example development of new courses within EURATOM Fission Training Schemes and new teaching technologies, did provide a contribution to the preservation and further development of the existing nuclear workforce and higher education and training institutions. They may nevertheless not be regarded as sufficient to attract and develop the new nuclear talents needed for the future development of nuclear power applications. Attraction and development of the best talents to work, communicate and contribute to the specific (safety) cultures in highly technically specialized and multicultural environments will in the future require participation and cooperation of all interested stakeholders.

Cooperation and coordination of stakeholders with very different missions and cultures (e.g., vendors, utilities, regulators, academia, technical support organizations...) could be facilitated much more efficiently with top-down approaches, including advanced coordination as proposed by the ANNETTE project.

It seems that the top-down approaches would need, at least in some member states, stronger support of the competent regulatory authorities and possibly also governments. It also seems that the competent regulatory authorities are the most challenging to be actively engaged in the ongoing discussions about the challenges and opportunities of nuclear education and training. Some potentially useful top-down approaches will be defined in more detail in the strategic agenda of nuclear education and training to be proposed by the ENEN+ project in the very near future.

An idea to revive the NESTet conference jointly by the ENS, ENEN and JRC has started to evolve at the workshop and will be further elaborated in the months to follow aiming at the NESTet in 2020. NESTet is considered an excellent annual or biannual forum for sharing nuclear research news with importance for nuclear higher education, experiences and expectations of educators, trainers and learners and last, but not least, to facilitate coordination between the nuclear stakeholders to secure future nuclear talents.

2.4 E&T networking event at FISA 2019: “Nuclear Education: A Cause for Concern?”

2.4.1 Purpose

The context in which this event was organized was similar to the one of the above described ENEN & ANNETTE Stakeholder Event (2019), though it had different panelists and the specific venue of the FISA Meeting allowed a completely different attendance.

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In particular, in the leaflet of the workshop it was noted again that, following the OECD/NEA 2000 report entitled “Nuclear Education and Training: A Cause for Concern?” a stringent conclusion was drawn: the status of education, training and knowledge management in many nuclear disciplines is reaching a critical point where lack of adequate actions could have a major impact in the development of an efficient process to ensure qualified work force for the industry. Several bottom-up initiatives have been started since then, resulting, among others, in preserving and further developing nuclear education and training. The initiatives allowed the continuation of the existing E&T centers, but lack of cooperation between providers and end-users did not allow for further development and increase.

2.4.2 Agenda

The format of the meeting was a moderated discussion starting with opening statements of panelists followed by the interaction with audience. The distinguished panelists were (leaflet in Annex 4):

- Prof. **Dr. Javier DIES LLOVERA** (Commissioner, Consejo de Seguridad Nuclear, Spain);
- Prof Dr **Joerg STARFLINGER** (Vice-President of ENEN, University of Stuttgart, Germany) ;
- Mr **Petros PAPANDOPOULOS**, Vice-President and **Nathan PATERSON**, President (ENS YGN, Belgium);
- Dr **Pavel ZHURAVLEV** (ROSATOMTECH, Russian Federation).

The meeting was chaired by Mr. Panagiotis Manolatos (DG RTD) (substituting Ms. Katerina Ptačkova) and was moderated by Prof. Walter Ambrosini. The Rapporteur for the EC organisation was Prof. Teodora Retegan (Expert, Chalmers University of Technology, SE). Prof. Retegan’s report is provided in Annex 4.

2.4.3 Summary of discussions

The event attracted participants present at the FISA conference, who filled up the room made available by the organization.

As an introduction, **Walter Ambrosini** proposed the main features of the ANNETTE Project, suggesting “networking” and “cooperation” as “magic” words in view of creating synergies among the different actors in the nuclear E&T fields. The ANNETTE project proposed networking and coordination, making use of the “coordination route” (i.e., the establishment of MoUs among different bodies in the field of E&T) and the “integration route” (i.e., the membership within ENEN of consortia developed independently, wishing to attain long-term sustainability through the Association). Both routes have been experimented. Attention was paid also to the present actions by the ENEN+ project, which deployed a full range of activities addressing different levels of education, from secondary school to BSc, MSc and PhD, in order to reach the future workforce during its evolution and stimulate and collect new talents for nuclear professions.

Javier Dies Llovera pointed out the different needs at university level (attract students to nuclear disciplines, establish and support nuclear education) and at nuclear organization level (recruitment, training, promotion schemes and planning of retirement). Concerning the University level, he stressed the need of an appropriate sizing of the offer (avoiding too many courses with a small number of students) and of supporting the university programs. A reasonable alignment of the demand and the supply of nuclear professionals should be established. National plans to cover

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recruitment needs should be also established; attention to a continuous attraction of nuclear experts must be paid, avoiding periods with several inlets of new personnel and periods of starvation. Training is also considered as another key feature, involving nuclear safety culture and the need to produce managers genuinely expert in nuclear technology. Finally, knowledge management should recover and transfer the expertise that risks to be lost in generational changes.

Joerg Starflinger, Vice-President of ENEN, summarised the concerns related to the nuclear workforce and the projection of needs, considering different demand scenarios. An important concern was expressed by saying that “Life-time extension of NPP is easier to achieve than life-time extension of people, leading to an **increased demand for E&T**”. **In particular, the needs in terms of workforce must be considered a cyclic demand, with the supply that can only cope with it by a delay of 10-20 years.** The current ENEN approaches in the ANNETTE and ENEN+ projects were then discussed. It was then stated that after two decades of »bottom-up« approaches which were only partly effective, a »top-down« phase should be started, with: 1) policy studies to review current and plan future activities; 2) development & implementation of nuclear ET(KM) strategies consistent with the long term visions/plans for nuclear; 3) demand oriented approach, with close connection to industry (main stakeholders). The availability of ENEN to contribute with tools, insight, experience and ideas was then declared.

Nathan Paterson, the ENS Young Generation chair, confirmed that the quality of the E&T initiatives was preserved in the last decades and produced specialists, but there is a cause for concern regarding the interest of people due to external factors. In order to stress this point, he reported a sentence of Prof. Iacopo Buongiorno from MIT (USA) who said that: “Europe and the US are at the tipping point in terms of nuclear knowledge. Either we seriously start building new projects or we will lose all competence”. By the way, the repeated claims that we need innovation in nuclear is counteracted by the immobility of the industry and regulator, so that only little innovation will survive: this causes a negative feedback from students. In describing the young professional expectations, the following were listed:

- Work-life balance (personal fulfillment);
- Career development (social reputation);
- Changing positions every 5 – 10 years (versatility);
- Good income (why not?).

Examples of initiatives stimulating attractiveness were proposed from Finland, Hungary, Croatia and the Czech Republic. On the other hand, examples of good practices for knowledge transfer were reported from Spain, France, Austria and Belgium. The activities of YGN were also presented. In concluding the speech, a good quality of studies was recognized to exist in Europe, while the most critical issues are public perception and volatile political support, which work as “poisons” for attractiveness. A strong commitment “from the above”, i.e. at governmental level, is needed to overcome these difficulties.

The distinguished speaker, Mr. **Pavel ZHURAVLEV** firstly depicted the history of E&T in the nuclear field in Russia, spanning over 50 years from 1967 to 2017. The system of educational organisations is also aimed to assist partner countries in developing their own nuclear education systems. Information on the links between ROSATOM and the partner universities was provided and the structure of the studies from university to training in industry was described. The importance of the ENEN-RU projects (the first and the second ones) was also underlined, stressing the role of the

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ENEN-RU Forum (established in the ENEN-RU II project) in providing the platform and framework for future cooperation between European and Russian E&T organizations. He finally underlined (and all agreed!) that we need **joint projects on competence building and networking**. Cooperation and coordination of actors with relevant missions and cultures (e.g., vendors, utilities, regulators, academia, technical support organizations...) could be facilitated much more efficiently with top-down approaches, including advanced coordination as proposed by the ANNETTE project.

The idea to revive the NESTet conference jointly by the ENS, ENEN and JRC was further elaborated and promoted. The 2020 NESTet should be an important forum for sharing nuclear research news with importance for nuclear higher education, experiences and expectations of educators, trainers and learners and an important hub for cooperation between the relevant nuclear stakeholders to secure future nuclear talents.

Prof. Teodora Retegan in her “rapport” (Annex 4) as a rapporteur on behalf of EC about the workshop summarised its conclusions as follows:

“As concluding remarks, the general request was that there must be a Nuclear education strategy for 2050. There must be a clear definition and tracks of the jobs which are needed in order to be able to adapt the current know-how. A high-impact publication, maybe even a memorandum conveying the discussions and the identified issues must be written and made public, where at least 8-9 scenarios on the needs, issues and existing and future path lines for nuclear field should be presented and discussed. This is aiming at awareness for the decision makers. Younger generation present in the room acknowledged that maybe there is a future in nuclear field, but the communication of this reality does not really reach them. The media channels used by current projects are not up-to-date to the age group intended. Many career paths are entirely personal and up to the interested to follow, however there is a clear need for a thorough analysis of the current situation, the future needs and finally a strategy summing up all the above. This needs to be done yesterday...”

3 CONCLUSIONS

The dwindling education, training and knowledge management in many nuclear disciplines was interpreted as “a cause for concern” in 2000 by the OECD/NEA report entitled “Nuclear Education and Training: A Cause for Concern?” Many bottom-up initiatives have been started since then, resulting among others, in preserving and further development of nuclear education and training. Nonetheless, the long-term sustainability of nuclear education and training seems to be exposed to higher risks than two decades ago.

This and other challenges of contemporary nuclear education and training, including the advanced networking and other activities proposed within the ANNETTE project have been discussed in the four special networking events organized within the project:

- ANNETTE Project Open Workshop at NESTet 2016 Conference in Berlin, Germany, May 25, 2016;
- Academic Session celebrating 15 years of the ENEN association, Koninklijke Vlaamse Academie van België, Brussels, Belgium, March 1, 2018;
- ENEN & ANNETTE Stakeholder Event, Stanhope Hotel, Brussels, Belgium, February 28, 2019, and
- FISA 2019 and EURADWASTE '19, E&T networking event, Nuclear Education: A Cause for Concern?, Pitesti, Romania, 4-7 June 2019.

The existing challenges of education and training are acknowledge widely by all nuclear stakeholders. The anticipated ways to resolve those challenges, nevertheless, differ very much given the well-known differences in missions and strategies of stakeholders and the market conditions, especially for the nuclear power applications. All of those may, namely, influence public perception of nuclear power and also the choice of careers by the coming generations. This choice finally influences also the quality and quantity of available education and training establishments, as well as and the long- term sustainability and public acceptance of the nuclear power industry.

The representatives of European Commission (DG RTD, DG JRC, DG ENER), technological platforms (SNETP, NUGENIA, MELODI, EUTERP), IAEA, OECD/NEA and other interested organizations including Energy for Humanity, Rosatom Tech, GEN-IV International Forum, ENS and FORATOM, attended the special events and presented their valuable views and feedback to the activities of ANNETTE and ENEN in general.

From the presentations and discussions, it appears that the many past and existing bottom-up initiatives , including for example development of new courses within EURATOM Fission Training Schemes and new teaching technologies did provide a contribution to the preservation and further development of the existing nuclear workforce and higher education and training institutions. They may nevertheless not be regarded as sufficient to attract and develop the new nuclear talents needed for the future development of nuclear power applications. Attraction and development of the best talents to work, communicate and contribute to the specific (safety) cultures in highly technically specialized and multicultural environments will in the future require cooperation and participating of all interested stakeholders.

Cooperation and coordination of stakeholders with very different missions and cultures (e.g., vendors, utilities, regulators, academia, technical support organizations...) could be facilitated much more efficiently with top-down approaches, including advanced coordination as proposed by the ANNETTE project.

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It seems that the top-down approaches would need, at least in some member states, stronger support of the competent regulatory authorities and possibly also governments. It also seems that the competent regulatory authorities are the most challenging to be actively engaged in the ongoing discussions about the challenges and opportunities of nuclear education and training. Some potentially useful top-down approaches will be defined in more detail in the strategic agenda of nuclear education and training to be proposed by the ENEN+ project in the very near future.

An idea to revive the NESTet conference jointly by the ENS, ENEN and JRC has started to evolve at the ENEN & ANNETTE Stakeholder Event (2019) and will be further elaborated in the months to follow aiming at the NESTet in 2020. NESTet is considered an excellent annual or biannual forum for sharing nuclear research news with importance for nuclear higher education, experiences and expectations of educators, trainers and learners and, last but not least, to facilitate coordination between the nuclear stakeholders to secure future nuclear talents

A clear and urgent need to prepare the Nuclear education strategy for 2050 has emerged at the FISA 2019 event. There must be a clear definition and tracking of the jobs that are needed in order to be able to adapt the current know-how. A high-impact publication, maybe even a memorandum conveying the discussions and the identified issues, should be prepared and made public. This is aiming especially at awareness for the decision makers.



Advanced Networking for Nuclear Education and Training and Transfer of Expertise
Project reference 661910 funded under H2020-Euratom-1.3. between 1.1.2016 and 31.12.2019

ANNETTE Project Open Workshop

NEStet 2016, Berlin, May 25, 2016, 13:40-15:30

Final version May 20, 2016

Aims and format of the workshop

The aim of the ANNETTE (Advanced Networking for Nuclear Education and Training and Transfer of Expertise) project open workshop is to provide a forum for the discussion between nuclear stakeholders on the current status, achievements, issues, challenges and the future directions and activities of the nuclear ETKM.

Workshop is a part of the ANNETTE activities to interact with stakeholders. The discussions and the outcomes of the workshop will be used to focus the actions within the ANNETTE project.

A moderated discussion **starting with opening statements of panelists (with up to 2 slides/5 minutes)** and followed by the interaction with audience, focusing on **"How can nuclear stakeholders better work together to attract and develop (the best) talent?"**

ANNETTE project (Advanced Networking for Nuclear Education and Training and Transfer of Expertise)

Education, training and knowledge management (ETKM) are essential for the safe and sustainable utilization of nuclear fission (and fusion) in the power and non-power applications. The European Nuclear Education Network (ENEN) Association, with its mission to preserve and the further develop the expertise in the nuclear fields by higher Education and Training, has been among the leaders in consolidating and strengthening the ETKM efforts of all nuclear stakeholders since 2003.

The ANNETTE projects aims at further consolidation and coordination of the many nuclear ETKM activities in Europe and beyond. The main ANNETTE goals include (1) to survey and propose coordination of the ETKM activities among the different nuclear areas; (2) to facilitate continuous professional development; (3) to produce teaching materials including open courses; (4) to facilitate the application of ECVET and cross border transfer of expertise in the industry; (5) to contribute to the enhancements in nuclear safety culture; (6) to bring together the ETKM communities in fusion and fission and (7) to coordinate all those activities with stakeholders. The ANNETTE project brings together 25 partners and is coordinated by ENEN.

The stakeholders include the technological platforms SNE-TP; IGD-TP and MELODI and other relevant associations and bodies, e.g., EHRO-N, NUGENIA, EUTERP, IAEA, and HERCA. Coordination with stakeholders improves coherence of this effort with similar other efforts going on in Europe.

Moderator

Mr. Jean-Pol Poncelet, Secretary General of FORATOM and ENS.

Panelists

Prof. Walter Ambrosini, University of Pisa, Italy, Past President of ENEN, coordinator of the ANNETTE project proposal:

[Introduce ANNETTE Project.](#)

Ms. Satu Helynen, Vice President, Operations, VTT, Smart Industry and Energy Systems, Finland, Vice president of the NUGENIA Association:

[NUGENIA needs/perspective on ETKM.](#)

Mr. Robert Geisser, Manager Training Department Germany and Talent Sourcing at AREVA:

[ETKM and industry \(perception from a country abandoning nuclear?\).](#)

Dr. Michèle Coeck, Head of SCK•CEN's Academy for Nuclear Science and Technology, Belgium:

[pooling research and university resources \(BNEN, ENEN, ?\).](#)

Prof. John Roberts, University of Manchester, UK, Chairman of the SNETP ETKM working group:

[ETKM coordination between ENEN and SNETP.](#)

Prof. Pascal Anzieu, Directeur, Direction des programmes et formations CEA/INSTN, France:

[French experience with coordination.](#)

Mr. Keith Allen, Manager, New Plant Training; Operating Plants Business, Westinghouse, USA:

[ETKM and industry](#)

Mr. Massimo Flore, Scientific Project Officer, JRC EHRO-N, European Commission:

[ETKM perspective by EHRO-N](#)

Mr. Roger Garbil, Research Scientific & Technical Project Officer, Euratom Fission, European Commission:

[ETKM support by the EC.](#)

Prof. Leon Cizelj, Head, Reactor Engineering, Jožef Stefan Institute, Slovenia, president of ENEN Association:

[Perspective of ENEN.](#)

Topics to be discussed

- Is it possible to decouple education, research, expertise, credibility, skills, attitudes, safety culture? In other words, how should all stakeholders work together to attract more and better talents?
- Cooperation within the frame of the ANNETTE Project for future courses
 - Main features of the ANNETTE project: short outline
 - The ANNETTE project is aimed, inter alia, at setting up courses for CPD, coherently with what requested in the Euratom call and with the previously issued SET Plan; an offer of courses has been already proposed while setting up the Consortium, gathering items from different areas (Nuclear Safety/Engineering, Radiation

- Protection, Geological Disposal and Waste Management, Nuclear Fusion): how to plan interactions with an End-User Group for better directing the present offer?
- ANNETTE can be the workbench for establishing systematic interactions between course providers and stakeholders, aiming at planning courses on the basis of better specified needs, to attract new talents in better coordination among stakeholders and course providers; contacts with some platforms are already in place, but how is it possible to systematically activate this dynamics?
 - How to enlarge the offer under the ANNETTE umbrella by letting more course providers joining with “in-kind” contributions? (interests are being expressed)
 - How can ANNETTE become the “umbrella” for future pan-European courses developed in systematic interactions among end-users and course providers?
 - How to attract (more and better) talents to nuclear?
 - Is supply sufficient (quality and quantity) today? Tomorrow?
 - More opportunities for careers?
 - More opportunities /support for education/training?
 - Knowledge management head-book-head- or head-to-head?
 - What can be improved by the ETKM?
 - What can be improved at the end-user side?
 - How to progress towards longterm sustainability in the realistic market conditions?
 - Missions and responsibilities of stakeholders are well known, well defined, and to some extent complementary.
 - National responsibility for the legal framework and to supply trained people
 - Operators responsibility for safety (and trained workforce)
 - Regulators responsibility to provide oversight and enforcement
 - Responsibility of academia to provide basic education for a wide range of duties and for 4-5 decades of active life
 - Responsibility of training providers to develop the basic education into skills, attitudes, cultures, to be continuously developed during the lifetime
 - How to better pool resources and infrastructures?
 - While preserving and strengthening national capabilities and infrastructures
 - (Mission, key achievements and key challenges of ENEN Association)

ANNEX 2: Academic Session celebrating 15 years of the ENEN (2018)



15 years of the European Nuclear Education Network (ENEN)

Academic session

March 1, 2018, 14:00-18:00

Koninklijke Vlaamse Academie van België, Paleis der Academiën, Hertogsstraat 1, Brussels, Belgium

www.kvab.be

14:00 Arrival of guests

Session on the role of education, training and knowledge management

14:30 *The ENEN Association today and tomorrow*

Leon Cizelj, President of the Board of Governors, ENEN

14:45 *Human Resources for Low Carbon Economy.*

Vladimir Šucha, Director General, JRC, European Commission

15:00 *Fifteen years of successful cooperation between professionals and academia, as viewed by the European Nuclear Society*

Alastair Laird, President, European Nuclear Society

15:15 *The ENEN Association - From FP5 to Horizon 2020*

Joseph Safieh, past president, ENEN

15:30 Awards for Outstanding support in the launching and operation of ENEN Association

Session on the cooperation with nuclear stakeholders

15:45 *The importance of education and training for the future of the nuclear industry*

Yves Desbazeille, Director General, FORATOM

16:00 *On the difficulty to address innovation in nuclear Fission*

Hamid Ait Abderrahim, Chairman of the Governing Board, SNETP

16:15 *Training and skills management for creating value in nuclear industry*

Michel Maschi, President, NUGENIA

16:30 *Education and training activities in the radiation protection area*

Michèle Coeck, member of MELODI E&T Working Group and EUTERP Board

16:45 *Skills and trends in operational Euratom safeguards – are we fit for the future?*

Stephan Lechner, Director Euratom Safeguards, DG Energy, European Commission

17:00 Launching the ENEN+ 1 MEUR Mobility Call

Session on the cooperation beyond EU

17:15 *Innovation and education, a virtuous circle*

Daniel Iracane, Deputy Director General and Chief Nuclear Officer, OECD/NEA

17:30 *Knowledge management and networking activities of IAEA*

Wei Huang, Director of the Division of Planning, Information and Knowledge Management, IAEA

17:45 *Current status of Russian nuclear power development and cooperation with Europe: The issue of human resource development*

Vladimir Artisyuk, Vice-Rector, Rosatom Technical Academy (RosatomTech)

18:00 *Generation-IV International Forum education and training initiatives*

Konstatin Mikityuk, Co-Chair, Task Force on Education and Training, GEN IV International Forum

18:15 Adjourn

Dinner

March 1, 2018, 19:00-22:00

Fondation Universitaire, Rue d'Egmont 11, Brussels, Belgium (www.universityfoundation.be)



ENEN & ANNETTE Stakeholder Event

Nuclear Education: A Cause for Concern?

14:00-18:00, February 28, 2019, Stanhope Hotel, Rue du Commerce 9, Brussels, Belgium

Background

The dwindling education, training and knowledge management in many nuclear disciplines was interpreted as “A cause for concern?” in 2000 by the OECD/NEA report entitled “Nuclear Education and Training: A Cause for Concern?”

Many bottom-up initiatives have been started since then, resulting among others in preserving and further development of nuclear education and training. Nonetheless, the long-term sustainability of nuclear education and training seems to be exposed to larger risks than two decades ago.

The challenges to be discussed

How did this happen? What are possible bottom-up and top-down strategies to preserve and further develop the nuclear education and training for the future generations of nuclear workforce and reactors in Europe? How can we engage all nuclear stakeholders (including general public) to jointly promote the necessity of and support for nuclear education and training?

Panelists

Mr. Jacques Repussard, former director of IRSN, France, former chair of MELODI
Mr. Yves Desbazeille, director general, FORATOM
Mr. Petros Papandopoulos, vice chair ENS YGN, ETH Zürich
Mr. Patrick Child, Deputy Director General DG RTD
Ms. Kirsty Gogan Alexander, Founder and CEO, Energy for Humanity, UK
Ms. Satu Helynen, Vice-president, NUGENIA, Vice president VTT
Mr. Leon Cizelj, President, ENEN, Head of Reactor Engineering Division, Jožef Stefan Institute

Moderator

Prof. Joerg Starflinger, Director IKE, Universitaet Stuttgart, Germany

Format

14:00 – 15:45 Opening statements by panelists
15:45 – 16:15 Coffee break
16:15 – 18:00 Moderated discussion.

Acknowledgement

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FISA 2019 Technical Workshop n°3

E&T Networking Event

Co-Chairs: Prof. **Walter AMBROSINI** (Università di Pisa, IT), **Panagiotis MANOLATOS** (DG RTD, EC)

Rapporteur: **Teodora RETEGAN** (Expert, Chalmers University of Technology, SE)

Panelists: Prof. Dr **Javier DIES LLOVERA** (Commissioner, Consejo de Seguridad Nuclear, ES), Prof. Dr. **Joerg STARFLINGER** (Vice-President of ENEN, Uni Stuttgart Germany, DE), Dr. **Nathan PATERSON**, President (ENS YGN, BE), Dr **Pavel ZHURAVLEV** (ROSATOMTECH, RU)

The workshop has been opened by Prof. Walter Ambrosini, which invited the panellist and participants to introduce themselves in order to establish a good connexion between the official participants and the audience.

He further introduced the objectives of the Technical workshop as following:

Objectives

The objectives of the TW3 were the dwindling education, training and knowledge management in many nuclear disciplines. Many bottom-up initiatives have been launched since then, resulting among others in preserving and further development of nuclear education and training, however the long-term sustainability of nuclear education and training seems to be exposed to larger risks than two decades ago.

He introduced the concept of “networking” by presenting ANNETTE Project and ENEN+, concluding that **Networking is therefore a magic word in this field**, meaning that we should act as far as possible together in order to preserve nuclear competences in the nuclear fields: this is a specific mandate of ENEN. Two recent examples were presented, which were crystalized as eventual “routes” for the advancement in networking envisaged in the SET Plan Roadmap for E&T: the creation of an Advanced Network as the “**integration route**” and Advanced Network as the “**coordination route**”.

Practical key recommendations on the paramount importance of guaranteeing an adequate supply of experts and trained cross-sectorial workers will be the main objective of this workshop.

The items for reflection during the workshop were introduced in the form of a set of questions:

- How is nuclear education a “cause of concern”?

- What are the bottom up and top down strategies to preserve nuclear education?
- How we can engage stakeholders in the common **networking effort** for nuclear E&T, e.g. as catalyzed by ENEN?
- How to involve **the general public** (as a major stakeholder) in this process?

Panel discussions

Each panelist started presenting their own view over this topic, like for example a 33 years own experience (Prof. Dr. **Javier DIES LLOVERA**) where some keypoints were highlighted: Achieve **communication** with students at an early stage → building a community-based support & stimulate **interest in the future careers in nuclear technology**.

Adequate sizing of number of master's degrees in nuclear safety / nuclear engineering / radiation protection **by country**. → backbone for R&D groups.

Enhance support to Universities with well-established master's degrees, here there were several examples given.

Prof Dr. **Joerg STARFLINGER** gave his perspective where his experience in ENEN have led to the conclusion that there were bottom-up approach (2 decades) which were: sufficient to maintain the education system and generate warnings; insufficient to attract many good students, no notable improvements; closures of operating plants may suspend the nuclear education. There are **top-down (strategic) approach needed**:

- Policy studies to review current and plan future activities.
- Develop & implement nuclear ET(KM) strategies consistent with the long-term visions/plans for nuclear.
- Demand oriented approach with close connection to industry (main stakeholder)

ENEN can contribute with tools, insight, experience and ideas.

Dr. **Nathan PATERSON** gave his perspective after being involved in YGN and having, as he presented, an a-typical nuclear technology career. The overall conclusion was that Nuclear education in Europe is generally speaking not in a bad shape with some exceptions:

- Public perception and volatile political support are poison for the attractiveness of the studies,
- A lack of job positions, career opportunities and the availability of technical jobs with brighter reputation are existentially threatening the European nuclear competence,
- Commitment needed from above, i.e. governmental level down to the industry.

Also, for answering the question: "Nuclear Education: A Cause for Concern?" The obvious answer would be, from his perspective: "No" in terms of quality of studies however "Yes" in terms of interest of people due to external factors.

For the question: "How can we fix it?": The Public relations need to "talk nuclear", raise awareness within personal network, Support the Young Generation (Network).

Dr. **Pavel ZHURAVLEV** presented the very long history of the Russian education and training experience, started officially by a state decree in 1967 and which was the precursor of the current ROSATOM. Also, he presented to current activities, like the umbrella ROSATOM Technical Academy comprising on 6 training facilities and 2 training centres (at NPPs facilities) as well as the composition of the key activities: 290 training programmes conducted by 120 professional trainers and training specialists. He presented an initiative called "ENEN-Ru Forum" (which was at the third project, stating 2011) as a possible base for future cooperation with Europe. The focus is on the competence building in the areas of

advanced nuclear power technologies through the use of experimental infrastructure and simulation software.

Main discussion and concluding remarks

The main discussions were around the dwindling number of students which are willing to start, continue and afterwards stay in the branch of Nuclear technologies/research. Many programs, especially in the universities have created a “magic number” of how many students are needed for a course or a program to be given. Also, in many countries, there are not new chairs in nuclear related fields and in some cases, some are in “stand-by”, no reason given. Most of the times this is a political decision.

Trainee, promotion schemes and mobility (with a serious scholarship which can cover costs and accommodation) as seen as a positive approach to maintaining the know-how, however it needs to be backed-up with good entrance salary, development scheme and clear paths for advancements in order to be attractive for younger generation.

It would be good if other funding opportunities would open to nuclear related programs, like Marie-Curie.

As concluding remarks, the general request was that there must be a Nuclear education strategy for 2050.

There must be a clear definition and tracks of the jobs which are needed in order to be able to adapt the current know-how.

A high-impact publication, maybe even a memorandum conveying the discussions and the identified issues must be written and made public, where at least 8-9 scenarios on the needs, issues and existing and future path lines for nuclear field should be presented and discussed. This is aiming at awareness for the decision makers.

Younger generation present in the room acknowledged that maybe there is a future in nuclear field, but the communication of this reality does not really reach them. The media channels used by current projects are not up-to date to the age group intended.

Many career paths are entirely personal and up to the interested to follow, however there is a clear need for a thorough analysis of the current situation, the future need and finally a strategy summing up all the above. This needs to be done yesterday.