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NUCLEAR EDUCATION AND CAPACITY BUILDING

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NUCLEAR POWER AND COMPTENCE BUILDING – THE NEXT CHALLENGES

NUCLEAR EDUCATION AND CAPACITY BUILDING

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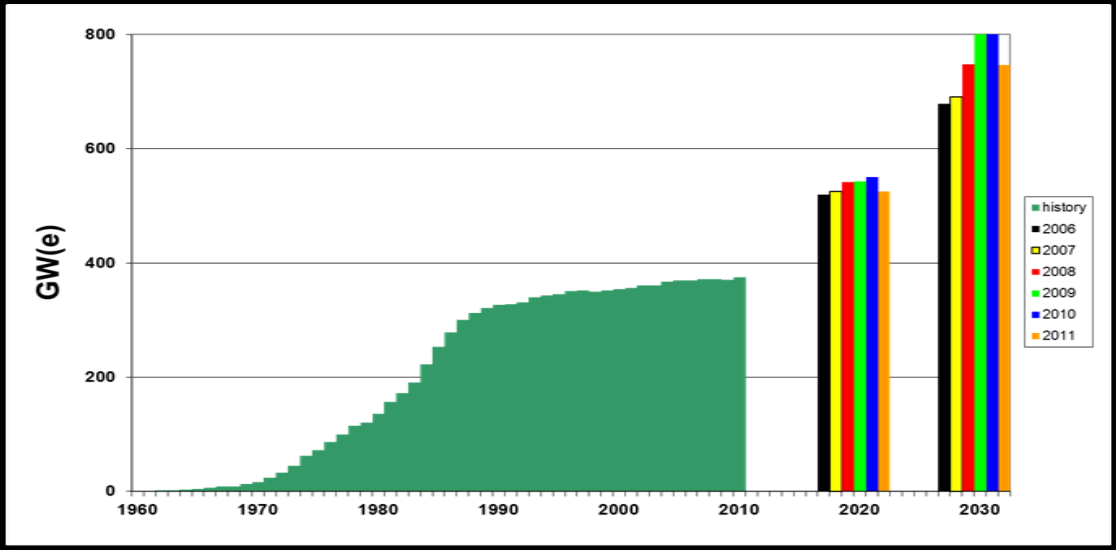
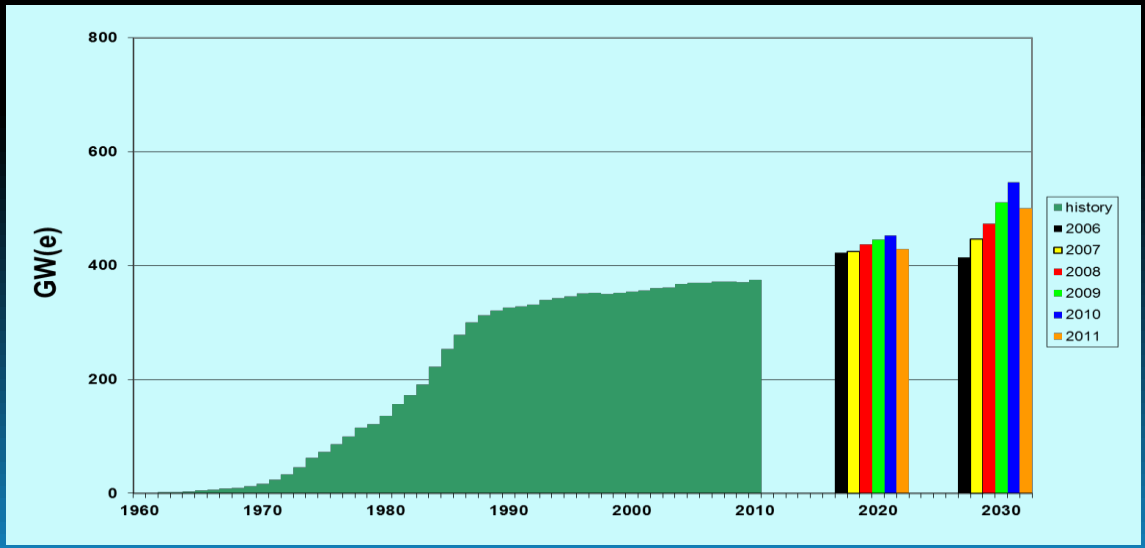
Education and Training

- **Education** is the delivery of knowledge, skills, and information from teachers to students. Education usually ends with a diploma.

- **Training** is the process of creating competence through a systematic learning and practical exercises from an experienced trainer to an un-experienced trainee. Training is usually certified.

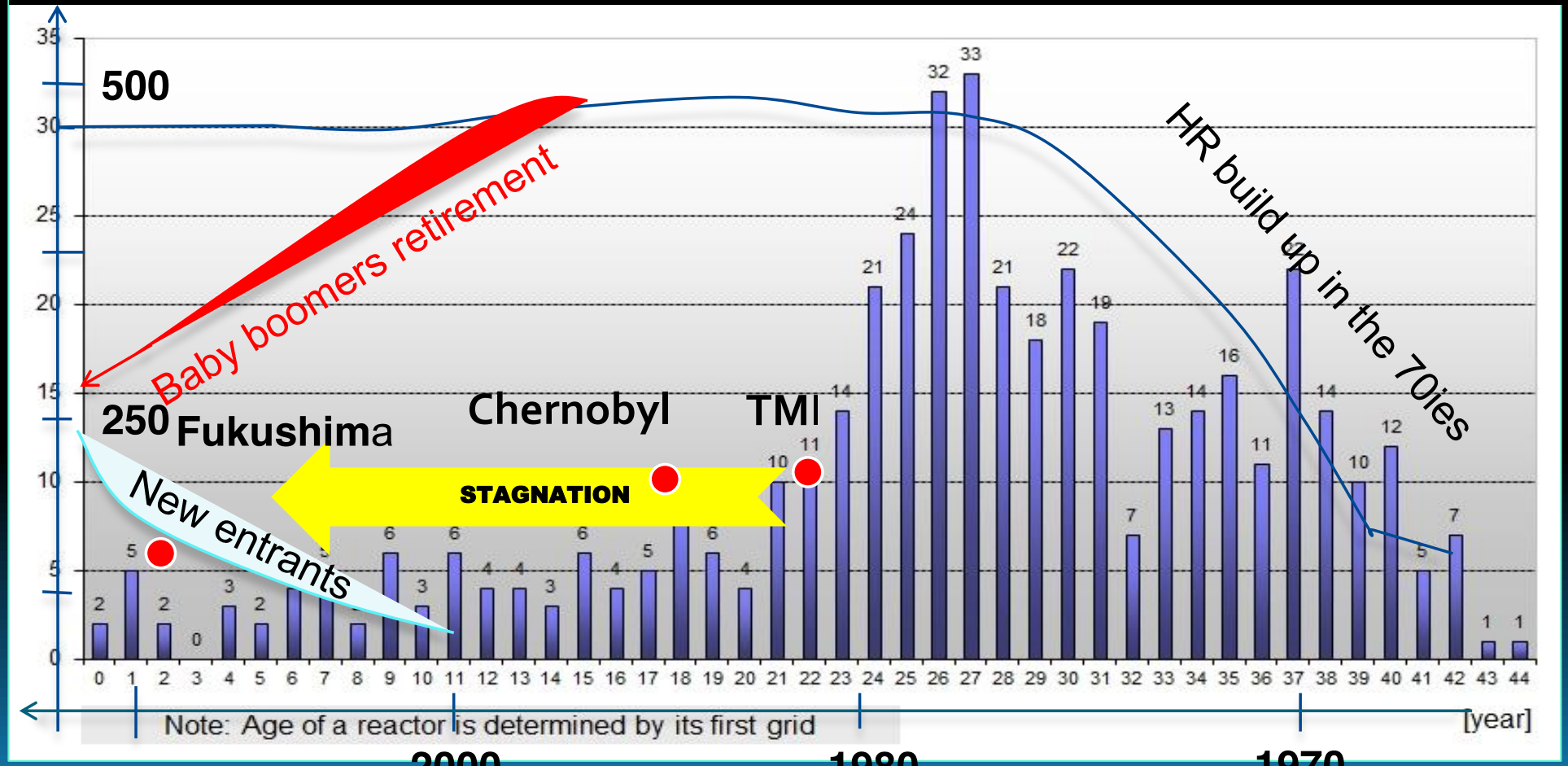
Nuclear Power perspective





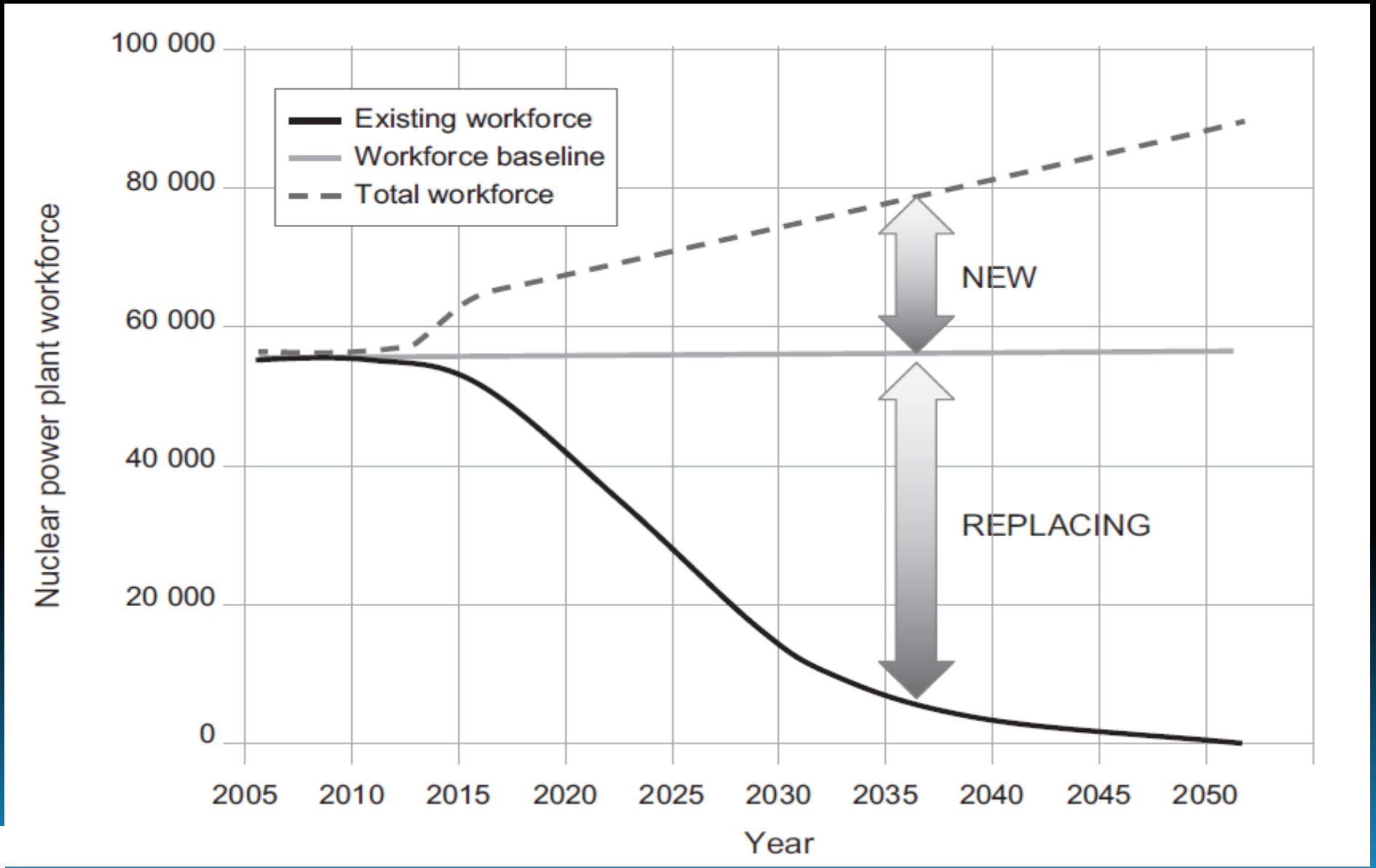
- Nuclear Power development requires very specific competences, based on *knowledge* and *understanding* as well as on *skills* and *behavior*.
- Nuclear power needs strong nuclear safety culture world-wide.
- With new countries establishing programs for introducing nuclear power the demand for harmonization becomes ever more important.

History and Present



The Nuclear Workforce Issue

(mature countries)



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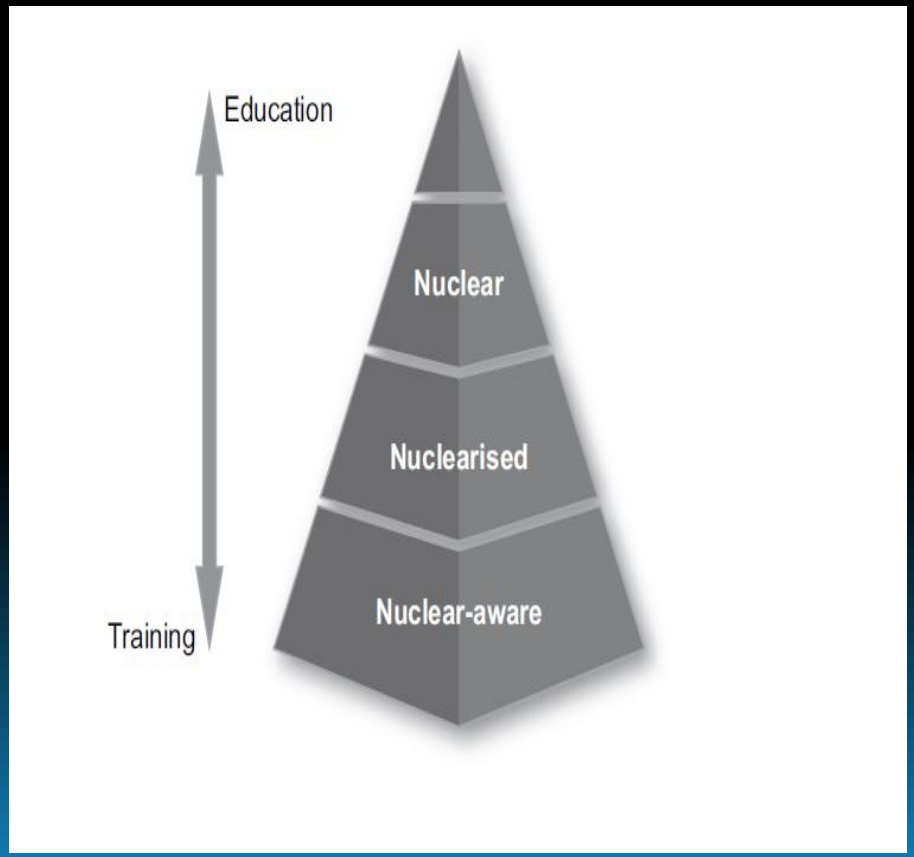
Nuclear Competence

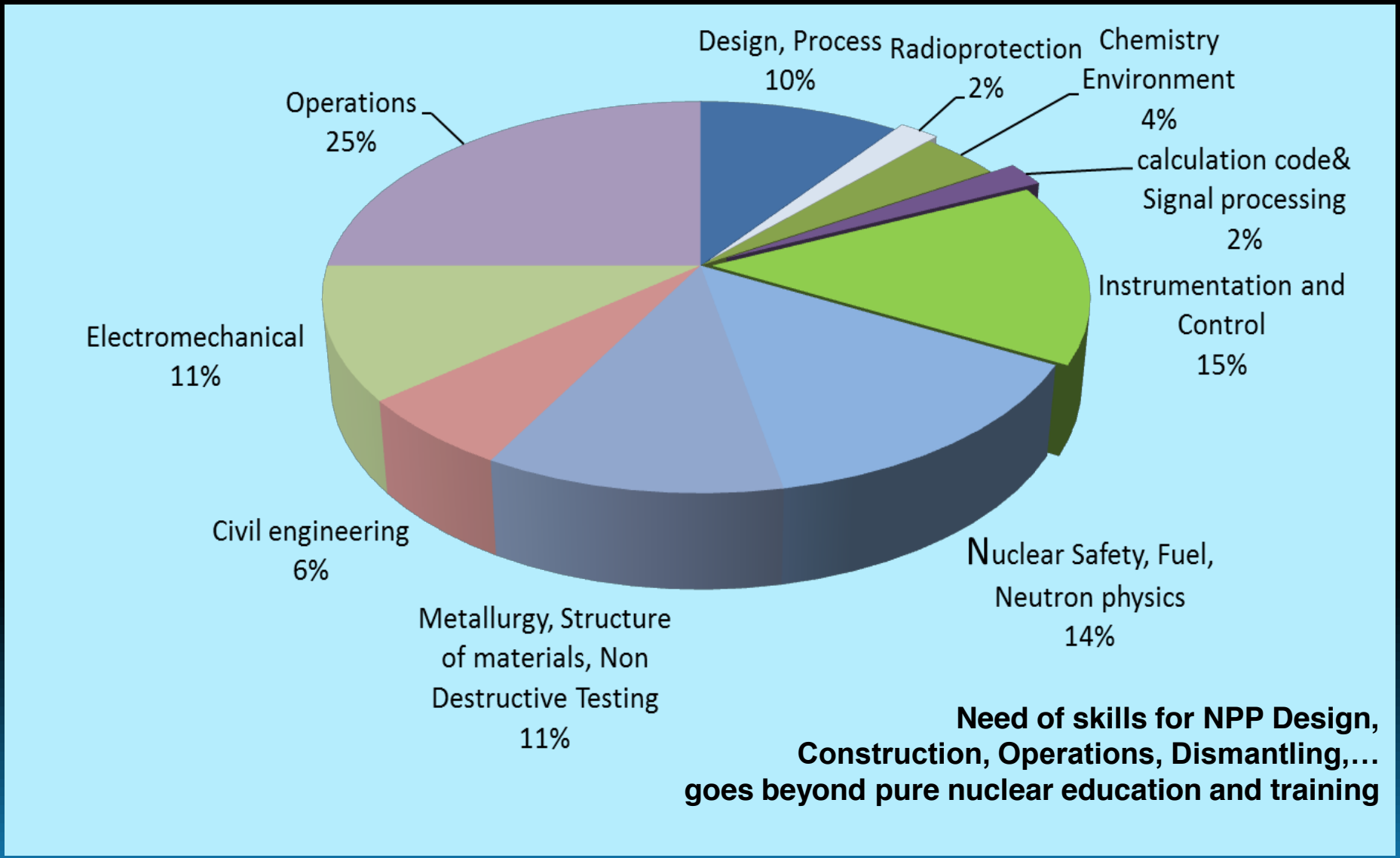
Competency range



Three levels of competence

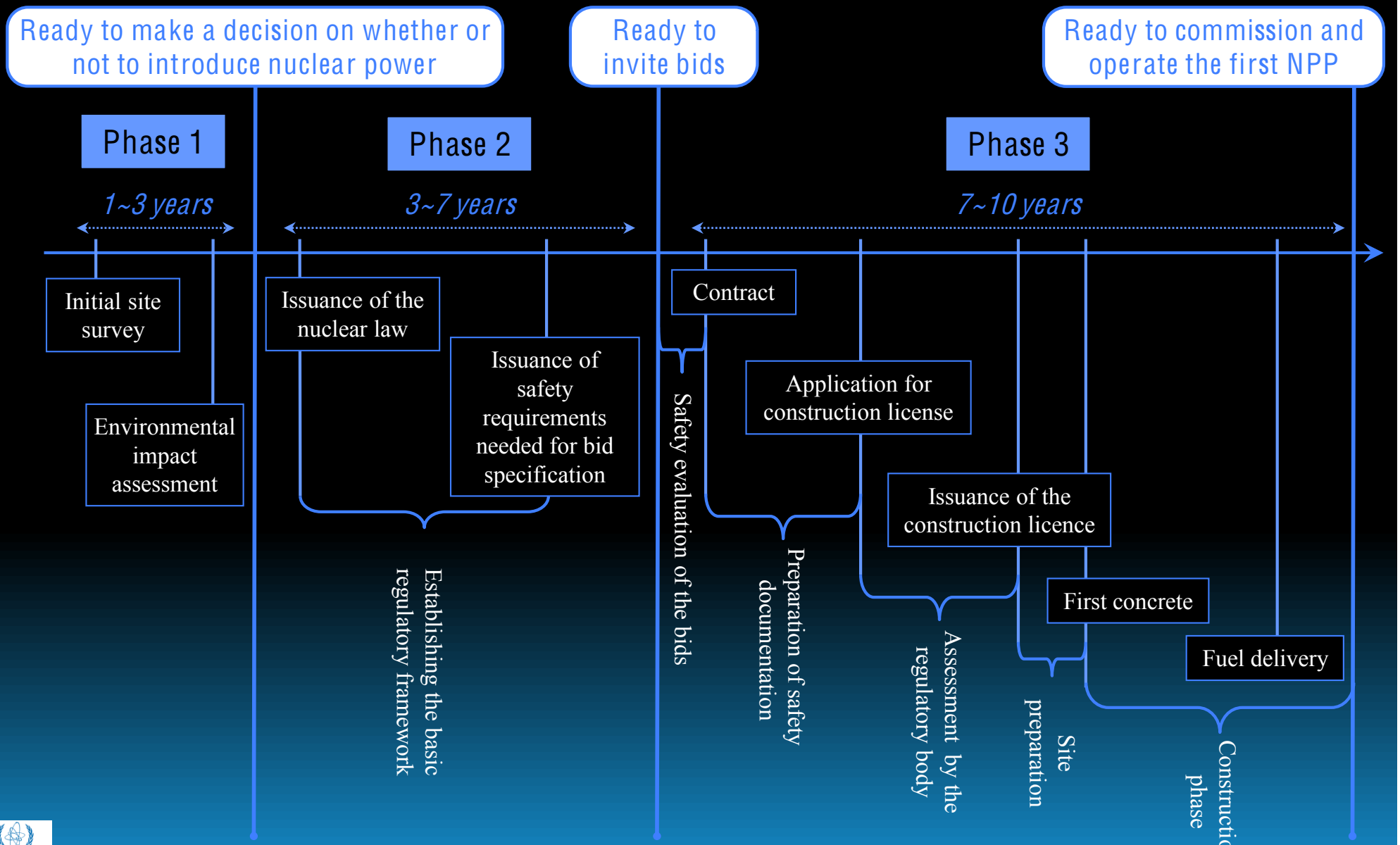
- **Nuclear** – Profound understanding of nuclear science and technology..
- **Nuclearized** – Good knowledge of nuclear implications of other competencies.
- **Nuclear aware** – Basic knowledge for safety rules and practices in nuclear area.

Specialist areas needed

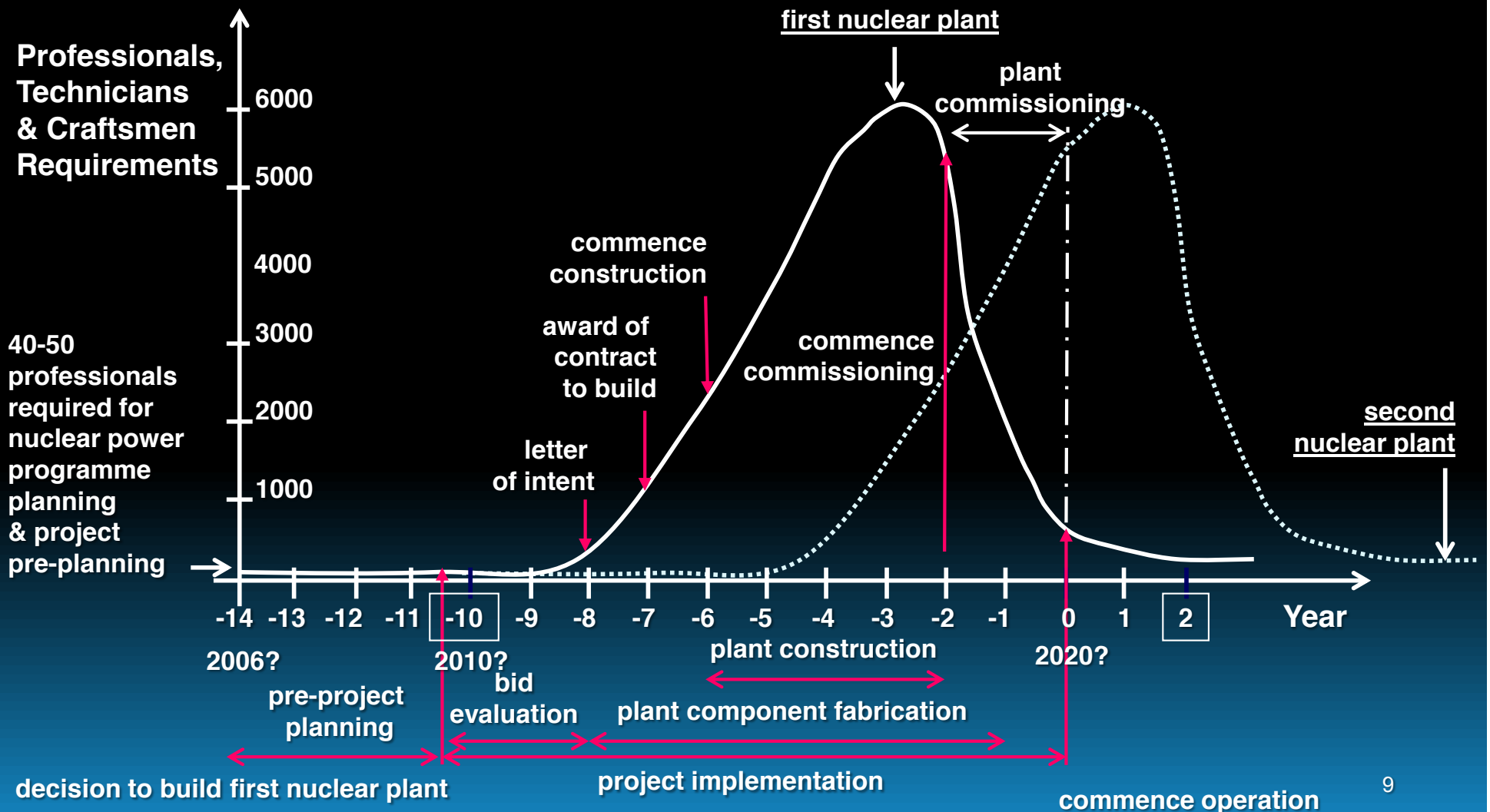


Need of skills for NPP Design, Construction, Operations, Dismantling,… goes beyond pure nuclear education and training

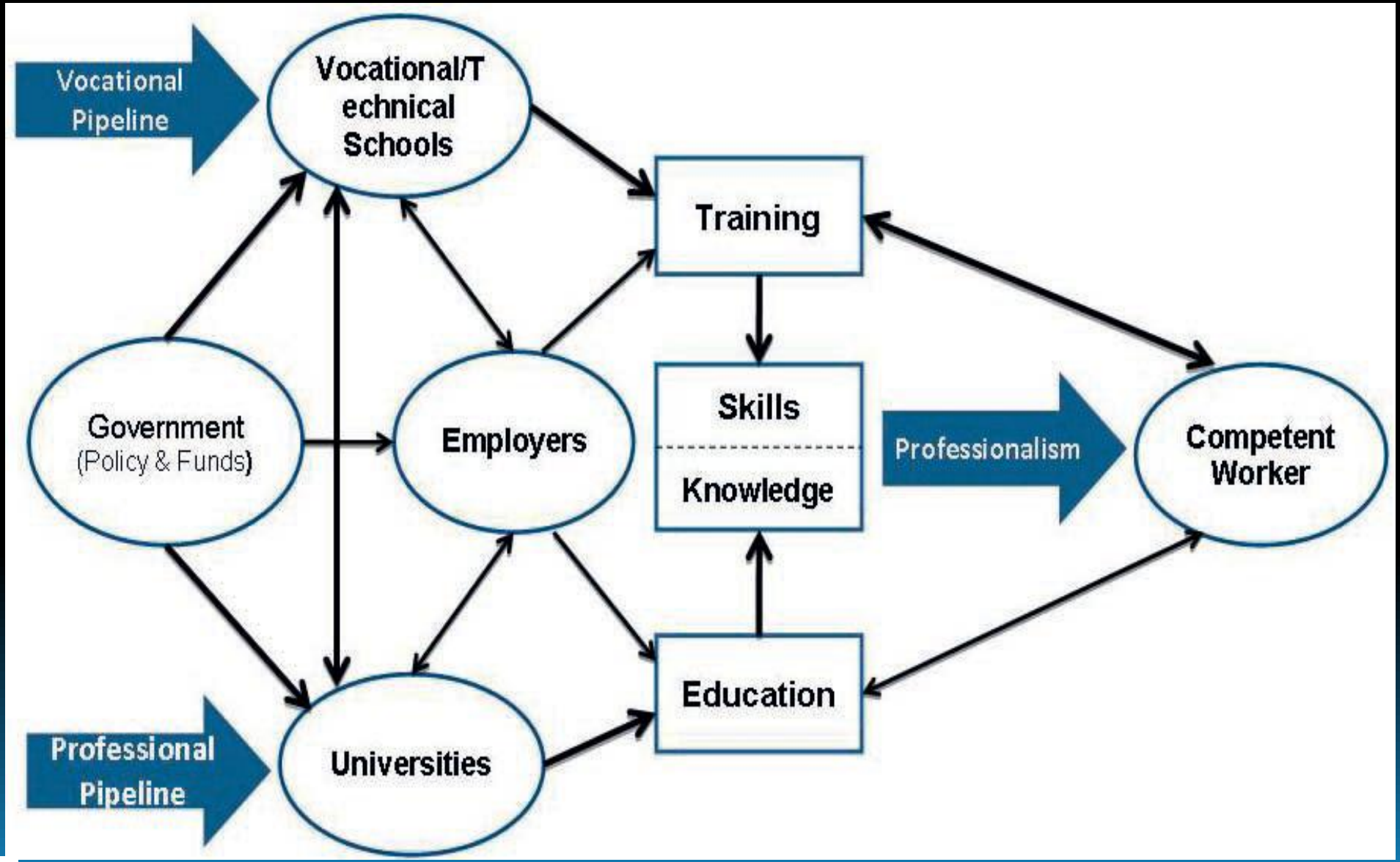
Milestones and competences



HR involved in NPP construction and operation

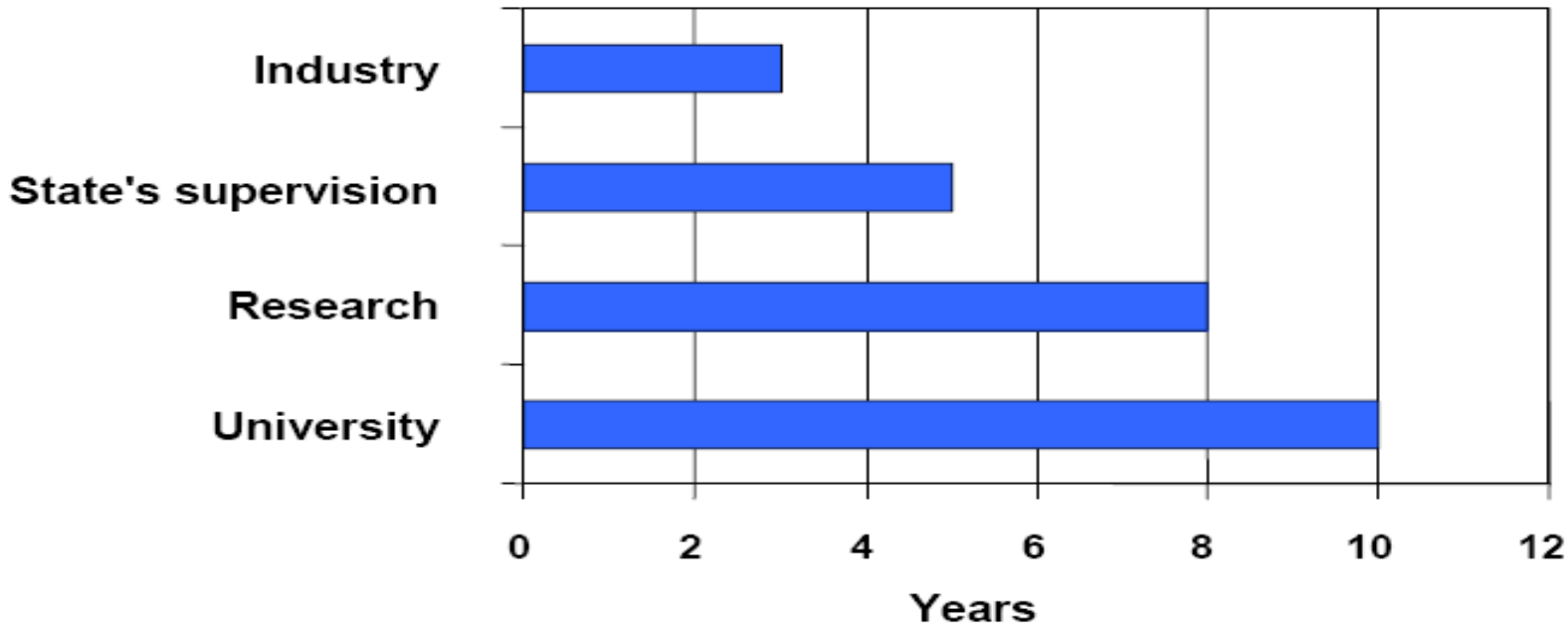


Stakeholders



Time to build competence

Times for establishing nuclear engineering competence



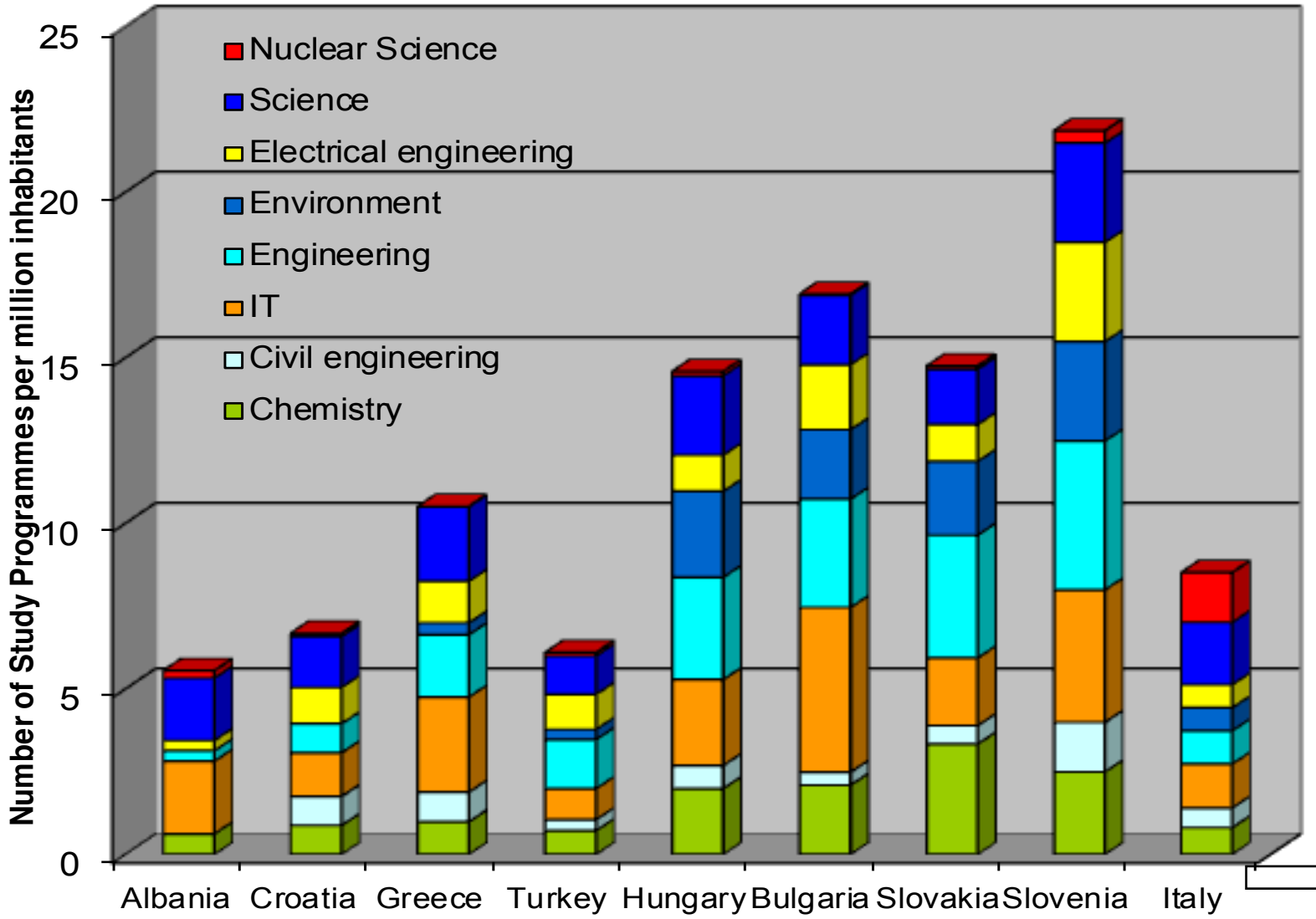
Source: S. Griffiths, J. Royen: „Assuring future nuclear safety competence “, NEA News 2000 - No. 18.1

Benchmarking nuclear education potential

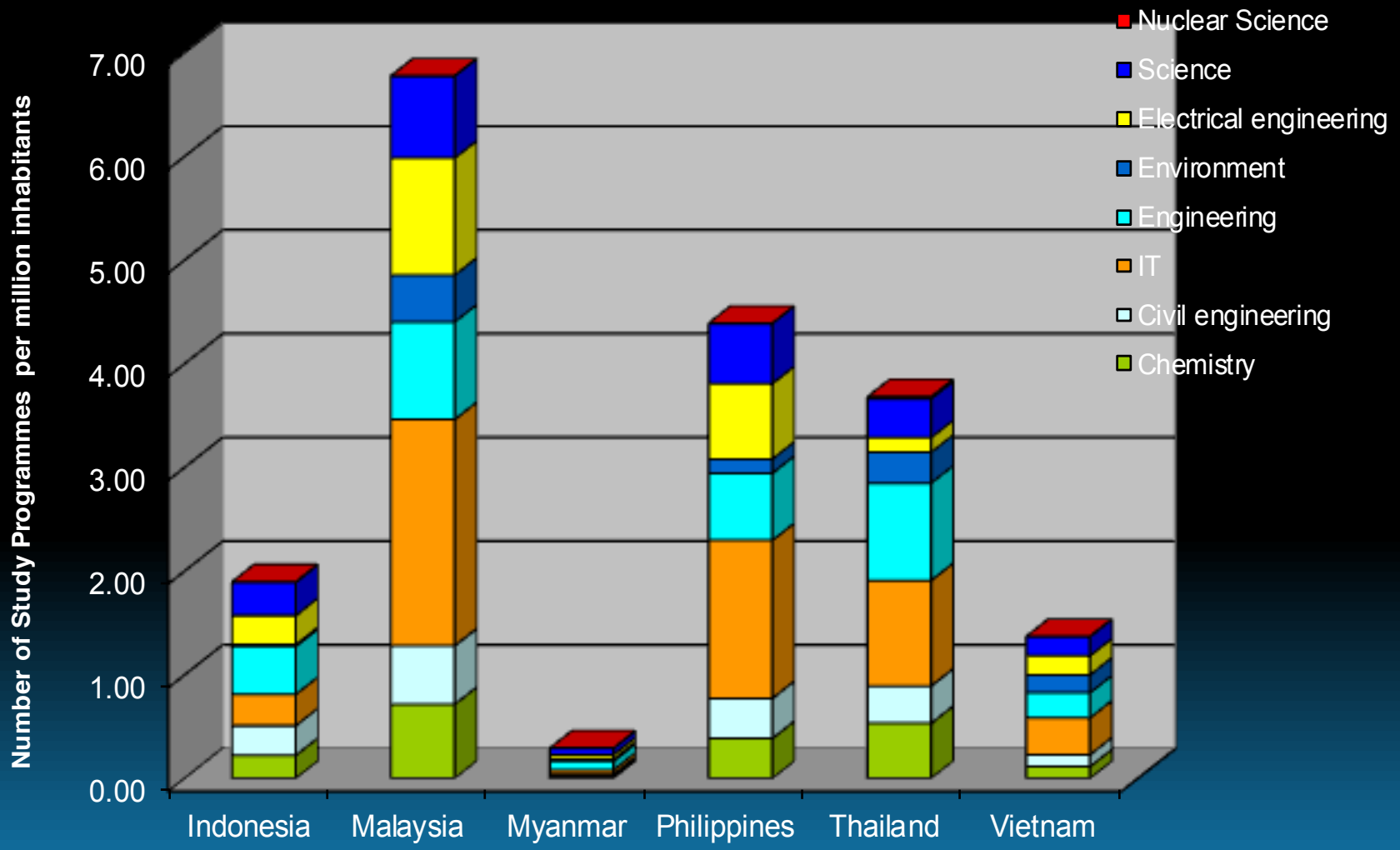
ANALYSIS OF CURRENT POTENTIAL

Data from K4D platform of the World Bank and UNESCO

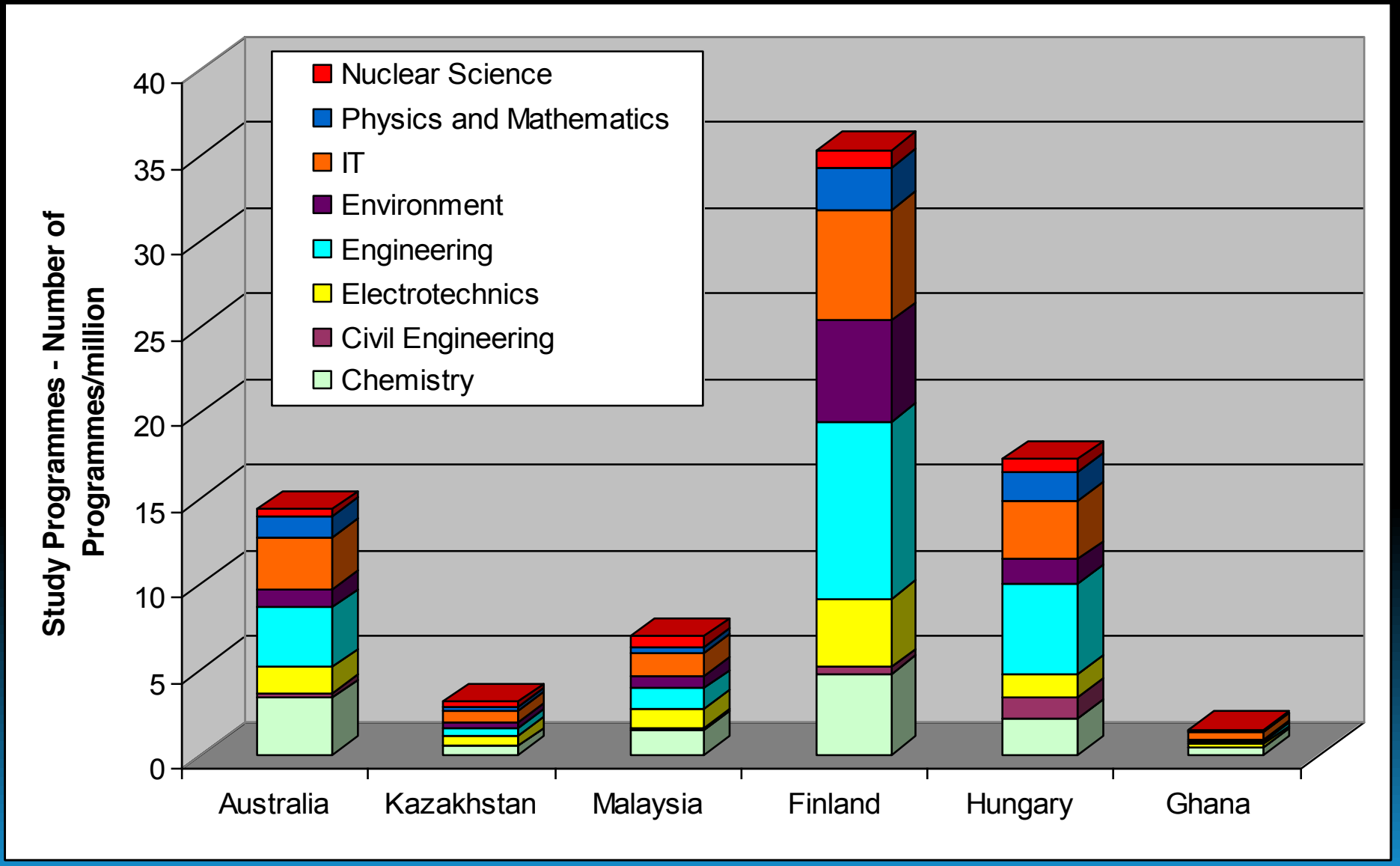
South East Europe



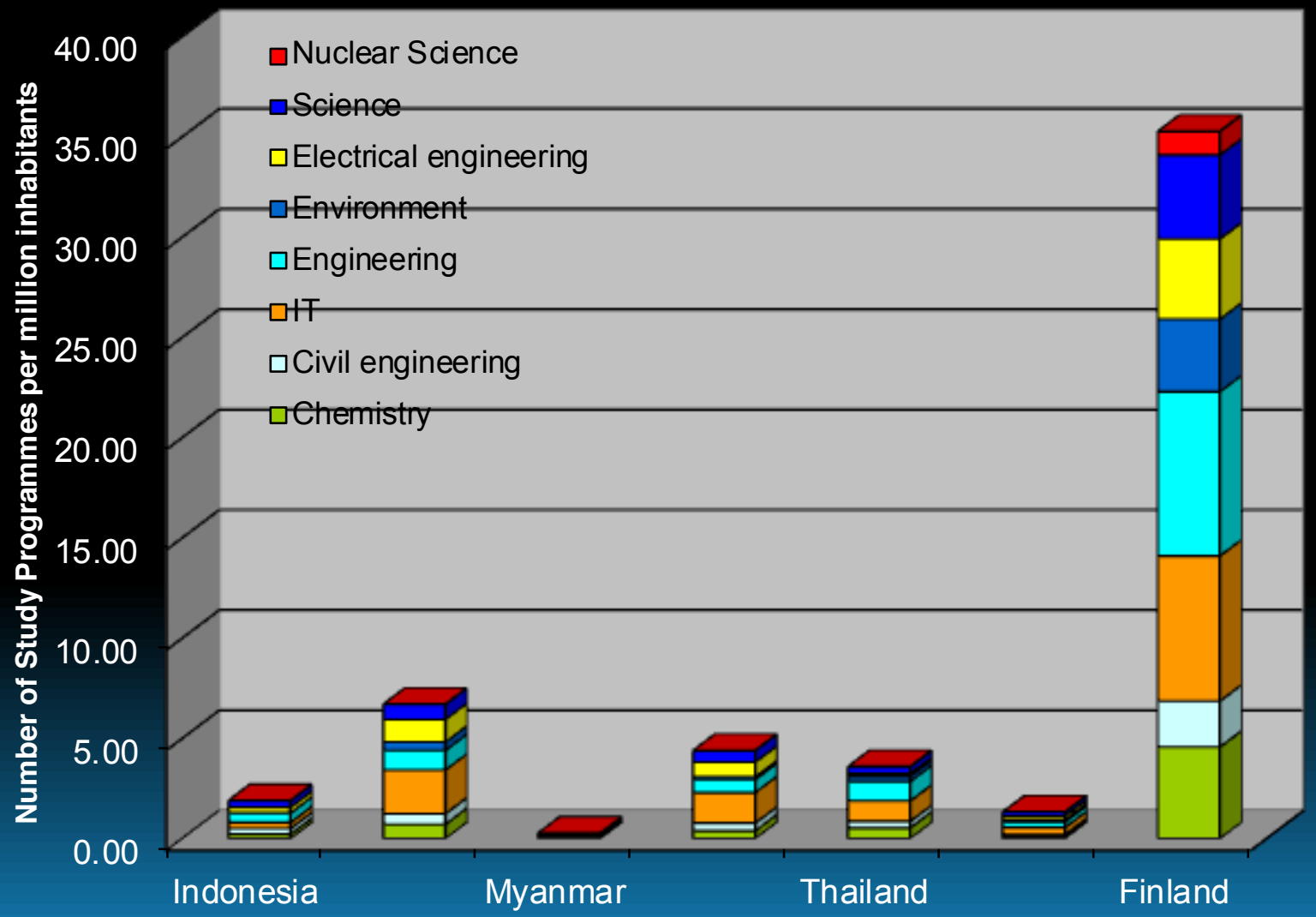
South East Asia



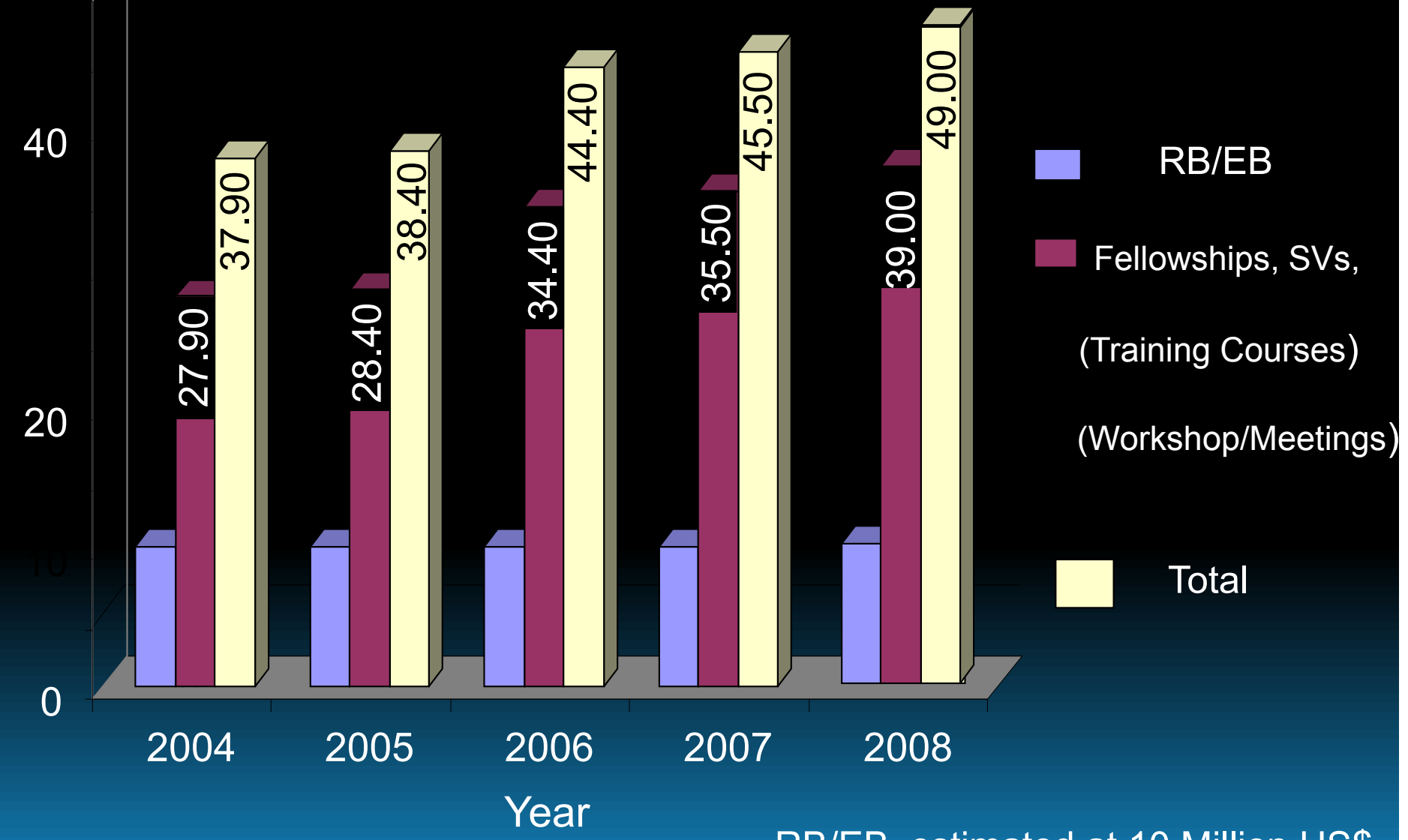
Newcomers and Mature



Newcomers and Mature



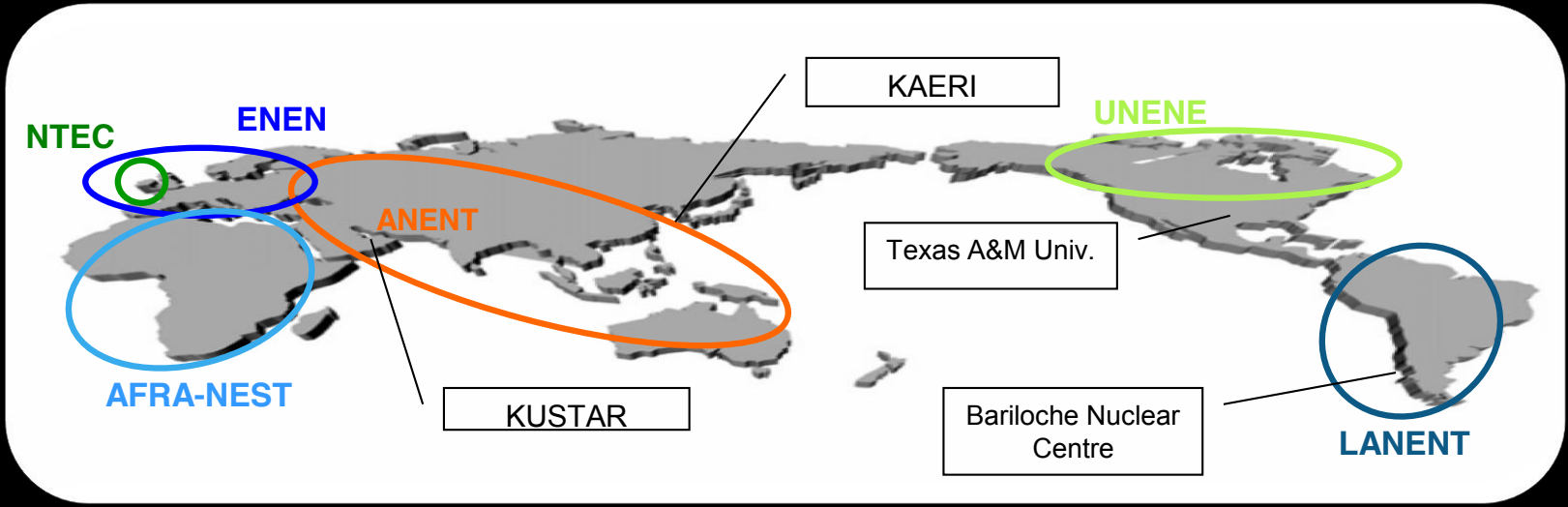
IAEA resoures supporting Nuclear Education



RB/EB estimated at 10 Million US$

Networking Nuclear Education

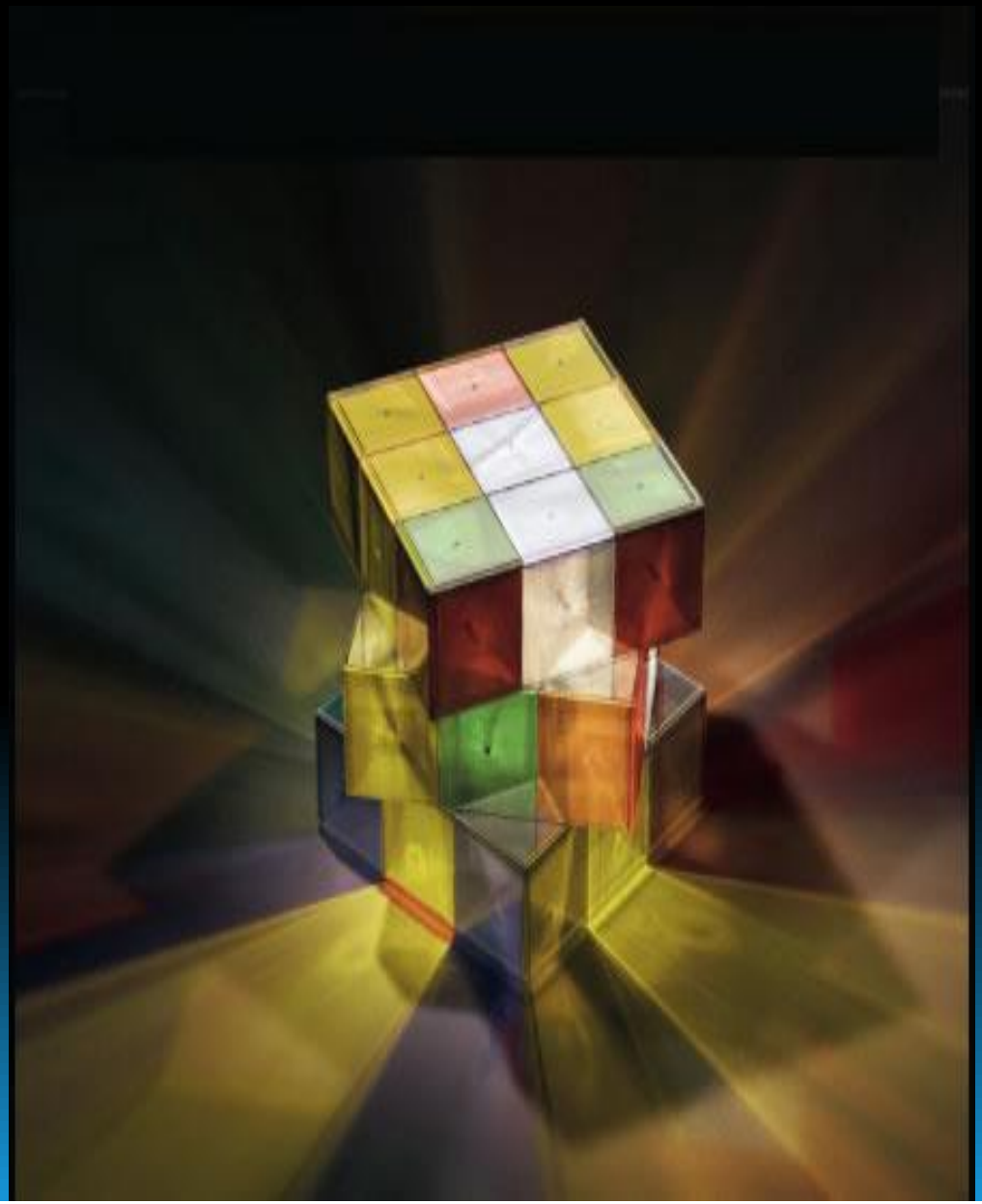
"...Networking education should be further made more efficient by interlinking networks and sharing best practices on a global scale..." *SAGNE, 2010*



To provide a forum to exchange the policy and strategies for nuclear education and training and to facilitate the regional and interregional cooperation to share educational experiences and resources:

- The Asian Network for Education in Nuclear Technology (ANENT)
- The European Nuclear Education Network Association (ENEN)
- The Nuclear Technology Education Consortium (NTEC)
- The University Network of Excellence in Nuclear Engineering (UNENE)
- African Regional Cooperative Agreement – Network for Education in Nuclear Science and Technology (AFRA-NEST)
- Regional Cooperative Agreement in Latin America and the Caribbean (ARCAL) – Bariloche Nuclear Centre in Argentine

Nuclear education



- *The Students*
- *The Teachers*
- *Courses and textbooks*
- *Infrastructure(R&D)*
- *Nuclear facilities*
- *Outreach to society*

Nuclear Education

- social dimension: equitable access and completion;
- lifelong learning and employability;
- student-centered learning and the teaching mission of higher education;
- education, research and innovation;
- international openness and mobility;
- funding.

Challenges

- The **identification of the knowledge gap** in a sufficiently precise and predictable way so that effective short- and long-term measures can be defined to adapt the nuclear E&T programs to the needs in a sustainable way.
- **Closer relationships between universities and nuclear stakeholders** needing new human resources are a key factor for the further evolution of academic courses;

Challenges

- **Meeting the rapidly growing need for highly qualified trainers** and university professors capable of educating and training a new generation of nuclear workers at a high level of excellence.
- **Developing sufficient middle management training capacity**, through appropriate nuclear education and training programmes, to satisfy the rapidly growing needs imposed by the expected pace of nuclear renaissance and the growing number of new plants.

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Challenges

- **Ensuring the availability and effective use of specific infrastructure** for nuclear education and training such as training reactors, experimental and radiochemical facilities, simulators, and e-learning software. **Transnational access to such infrastructure** needs to be improved taking into account significant differences in the national conditions in the different Member States.

Harmonization

- "Harmonization" is the name given to the effort by industry to replace the variety of product standards and other regulatory policies adopted by nations in favor of uniform global standards.(Wikipedia)

- Considered in the case of IAEA Harmonization of E&T will stand for comparison(benchmarking) of nuclear educational standards, learning objectives, curricula, training materials, methodology, regulatory practices and requirements etc. with IAEA recommendations and guidance and providing a uniform global educational approach between the vendor countries.

Our main challenge …