

Decommissioning and Legacy Management

Capacity and Skills Building, Knowledge Maintenance



Background

The Nuclear Energy Agency (NEA) Committee on Decommissioning of Nuclear Installations and Legacy Management (CDLM) addressed the topic of “Capacity and skills building and knowledge maintenance for decommissioning and legacy management” in the topical sessions of its 2022 plenary meeting. This brochure summarises the key findings.

The CDLM was created in 2018 to address the needs of NEA member countries in nuclear decommissioning and the remediation of legacy sites. The creation of the CDLM reflects the NEA goals of providing governments and other interested stakeholders with authoritative and reliable information on the political, strategic, regulatory and social aspects of decommissioning activities and the management of legacy and complex sites.

Objectives

Given the time needed to decommission a nuclear facility or to remediate a legacy site, implementers must develop and implement a human resource management plan to ensure that sufficient knowledgeable and skilled personnel are available for the various tasks to be performed at all phases of the project. Capacity and skills building as well as knowledge maintenance become even more challenging due to the high number of projects worldwide that are either ongoing or expected to commence in the near future, paired with an ageing workforce. This is not only a challenge for implementers but also contractors and regulatory bodies.

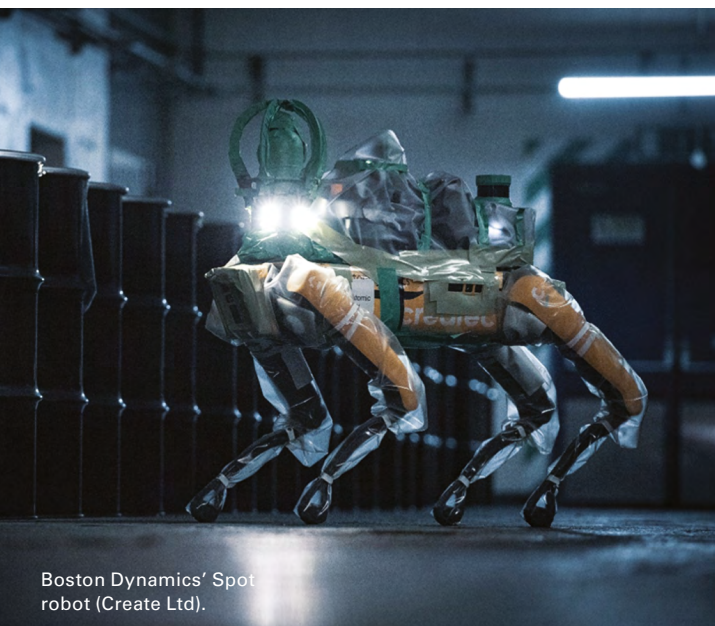
Basis and structure of the exchange

The CDLM topical session was structured in two parts. The first featured four presentations followed by discussions. The second part was centred around breakout groups where participants were given a list of questions to discuss with the support of a moderator.

Key findings of the presentations

The four presentations are summarised below:

1. The first was provided by the NEA Working Group on Human and Organisational Factors (WGHOFF). It introduced the report *Organisational Capabilities for Decommissioning Nuclear Installations* (NEA, 2022), which was produced by gathering operating experience from both operators and regulators and which included case studies as well as self-assessment questions for organisations. The objective of the report was to identify key organisational capabilities for decommissioning and to provide practical guidance in the form of a framework in four parts: Capable and Competent Workforce, Effective Leadership and Governance, Culture and Motivation, and Programme and Project Management. The discussions that followed highlighted that decommissioning organisations need to be honest during their self-assessments, and that leadership should be cautious not to set cost reduction as the primary objective in their strategy.
2. The second presentation was given by the NEA Regulators’ Forum. It introduced the key findings of the NEA Workshop on Competency Management of Regulators (COMAREG) held in May 2021 (NEA, 2023). The workshop highlighted that regulators need to maintain an interdisciplinary range of technical skills such as radiation training, but also need to develop an understanding of new and advanced technologies (e.g. robotics, artificial intelligence, small modular reactors). This could be supported by a strong network of external experts. Additional skills such as competence in the area of public communication should also be integrated into HR development plans, as they facilitate outreach to the public and engagement with young professionals and students who might consider working in the field. Since legacy remediation and radioactive waste management and disposal occur over long periods of time, organisations need to facilitate the transfer of skills internally to new generations of workers through mentoring and teaching as well as digital platforms or e-learning. Therefore, regulatory institutions should consider aspects of knowledge management and governance in their strategy.
3. The third presentation was delivered by the European Commission Joint Research Centre (JRC). It introduced the European Learning Initiatives for Nuclear Decommissioning and Environmental Remediation (ELINDER). The project aims to stimulate vocational training in nuclear decommissioning through a set of training initiatives offered



Boston Dynamics’ Spot robot (Create Ltd).

at different locations, with courses, visits and practical studies. It is organised in complementing modules with harmonised and clarified learning outcomes. The knowledge management model is to collect raw data, structure the information, contextualise knowledge and share wisdom. This project offers visibility to training programmes, creates synergies and increases opportunities.

4. The last presentation was given by the Nuclear Skills Strategy Group (NSSG) and focused on the practices and lessons learnt in building capability in the United Kingdom. First, the NSSG focused on understanding the demand for skills. Data showed that the current supply will not meet the United Kingdom's future demand, as there will be competition between sectors over a small pool of specialists as well as over a larger number of more generic skills. For instance, nuclear manufacturing will be under tension beyond 2030. The current workforce also lacks in diversity and could better reflect the communities in which recruitment takes place. With tools such as heat maps reflecting skills risks, the NSSG then developed a Strategic Plan to support prioritisation and focused interventions to influence the supply of skills. Some examples of interventions include targeted campaigns in schools to attract the interest of students, retraining and apprenticeship programmes, and the creation of career pathways at every level of seniority and for every education level.

Key findings of the breakout sessions

For the second part, the participants were divided into five breakout groups, formed to reproduce geographical distribution. All groups were given the following set of questions:

- What mechanisms are used in your organisation to build capacities and skills for decommissioning and to maintain knowledge?
- Assess the most important mechanisms to support and improve international capacity and skills building and knowledge maintenance for nuclear decommissioning.
- How can the CDLM support this topic?

The discussions initiated by these questions can be structured into three categories of best practices which are highlighted below:

Predicting workforce needs including skills, identifying gaps, and setting up programmes to address those needs

- In some NEA member countries, legal and regulatory frameworks require that during the authorisation of decommissioning the implementer demonstrates that the skills and competencies needed to perform the planned activities are present. This demonstration usually includes a plan for how these skills and competences will be maintained over the duration of a project, as is the case for other stages in the life cycle of a nuclear facility, e.g. during operation.



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- Some implementers track the numbers and availability of qualified and experienced staff as a key performance indicator.
- Strategic human resource planning is desirable on an organisational level, whereby present and future needs are analysed and a range of measures taken to ensure that the right people with right skills are present when needed.
- Surveys on a national level have been shown to be beneficial to predict workforce needs and identify potential gaps to provide a basis for maintaining/establishing national programmes to address those needs.
- National skills development programmes often focus on academia; however, the role of vocational training provided by trade schools and by the supply chain and small and medium-sized enterprises (SME) supporting the conduct of decommissioning projects, should not be underestimated.
- Difficulties to hire workers or contract SMEs from abroad due to language and training requirements have been reported.

Strengthening mechanisms for knowledge transfer

- It is important to have a well-structured educational programme in place in all involved organisations that is integrated with hands-on exercises in actual decommissioning programmes to attract young people to the nuclear sector for the long term. For countries with large nuclear programmes, the government often supports the establishment of university programmes and respective curricula to provide the education and skills needed for the decommissioning industry. Countries with smaller nuclear programmes may profit from international programmes like the NEA Nuclear Education, Skills and Technology (NEST) Framework, the European Commission's ELINDER or European Nuclear Education Network (ENEN) initiatives.

- Setting up mentoring programmes to preserve tacit knowledge within an organisation has proven to be invaluable. Where this is not possible, interviewing people leaving the organisation in an effort to capture some of their tacit knowledge is critical.
- The knowledge of an organisation needs to be made accessible in a structured, easy to retrieve, and attractively presented format. Some organisations have chosen a Wiki-type database to compile knowledge and information, including videos and interactive graphics.
- A substantial part of the decommissioning knowledge lies within the supply chain. Promoting the mobility of SMEs across borders is an opportunity to make this knowledge available in the global decommissioning field.
- The (international) exchange of experience is important to the transfer of knowledge. This ranges from a project at a programme level to international organisations like the NEA and the International Atomic Energy Agency (IAEA).

Maintaining the attractiveness of the field across generations and borders

- Interest among younger generations might be increased by highlighting the potential contributions to decommissioning from highly recognised fields such as environmental protection, sustainability, artificial intelligence and augmented reality applications, state-of-the-art robotics and engineering, complex decision making, international collaboration and multidisciplinary.
- Offering opportunities such as internships and shadowing programmes to gain hands-on experience and foster engagement in projects might attract newcomers.
- Success stories of decommissioning and highlighting the long-term job perspectives of fleet, national and international decommissioning programmes might attract the interest of younger generations.
- Funding programmes for theoretical and applied research and engineering are the main way by which students recognise job perspectives in decommissioning offers.
- It is recognised that learning material must be presented in new ways, for example in webinars, videos and interactive graphics, to present knowledge in a format that is akin to how younger generations often learn and receive information.

Future perspectives and considerations

Each organisation involved in nuclear decommissioning and legacy management is tasked with providing the required human resources, including the right skills and knowledge. This

is true for the regulatory body, the licensee and the contractors. To ensure that critical knowledge is captured, preserved, made available and used, when needed, it is mandatory to:

- acquire and create the necessary knowledge;
- transfer it to the people that are tasked to plan, implement, conduct or regulate decommissioning and legacy management projects;
- establish processes to preserve and share the knowledge; and
- provide technology to share and make the knowledge accessible.

An education and training programme tailored to the required needs is desirable on a national or even international level.

International initiatives for training include, for example:

- Nuclear Education, Skills and Technology (NEST) Framework (www.oecd-nea.org/nest);
- The European Learning Initiatives for Nuclear Decommissioning and Environmental Remediation (ELINDER) (https://joint-research-centre.ec.europa.eu/elinder-european-nuclear-decommissioning-training-programme_en);
- European Nuclear Education Network (ENEN) (<https://enen.eu>);
- IAEA E-learning on Spent Fuel and Radioactive Waste Management, Decommissioning and Environmental Remediation (www.iaea.org/services/education-and-training/online-learning/spent-fuel-and-radioactive-waste-management-decommissioning-and-environmental-remediation).

References and further reading

- IAEA (2022), *IAEA Nuclear Energy Series No. NG-T-2.3 (Rev 1): Training and Human Resource Considerations for Nuclear Facility Decommissioning*, IAEA, Vienna, www.iaea.org/publications/14771/training-and-human-resource-considerations-for-nuclear-facility-decommissioning.
- NEA (2023), “Summary of the NEA Workshop on Competency Management of Regulators (COMAREG)”, OECD Publishing, Paris, www.oecd-nea.org/jcms/pl_72069.
- NEA (2022), *Organisational Capabilities for Decommissioning Nuclear Installations*, OECD Publishing, Paris, www.oecd-nea.org/jcms/pl_70244.