Attracting & Developing New Nuclear Talents: Know-Why or Know-How?

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ENEN: European Nuclear Education Network

ESTABLISHED in 2003
Steady support by European Commission through projects

OBJECTIVE
the preservation and further development of expertise in the nuclear fields by higher Education & Training.

ACHIEVEMENTS
• Exchange of information, best practices, teachers and students
• Voluntary accreditation in academic education (QA/QC)
• Coordination of projects of mutual interests (~1MEUR/year)
• Coordination of Education, Training, Knowledge Management) activities among different NUCLEAR knowledge communities
• Facilitating communication & cooperation between nuclear stakeholders

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ENEN+ Project Mobility

Attract, Retain and Develop New Nuclear Talents Beyond Academic Curriculum

More than 400 students mobilized in 18 months with 0.6MEUR (0.4MEUR for next 18 months).
EU citizens anywhere & anybody to EU.

http://plus.enen.eu
Setting the scene

The importance of training and education in maintaining safety cannot be understated.

(NAdvisory Group Meeting on Education and Training in Nuclear Safety, IAEA, 2001)

Nuclear energy should (continue to) use the best available people, science, knowledge, technologies and operational experience.

Good culture for safety resolves and eliminates known problems.
Historic data (USA)

Nuclear engineering degrees conferred

2001 2009 2011

Nuclear students enrolled in Harbin Engineering University, China

Notes: Dates shown reflect the end of the academic year

Source: Oak Ridge Institute for Science and Education. Nuclear Engineering Enrollments and Degrees Survey
Nuclear Workforce in EU (2012)

↓ workforce needs 2010-2018

↓ ↓ ↓ workforce needs 2018-2028

Existing workforce (no replacement of retired)  Number of operating NPP (40 years)

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Nuclear Workforce in EU (2012)

- Existing workforce (no replacement of retired)
- Number of operating NPP (60 years)
- Number of operating NPP (40 years)
Nuclear Workforce in EU (2012)

Cyclic Demand! Supply can only cope with delay 10-20 years!
Lessons learned (2000-2018)

2000/2001
OECD/NEA: Nuclear Education and Training: A Cause for Concern?
US DOE (NERAC): The Future of University nuclear engineering programs....
EC: How to maintain nuclear competence in Europe

2012
OECD/NEA: Nuclear Education and Training: From Concern to Capability
EC (EHRO-N): Putting into perspective the supply of an demand for nuclear experts by 2020 within the EU-27 nuclear energy sector

2018
Prof Bum-Jin Chung, @IAEA HRD Conference, Korea:
After 2 decades, still concerns!
• We tend to solve easy problems First
• We tend to be more concerned about How than Why
• Phase out of nuclear power plants continues.
Education concerns persisting for 2 decades!? 

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Know-Why vs. Know-How

Education

Why?
Knowledge
Research
Curiosity
Academia

Training
Knowledge mngmt

How?
Skills
Experience
Need
Industry
Knowledge communities

http://stage-gate.com/newsletter/nl_feb_2012.htm
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## Typical traits of know-why and know-how cultures

<table>
<thead>
<tr>
<th>Know-Why</th>
<th>Know-How</th>
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</thead>
<tbody>
<tr>
<td>Education, knowledge</td>
<td>Training, skills,</td>
</tr>
<tr>
<td>Research, curiosity</td>
<td>Experience, need</td>
</tr>
<tr>
<td>Academia, problem(s)</td>
<td>Industry, regulators, solution(s)</td>
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<tr>
<td>Creativity</td>
<td>Protective (IP, best practices)</td>
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<tr>
<td>Innovative</td>
<td>Conservative</td>
</tr>
<tr>
<td>Learns through errors</td>
<td>Precludes errors</td>
</tr>
<tr>
<td>OPEN, TRANSPARENT</td>
<td>CLOSED</td>
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<tr>
<td><strong>Difficult</strong> to develop and maintain:</td>
<td><strong>Easy</strong> to develop and maintain:</td>
</tr>
<tr>
<td>Strategic planning, communication, cooperation</td>
<td>Market (&amp; regulations) driven</td>
</tr>
<tr>
<td>Long term investments (.gov &amp; .com)</td>
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</tbody>
</table>
Classic talent attraction pipelines

Why and How
Nuclear Education
Training
Work

Why and How
Nuclear Education
Training
Work

Weakest link!
Since ~2000!

How
Nuclear Education
Nuclearizing Training
Work

Nuclear Know-Why & How for .com, .gov, .edu, .org, ...

Transparency!
Defense in depth!
Safety Culture!

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Principal future talent attraction pipeline

Why and How
Nuclear Education
Training
Work

stronger support needed!

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Nuclear Know-Why & How for .com, .gov, .edu, .org, ...

Transparency!
Defense in depth!
Safety Culture!

Nuclearizing Education
Training Work
Summary

Nuclear energy should (continue to) use the best available people, science, knowledge, technologies and operational experience.

Nuclear education in distress since 1990s.

Nuclear education should remain a necessary prerequisite for training.

Bottom-up solutions (e.g. ENEN):
- Assist in maintaining the education system(s) and generate warnings;
- Insufficient to attract many good students;
Summary

Top-down approaches needed:
- Strategic planning, communications and cooperation of nuclear stakeholders (e.g., .gov, .com, .edu)
- Long term investments

ENEN to propose an EU wide nuclear ETKM strategic agenda.

Good culture for safety resolves and eliminates known problems.
Thank you for your attention

www.enen.eu

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