# INMA: International Nuclear Management Academy

John Roberts
The University of Manchester

John de Grosbois
Nuclear Knowledge Management, Department of Energy
International Atomic Energy Agency

# What is Knowledge Management ?









**Nuclear Knowledge Management is**

## an integrated and systemic approach

**applied to all stages of the knowledge cycle,**

including its creation, identification, sharing, protection, dissemination, preservation, transfer, etc.

**Knowledge processes in place, to serve a purpose**

# Agency's role

- Potential high risk of knowledge loss with additional costs for future generations must be avoided, and the Agency can help to integrate this long-term aspect into today's strategic decisions.

- The role for the Agency is to assist in the transfer of knowledge from "centres of competence" to "centres of growth"

# Nuclear KM Focus Areas & Scope


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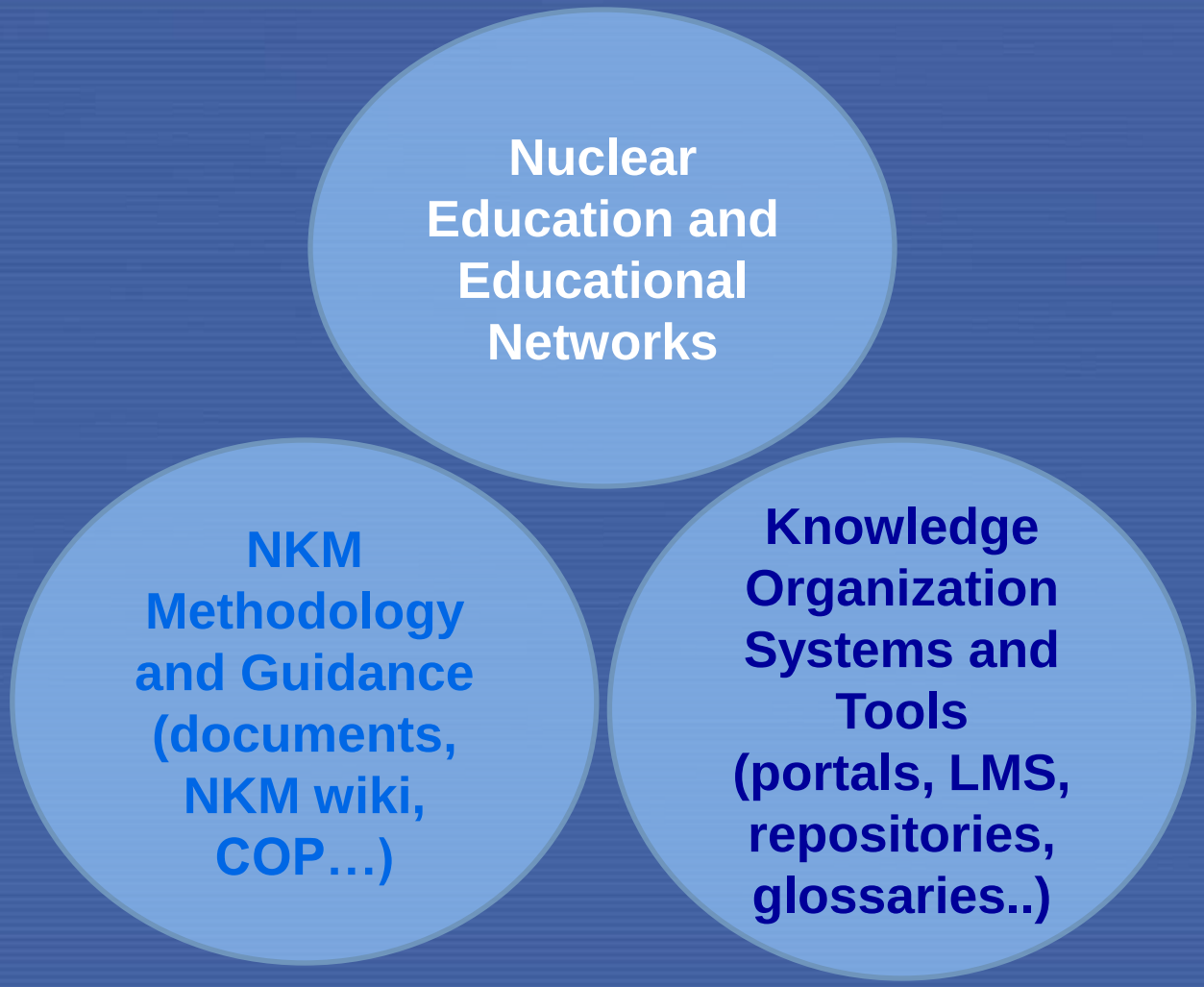
# IAEA Nuclear Knowledge Management Programme

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# Education provides knowledge (hopefully)

## Facilitating nuclear science and Technology education and networking

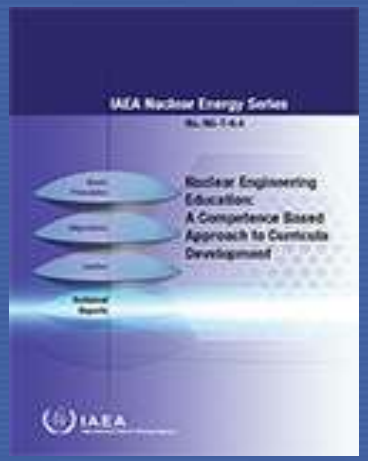
I. **Fostering high quality sustainable nuclear education**

II. **Developing NKM competences**

# Fostering nuclear education

- **Methods and tools**
- **Content sharing**
- **Supporting Networks**
- **Assistance and peer reviewing**

# Some documents




Nuclear Engineering Education:
A Competence-based Approach in Curricula Development

Nuclear Energy Series No.NG-T-6.4, 2014

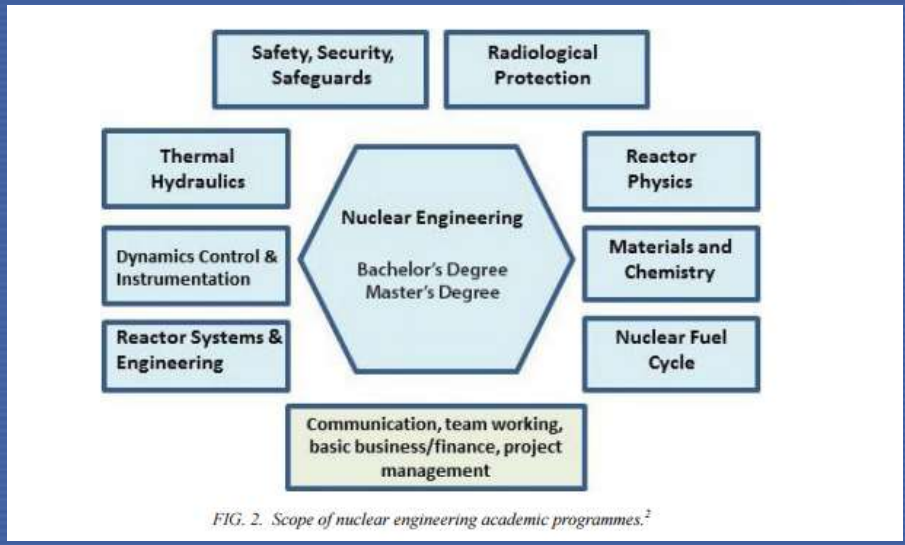



*FIG. 2. Scope of nuclear engineering academic programmes.*[2]

# Fostering Regional Educational Networks


STAR-NET
Regional Network for Education and Training in Nuclear Technology

ANENT
Asian Network for Education in Nuclear Technology

AFRA NEST

LANENT

**IAEA supported**

Close collaboration with

| | |
|---|---|
| **ENEN** | **(Europe)** |
| NTEC | (UK) |
| SCK-CEN | (Belgium) |
| UNENE | (Canada) |

enen

NTEC
Nuclear Technology Education Consortium

SCK·CEN

UNENE
University Network of Excellence in Nuclear Engineering

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# CRP L53003

Research on

**“Sustainable Education in Nuclear Science and Technology”**

- Impact of adopting modern ICT tools
- Cooperation and collaboration approaches (industry, universities and government)
- Outreach best practices
- Demographics and gender and supply and demand issues
- Benchmarking nuclear education
- Challenges in “nuclearization”
- Map nuclear competences

# CLP4NET (http://nkm.iaea.org/clp4net)

# Integrated Database on Nuclear E&T

# Nuclear Energy Management Schools

**2010: ICTP**

**2011: ICTP**

**2012: UAE ICTP Tokaimura**

**2013: Texas A&M Tokyo ICTP**

**2014: Tokyo ICTP**

**2015: UAE Tokyo ICTP**

**2016: S. Africa 17-28 Oct. Tokyo ICTP**

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# NMK education

- **Basic NKM school** (2016, 222 applicants)
  - Modality : blended learning

  **NKM PRETRAINING**
  - Trieste, Italy (12th edition)
  - Brazil (October)


- **Advanced NKM School**
  - **Pilot 2016, for NPPs practitioners**

    (last week of October, Karlsruhe

- **NKM for Universities**

# *International Nuclear Management Academy*

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# Need for Formal Education in Nuclear Technology Management

- Ongoing need for competent nuclear managers
  - Nuclear-specific management education needed
  - Broad understanding of nuclear technology issues needed
  - Mostly "*managerizing*" engineers and scientists and "*nuclearizing*" managers
- Greater availability and accessibility needed
  - Little available now except in-house training
  - Working professionals need access to part-time distance learning
  - Developing countries need to develop managers

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# Background Research - Findings

- Managers in the nuclear industry are typically engineers
- Most have limited chances to obtain formal management education
- Some have no nuclear engineering or nuclear science education
- Long time-lines to prepare for management roles
- Often major gaps in a managers knowledge
- Many experienced managers are near retirement

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# International Nuclear Management Academy

- An IAEA-facilitated framework for university collaboration to implement master's level programmes in Nuclear Technology Management
- Students in the programme are current managers or future managers working in the nuclear sector
- Initiative launched in Nov 2013. First programme started in 2014.

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International
Nuclear
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Academy

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# The Purpose of INMA NTM Programmes

- Avoid serious gaps in nuclear technology managerial competencies
- Strengthen depth and breadth of managerial competencies
- Ensure high quality technology management education for nuclear managers is available & accessible
- Reduced time-lines to managerial competency
- Strengthening management competencies and management decision-making
- Improving both safety and economics of nuclear technology

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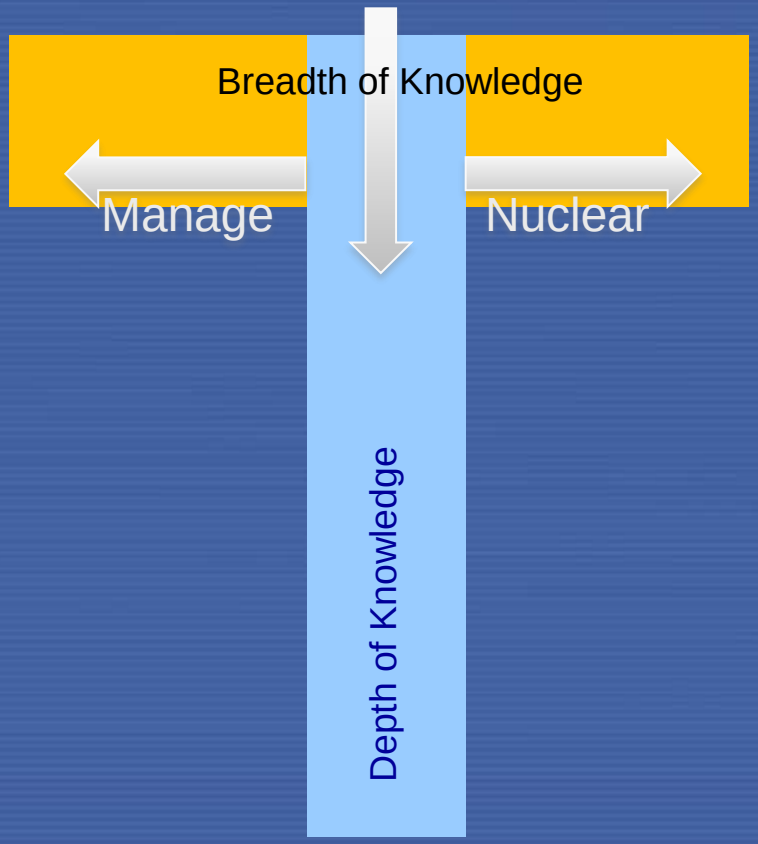
# Aim: T Shaped Leaders

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# Common Requirements Defined as Competency Areas

Divided into four Aspect Groups:

- External Environment
- Technology
- Management
- Leadership

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# Aspect Group 1: External environment

1.1 Energy production, distribution and markets

1.2 International nuclear organizations

1.3 National nuclear technology policy, planning and politics

1.4 Nuclear standards

1.5 Nuclear law

1.6 Business law and contract management

1.7 Intellectual property (IP) management

1.8 Nuclear licensing, licensing basis and regulatory processes

1.9 Nuclear security

1.10 Nuclear safeguards

1.11 Transport of nuclear goods and materials

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# Aspect Group 2: Technology

2.1 Nuclear power plant and other facility design principles
2.2 Nuclear power plant/facility operational systems
2.3 Nuclear power plant/facility life management
2.4 Nuclear facility maintenance processes and programmes
2.5 Systems engineering within nuclear facilities
2.6 Nuclear safety principles and analysis
2.7 Radiological safety and protection
2.8 Nuclear reactor physics and reactivity management
2.9 Nuclear fuel cycle technologies
2.10 Nuclear waste management and disposal
2.11 Nuclear power plant/facility decommissioning
2.12 Nuclear environmental protection, monitoring and remediation
2.13 Nuclear R&D and innovation management
2.14 Application of nuclear science

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# Aspect Group 3: Management

3.1 Nuclear engineering project management
3.2 Management systems in nuclear organizations
3.3 Management of employee relations in nuclear organizations
3.4 Organizational human resource management and development
3.5 Organizational behaviour
3.6 Financial management and cost control in nuclear
3.7 Information and records management in nuclear
3.8 Training and human performance management in nuclear organizations
3.9 Performance monitoring and organizaiton improvement
3.10 Nuclear quality assurance programmes
3.11 Procurement and supplier management in nuclear organizations
3.12 Nuclear safety management, risk-informed decision-making
3.13 Nuclear incident management, emergency planning and response
3.14 Operating experience feedback and corrective action processes
3.15 Nuclear security programme management
3.16 Nuclear safety culture
3.17 Nuclear events and lessons learned
3.18 Nuclear knowledge management

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# Aspect Group 4: Leadership

4.1 Strategic leadership

4.2 Ethics and values of a high standard

4.3 Communication strategies for leaders in nuclear

4.4 Leading change in nuclear organizations

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# Scope and Depth of NTM Programmes

Required Minimum Competency Areas

Exceeded
Competency Areas
Minimum Levels

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# Proposed Programmatic Themes

Specializations may include:

- Theme 1: Licensed Nuclear Facilities (POM for nuclear)
- Theme 2: New Build Projects (and Refurbishment)
- Theme 3: Technology Research, Design & Development
- Theme 4: Decommissioning and Environmental Remediation
- Theme 5: Safety Assessment, Licensing & Regulatory Affairs
- Theme 6: Energy Policy, Planning and Development
- Theme 7: Management of the Nuclear Fuel Cycle
- Theme 8: Management of Non-power Applications (separate CA's in development)

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# INMA Learning Hours

| | Approximate Number of Learning Hours |
|---|---|
| Aspect Group 1: External Environment | 150 - 450 |
| Aspect Group 2: Technology | 450 - 750 |
| Aspect Group 3: Management | 300 - 750 |
| Aspect Group 4: Leadership | 150 - 300 |
| Master's Project and Dissertation | 300 - 600 |
| **Work Experience or Internship** | **900 - 1800** |

# Collaboration With Industry

- The Nuclear Industry manages nuclear facilities
  - Contribute to the Educational Programmes - send managers as lecturers
- Send managers / future managers to INMA programmes as students
- Emply those who have completed an INMA programme
- Provide input and feedback on curriculum
- Nuclear-specific case studies and experience (practitioners perspective)
- Provide facilities for site tours, work terms or internships

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# International Nuclear Management Academy

- Master's level degree programmes in Nuclear Technology Management that member universities develop and deliver (alone or together)
- Work to promote national level recognition of NTM professional designation for INMA graduates
- IAEA will provide a lead on –
  - INMA Programme Competency Requirements
  - Annual Meeting
  - Advisory Board and Steering Committee
  - INMA Website
  - CLP4NET for Resource Sharing
  - Peer Review Assessment of NTM Programmes

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# Peer Review Assessment

- To determine if an INMA programme implemented by a University meets the Competency Areas
- Universities get useful advice and suggestions from the peer review assessment
- Best practices are passed on to other Members
- The process encourages collaboration, sharing of resources, networking etc.
- Right to use INMA logo granted after successful peer review

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# Peer Review Process

- IAEA INMA Assist Visit — optional
- Self-assessment benchmarking of existing programme(s)
- The Peer Review Assessment Mission
- Final Peer Review Assessment Report
- Consideration of Peer Review Report and Suggestions by the University
- IAEA acceptance of INMA endorsement

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# Visits to Universities

2014
- University of Tokyo, Japan
- University of Manchester, UK
- Texas A&M University, USA
- MEPhI, Russia

2015
- North-West University, South Africa
- Wits University, South Africa
- Tsinghua University, China
- University of Manchester, UK

2016
- UOIT, Canada
- Wits University, South Africa
- MEPhI, Russia

2017
- Texas A&M University, USA

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# The University of Manchester INMA Peer Review Mission


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# Possible Future Visits

- Inst de Tecnología Nuclear Dan Beninson, Argentina
- Barcelona, Spain
- Harbin Engineering University, China
- University of South China
- Tsinghua University, China
- University of Tokyo, Japan
- Pavia, Italy
- Others (Excelsior, Australia, Malaysia?)

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# INMA Summary

- To support education in Nuclear Technology Management
- To improve the competency profiles of the workforce and their organisations
- To support professional career development for practitioners in the nuclear community
- To raise the profile of nuclear technology management
- To develop and sustain communities of both learning and practice for nuclear professionals
- Long term real benefit is improved safety, performance, and economics

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Third International Conference on

# Nuclear Knowledge Management

## Challenges and Approaches

Vienna, Austria 7–11 November 2016


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In cooperation with the OECD/Nuclear Energy Agency (NEA)

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NEA NUCLEAR ENERGY AGENCY

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# Thank you very much for your kind attention!


For further information

http://www.iaea.org/nuclearknowledge

NKM@iaea.org

m.sbaffoni@iaea.org