Opportunities for building nuclear competences and their exploitation: a preliminary analysis

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Motivation

- Building nuclear knowledge, skills and competences is an essential effort for Europe and Worldwide (OECD-NEA, IAEA, EC, ENS, etc.)
- A growing number of initiatives have been implemented with the objective to offer new and more adapted nuclear training opportunities for students and professionals
- Some of these initiatives have been well received others had lower success:

an analysis is performed to understand these discrepancies and to propose actions for potential solutions

Outline

1. Nuclear Education and Training initiatives within ENEN, NUGENIA+ and GENTLE
2. Feedbacks on training programs for professionals
3. GENTLE Students Research Experiences (SRE): Achievements on access opportunities for students to nuclear research infrastructure
4. Suggestions for future actions
5. Conclusions
6. Acknowledgements

1. Nuclear E&T *within ENEN*

- NUSHARE – *Project for sharing and growing nuclear safety culture competence*: focus on policy makers; regulatory authorities; industry
- ENEN-RU-II - *Cooperation with Russia in Nuclear E&T and Knowledge Management*: mirror project by ROSATOM and MEPhi
- PETRUS III - *Program for Education, Training, Research on Underground Storage*: addressing mainly the radwaste agencies
- CORONA II - *Regional Centre of Competence for VVER Technology and Nuclear Applications*: focus on VVER personnel training
- ANNETTE – *Maintain and develop E&T in different nuclear energy and technology areas (including fusion),* with special attention to continuous professional development, life-long learning and border mobility.

1. Nuclear E&T *within NUGENIA +*

- Establishment of the NUGENIA School with the aim to maintain present knowledge of nuclear workforce and transfer it to young scientists & newcomers to nuclear field.

- In practical terms, the school will organise training courses / workshops for junior staff of NUGENIA member organisations.

- The training / workshops will be focussed on specific technical issues, and will be organised in close collaboration with existing nuclear E&T networks, projects, and training academies in order to avoid duplication of efforts.

1. Nuclear E&T *within GENTLE*

- Inter-semester courses on specific topics (*Nuclear Data; Safeguards and Security; Reactor Techniques; Thermal-hydraulics; Fuels; Waste Management; Decommissioning*) for graduate and post-graduate students

- Executive professional education program (managers). Modular training on nuclear energy (*Understanding nuclear power; Producing energy with nuclear reactors; Nuclear fuel from ore to waste; Conditions for social justification of nuclear energy; Management systems*)

- Student Research Experiences (SRE): mobility grants for BSc, MSc and PhD students enrolled in European Universities.

2. Feedbacks on training programs for professionals

- Recommendations have been formulated for building and keeping human capabilities and expertise (OECD-NEA, IAEA, etc.):
  - Continuous effort to identify new/specific education and training needs,
  - Provide accordingly opportunities both in the academic domain and for professional development,
  - Carry over the accreditation and certification culture into the vocational training sector,
  - Foster networking among industries, universities and research centers,
  - Draw and put in practice attractive career opportunities.

2. Feedbacks on training programs for professionals

- Recommendations: Identify education and training needs,

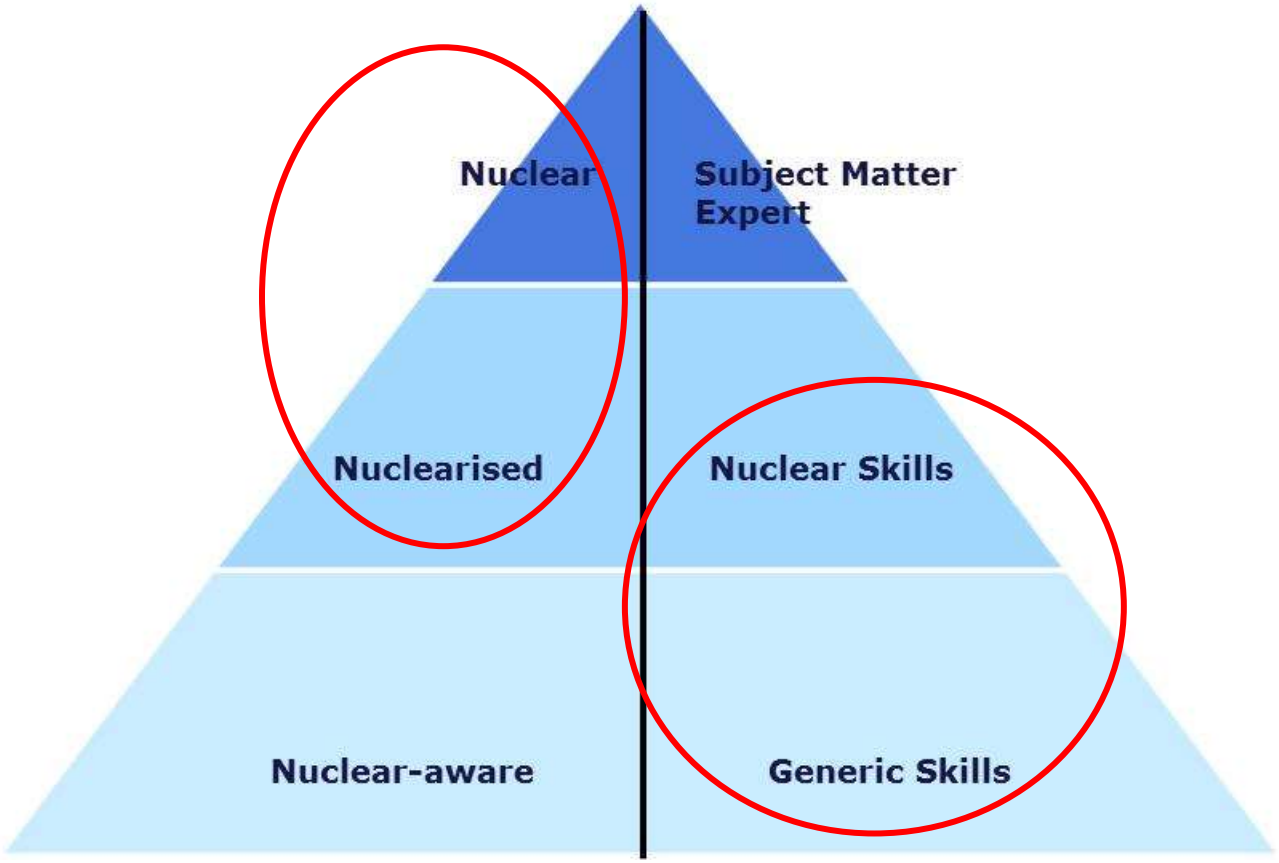
Done through surveys widely spread to industries, TSOs, etc. through different channels:

GENTLE: on the modular executive program (only 12 responses)

NUGENIA +: on the NUGENIA school (only 2 responses)

Therefore assumptions on E&T needs have been done

assumptions on needs: categorisation of competences



OECD and EHRO-N

UK

assumptions on needs: who is involved

Individuals

Consolidate (existing)/acquire competences

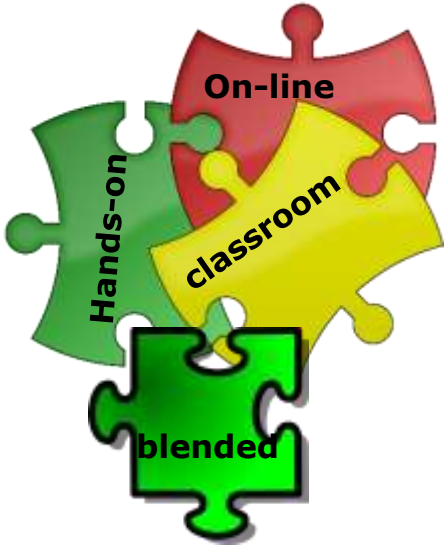
Deliver training opportunities

Require competences

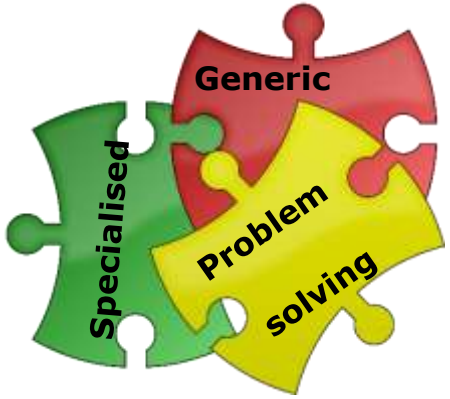
Training Providers

Nuclear employers

assumptions on needs: the puzzle



Individuals



ECVET

EQF level

Costs

Duration

Training Providers

Nuclear Employers

Nuclear aware

Nuclear Professionals

nuclearised

Accreditation

Non Nuclear Professionals

assumptions on needs: examples

Individuals

Nuclear aware/Generic skill: require nuclear awareness

Nuclear Skills/ Nuclearised: require nuclear specific knowledge

Universities: Students and ECTS

Research Centres: Nuclear facilities for students and professionals

Training Providers

Employers with nuclear competence framework and own training programs

Employers that need to nuclearize workforce but do not have own training programs

Nuclear Employers

A potential solution

Individuals

A more effective interaction is desirable

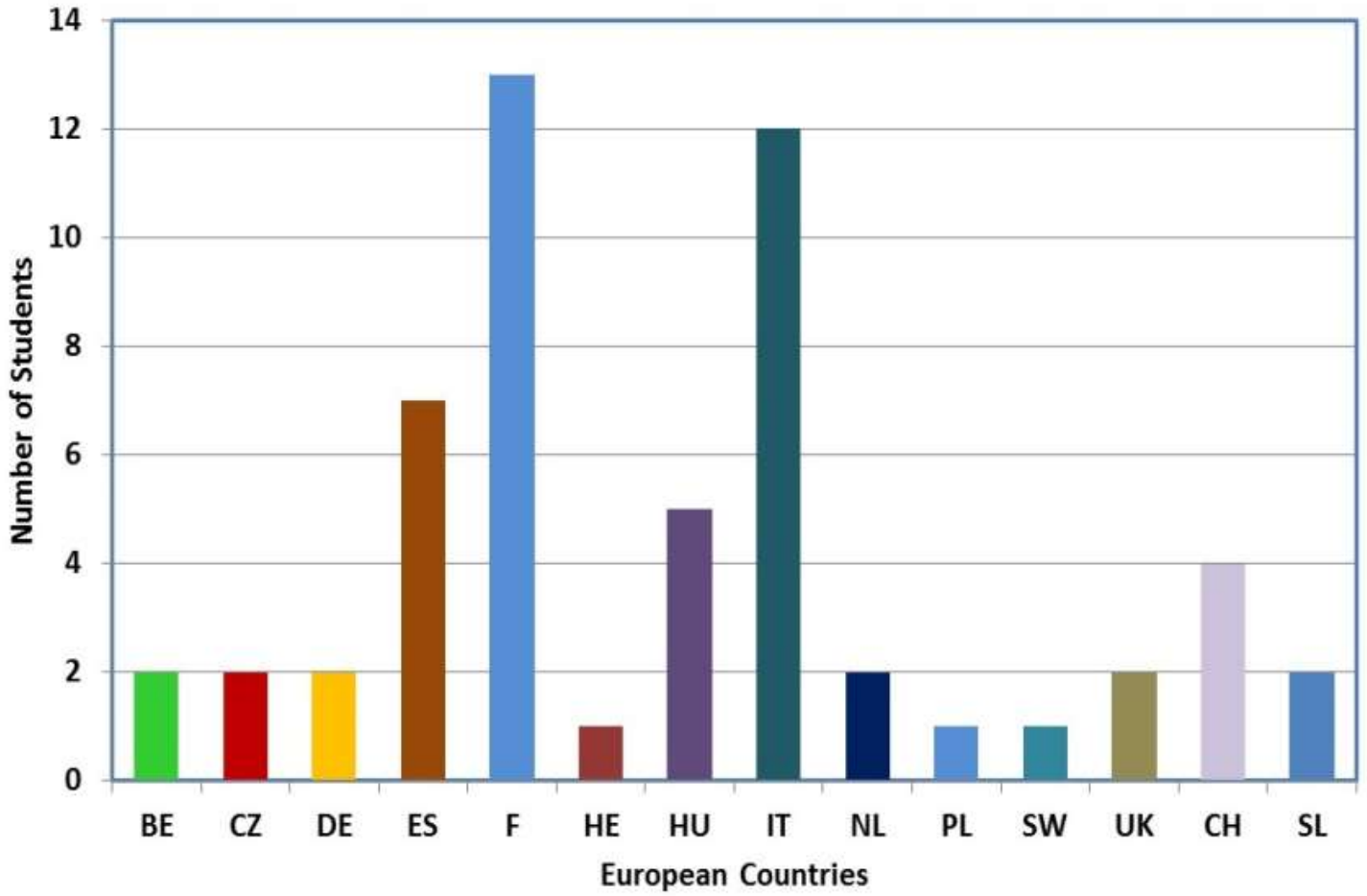
Networks (ENEN)
Platforms (SNETP, IGDTP)
Associations (FORATOM, ENS)

Training Providers

Nuclear Employers

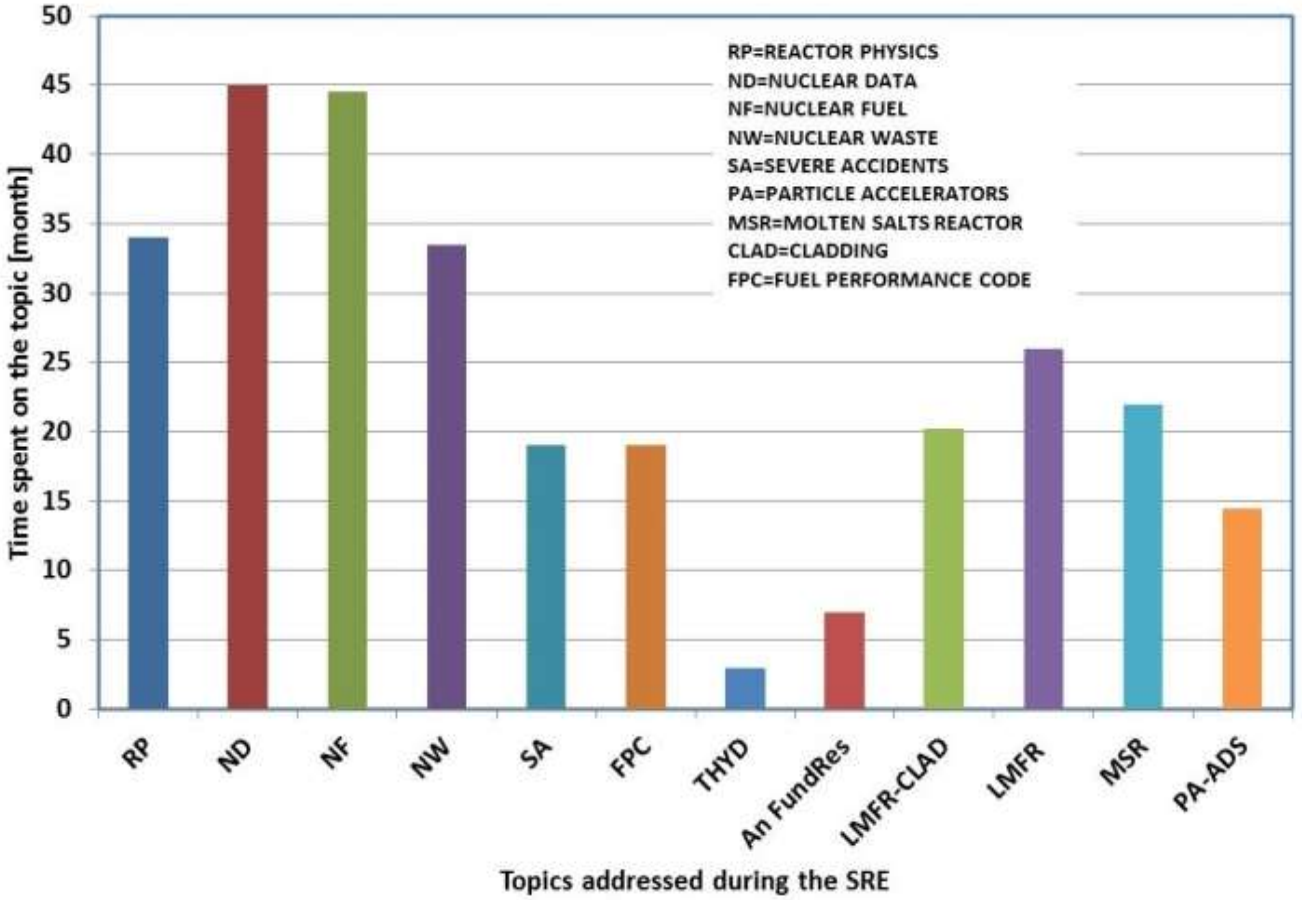
The GENTLE executive professional training transformed in a MOOC on „introduction to nuclear energy“
Soon available on the EdX platform

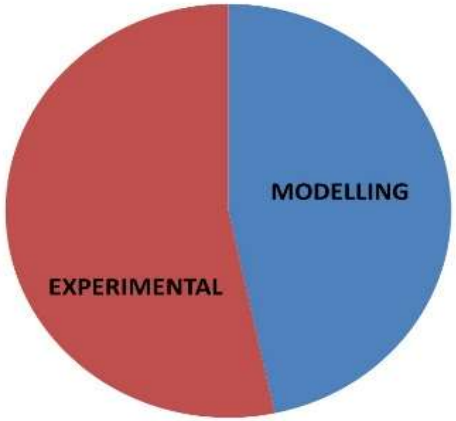
3. GENTLE SRE: mobility grants for students to access nuclear research infrastructure



During ~ 2 years more than 50 students from 14 countries have used the GENTLE mobility grants accessing nuclear "facilities" of the GENTLE partners

3. GENTLE SRE: mobility grants for students to access nuclear research infrastructure





Topics addressed by the students during the GENTLE mobility grants

4. Suggestions for future actions

- Continuous and outspoken dialog with European stakeholders (industry, research, TSOs, regulatory body, etc.) on nuclear energy and associated needs in order to identify shortcomings and possibly correct them and to improve the mutual understanding of developing more focussed nuclear knowledge, skills and competences.

- Establish specialised (sectorial) partnerships between education and training providers and nuclear employers for a deeper and continuous collaboration on nuclear competences and associated training needs.

4. Suggestions for future actions

- Integrate in the European approach the renewed interest for nuclear energy and innovation challenges that can be observed in different world-regions as long-term strategic efforts both for security of energy supply and for climate change mitigation.
- Develop exchange programmes for students/young researchers within EU and with countries outside EU that have a dynamic nuclear program. Enlarge hands-on training and field experiences
- Improve interaction with general public, provide training in media utilisation
- For a wider outreach: introduce e-learning modules, MOOCs, webinars etc. on nuclear energy and innovation.

5. Conclusions

- Nuclear energy is a controversial topic in Europe and there is a substantial risk that it might become less attractive for talented students and professionals:
  - Improve the communication on nuclear energy (training on media): with public, within academia, among energy professionals and policy makers.
- Clearly established and attractive career pathways in view of long-term evolution are needed:
  - Improve the communication on human resources /job opportunities/ professionals needed. Underline value of multidisciplinary skills offered by nuclear
- Strong partnerships between nuclear employers and education and training providers are essential:
  - Improve communication in order to obtain value for financial and human resources invested

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Thank you for your attention