

2.5. Capacity Building and Knowledge Management

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What is the Definition of Capacity Building in the Nuclear Safety Context?



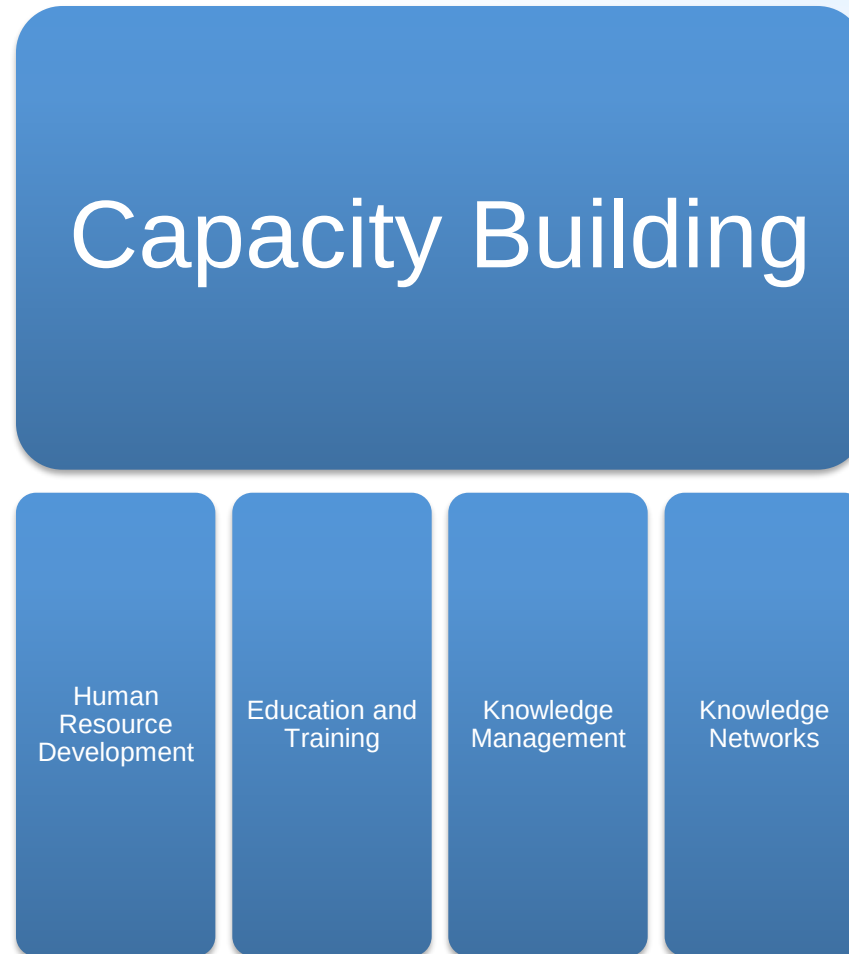
Capacity Building has been defined as:

“A systematic and integrated approach to develop and continuously improve the governmental, organizational and individual competencies and capabilities necessary for achieving a safe, secure and sustainable nuclear power programme.” (INSAG 27)

Capacity Building is necessary for achieving and sustaining high levels of nuclear safety and security in all areas of the nuclear industry.

The Four Elements of Capacity Building

- ***The Umbrella Approach***
 - ***Capacity Building is more than just Education and Training***



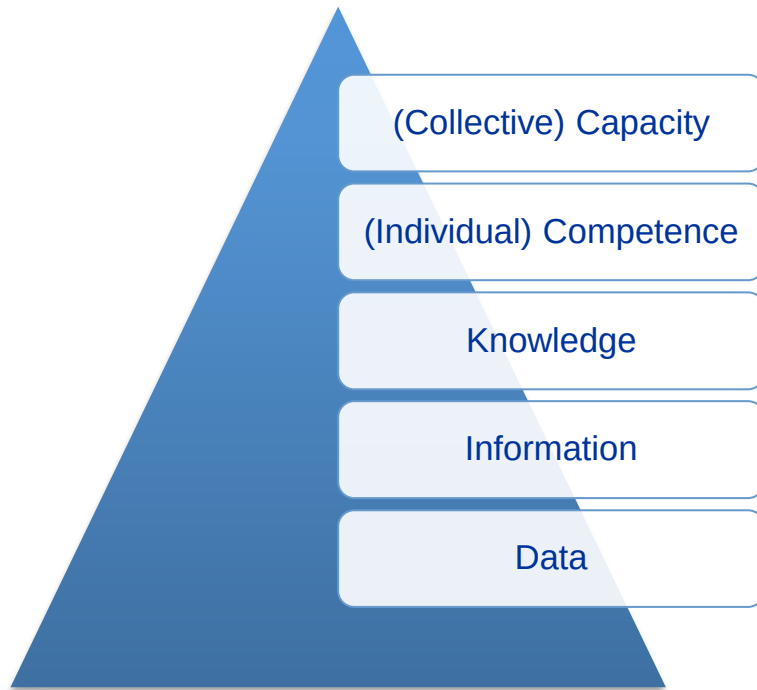
Importance of Knowledge Management

- Knowledge Management has been identified as one of the key factors that can contribute to the safe, secure and efficient operation of nuclear activities and facilities in Member States in:
 - Safety Standards
 - General Conference Resolutions
 - IAEA Conferences (HR 2014, NKM 2004, 2007, 2016, 2024)
 - Nuclear Safety Action Plan
 - INSAG 21 (2022), INSAG 27 (2017)
 - IEM Reports – Lessons Learned from Fukushima

Importance of KM for nuclear safety

- KM for nuclear safety poses special challenges
 - Knowledge base legally mandatory
- Required for regulatory activity and operations
 - Many types (legal, technical, operational ...)
 - Many owners (regulators, TSOs, vendors, operators ...)
 - Lack of nuclear safety knowledge can have significant implications
- Contrast to other knowledge types
 - Long timescales (decision basis)
 - Dual role of regulators (corporate and oversight)

Knowledge Pyramid



"Capacity for Action"

- Owning information is not equal to being able to use it for action
- "Information only becomes knowledge in the hands of someone who knows what to do with it." (Peter Drucker)

The Role of KM in Capacity Building

- If we do not manage knowledge well, at all levels, capacity building suffers.
- Capacity building requires the retention of critical knowledge, the sharing of both explicit and tacit knowledge and best practices and continuing access to nuclear safety knowledge for the safe and secure operation of nuclear installations and facilities throughout the life cycle.
- As such, KM must be integrated into the management system and programmes should be designed to maintain and increase KM.

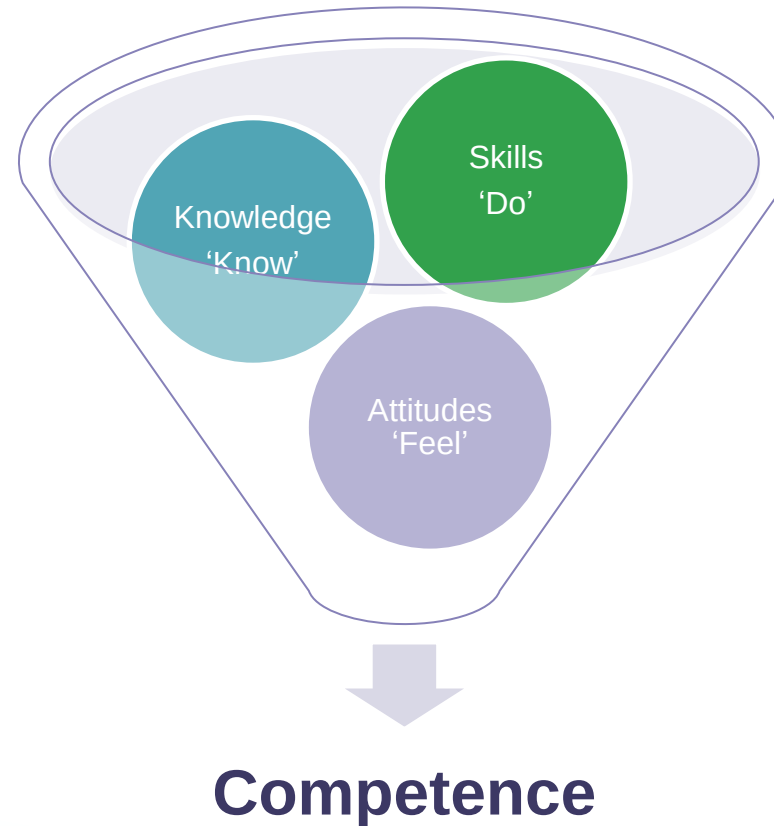
Capacity, competence, knowledge

- Knowledge
 - ready for action
- Competence
 - Set of knowledge, skills and attitudes
 - Competent staff (a person)
- Capacity has to do with number of people who know something
 - If two staff know the same things, the organization doesn't know more, just knows something twice
 - But: double production capacity!



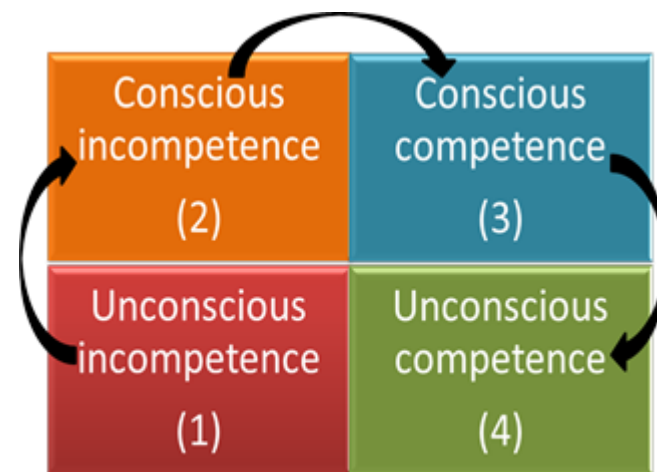
Competence

- Competence is the sum of an individual's knowledge, skills and attitudes



Four Stages of Competence

- (1) employee is not aware of knowledge needed
- (2) employee is aware of knowledge needed and their gap
- (3) employee will need focus to demonstrate knowledge
- (4) employee performs work instinctually



Introduced by Noel Burch

Competence Management

- Competence management is necessary to build capacity and ensure that critical knowledge is not lost.
- The IAEA offers a methodology and tool to support the competence management process in regulatory bodies: The Systematic Assessment of Regulatory Competence Needs (SARCoN)
- SARCoN assists in evaluation and self-assessment processes through a step-by-step approach that enables users to develop competence profiles and conduct competence gap analyses.
- Regulatory bodies can use the methodology and tool to ensure that their current and future competence needs are met. SARCoN is suitable for all RBs, it is flexible and can be applied at all organizational levels.

The Relationship Between Competence Management and The Four Elements of Capacity Building



Different components of Competence Management apply to one or all of the different elements of Capacity Building:

- Competence Development Plan → Education and Training
- Career Development Plan → Human Resource Development
- Succession Planning, Resource Allocation, Critical Knowledge Retention → Knowledge Management
- Preparation for New Technologies, Facilities and Activities → Knowledge Networks, Knowledge Management, Human Resource Development and Education and Training

The Relationship between KM and Competence Management

- KM is a key factor in Competence Management. Without it organizations cannot conduct analyses of strengths and weaknesses and critical knowledge loss risk assessments.
- Education and training programmes are based on the knowledge needed to perform the roles for a safe and secure nuclear programme either with power generation or with radiation facilities and activities.
- HRD programmes need KM to determine what capacities are missing or need strengthening for career development plans and hiring purposes.
- Knowledge networks are the avenues for knowledge sharing and learning best practices and proven methods and tools, but first organizations need to know what explicit and tacit knowledge they possess that they can share, whether in CoPs, international conferences or networks such as ANSN and what they need to learn.

Capacity at the national and organizational level

- A coordinated and unified approach to capacity building is necessary at both the national and organizational level.
- Communication with all stakeholders (such as the participants in this workshop) is important to developing a national capacity building plan, including all 4 elements and competence management, led by the applicable Regulatory Body in accordance with government laws and regulations, IAEA safety standards, and the identified needs of the Member State.
- Capacity Building needs to be incorporated into the Management System for nuclear organizations.
- The use of IAEA tools and methodologies for self-assessment, such as IAEA publications, SARCoN, KMAV, IRRS and other peer review missions, can be useful at both levels.

Proactive Capacity Building and KM for the Future – A Canadian Example for New Nuclear Technologies



- Canada's CNSC project on KM for SMR readiness looked at KM solutions for managing knowledge around SMR licensing.
- A benchmarking questionnaire was developed for national regulators, international regulators and stakeholders in the Canadian nuclear industry
- An internal review was conducted to identify previous pieces of work focused on KM: Documentation of Capabilities within the RB and a KM initiative resulting in a KM policy, a knowledge loss risk assessment and a catalogue of good practices.

CNSC Project on KM for SMR Readiness

- Assumptions resulting from this research informed the team's discussions:
 - Capturing, sharing and actioning lessons learned is currently localized but working well
 - Connecting KM objectives with individual performance ensures monitoring and positive progress
 - Limited support for new IT solutions and subsequent user training
 - No corporate/operational KM lead responsible for ensuring organizational coordination of KM activities
 - Lessons learned need to be organized and accessible in common digital structures

CNSC Project on KM for SMR readiness

- Criteria were identified for justification of the KM solutions selected:
 - Meeting IAEA guidelines on KM
 - Based on proven best practice
 - Ability to shift perceptions/behaviours (effective lasting cultural/behavioural change)
 - Replicable and scalable (flexibility)

KM Solutions Identified and recommended

- Identification of a single point of contact (SPOC) for each licensing team – this is a role not a job position
- Consistent approach by each KM SPOC to documenting and saving records using an established template, and all SPOCs to be active in a Community of Practice
- Establishment of a CNSC KM Programme Lead at the organizational level

CNSC Project on KM for SMR Readiness

- Implementation Phase suggestions:
 - Select new Objective Lead
 - Obtain approval for funding and planned effort
 - Conduct a Pilot
 - Establish a KM SPOC Community of Practice
 - Work to develop training for the role
 - Recommend a common folder structure and naming convention for KM SPOC project records

KM for SMR Readiness incorporated into CNSC KM Roadmap – Current status

- SPOC objective in place with project ending in March 2025
 - Business case made
 - Community of Practice established
- KM Champion at the VP Level
- Corporate KM Lead appointed
- KM strategy document being developed
- As part of Capacity Building and Competence Management, an NSERC grant of 15M issued to universities to prepare nuclear workforce for new technologies and challenges

Integrating KM into Capacity Building with Competence Management

- Managers are responsible for:
 - Implementing knowledge management practices within, and across, business units;
 - Promoting organizational knowledge management practices and tools;
 - Ensuring that KM requirements are incorporated in individual learning plans, alumni/consultant contracts, and performance reviews;
 - Allowing sufficient time and resources for employees to capture, share and build knowledge; and
 - Identifying at-risk knowledge and prioritizing the implementation of related knowledge transfer plans.
- Staff, including those authorized to work on behalf of the CNSC, are responsible for:
 - Capturing explicit knowledge in appropriate repositories;
 - Sharing relevant knowledge with colleagues;
 - Executing knowledge transfer plans; and
 - Incorporating knowledge management best practices in day-to-day operations

Integrating KM into Capacity Building with Competence Management

- HRD is responsible for:
 - Reporting on knowledge loss vulnerability through succession planning performance indicators, and
 - Offering knowledge transfer training and tools.
- The Internal Quality Management Division (IQMD) is responsible for:
 - Integrating knowledge management elements into CNSC management system processes.
- The Information Management and Technology Directorate (IMTD) is responsible for:
 - Ensuring that information is managed as required to facilitate the storing and sharing of key CNSC knowledge,
 - Exploring best practices and emerging technology to help facilitate knowledge Management (e.g. Artificial Intelligence).
- The Strategic Planning Directorate (SPD) is responsible for:
 - Ensuring that risks relating to KM are considered and captured during annual enterprise risk planning.

Integrating KM into Capacity Building with Competence Management



Monitoring and Reporting

- Knowledge Management at the CNSC is championed by the Chief Science Officer and is supported by the DG, Human Resources and DG, Information Management and Technology.
- A Knowledge Management plan is being developed and reviewed by relevant stakeholders. Updates to the plan, including performance indicators, will be reviewed and endorsed annually by senior management

Conclusion

- KM is an essential element of Capacity Building.
- Competence Management is inextricably linked with KM
- The CNSC demonstrates that efficient and effective KM practices that support attrition, regulatory activities, programme and service delivery, collaboration, informed decision making, accountability, and transparency are essential to integrate KM into an overall capacity building programme.
- Responsibility for the efficient and effective management of knowledge rests with all CNSC employees and managers. This aids in building capacity while managing competence within the organization for the improvement and enhancement of the national nuclear programme.

[Guide to Knowledge Management Strategies and Approaches in Nuclear Energy Organizations and Facilities](#)

Nuclear Energy Series No. NG-G-6.1 (2022)

[Exploring Semantic Technologies and Their Application to Nuclear Knowledge Management](#)

Nuclear Energy Series No. NG-T-6.15 (2021)

[Mentoring and Coaching for Knowledge Management in Nuclear Organizations](#)

TECDOC Series - 1999 (2022)

[Managing Nuclear Safety Knowledge: National Approaches and Experience](#)

Safety Reports Series No. 105 (2021)

[Mapping Organizational Competencies in Nuclear Organizations](#)

Nuclear Energy Series No. NG-T-6.14 (2020)

[International Nuclear Management Academy Master's Programmes in Nuclear Technology Management](#)

Nuclear Energy Series No. NG-T-6.12 (2020)

[Knowledge Management Perspectives on Outsourcing in Operating Nuclear Power Plants](#)

TECDOC Series – 1884 (2019)

[Planning and Execution of Knowledge Management Assist Visits for Nuclear Organizations](#)

TECDOC Series – 1880 (2019)

[Knowledge Loss Risk Management in Nuclear Organizations](#)

Nuclear Energy Series No. NG-T-6.11 (2017)

[Knowledge Management and Its Implementation in Nuclear Organizations](#)

Nuclear Energy Series No. NG-T-6.10 (2016)

Thank you!

With acknowledgement to Ms. Agnes Robert, CNSC