

# **Perspective from the OECD Nuclear Energy Agency Radioactive Waste Management Programme**

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## NEA: Bringing Advanced Countries Together to Address Global Challenges

### The role of the NEA:

Foster international co-operation to develop the scientific, technological and legal bases required for a safe environmentally friendly and economical use of nuclear energy for peaceful purposes.

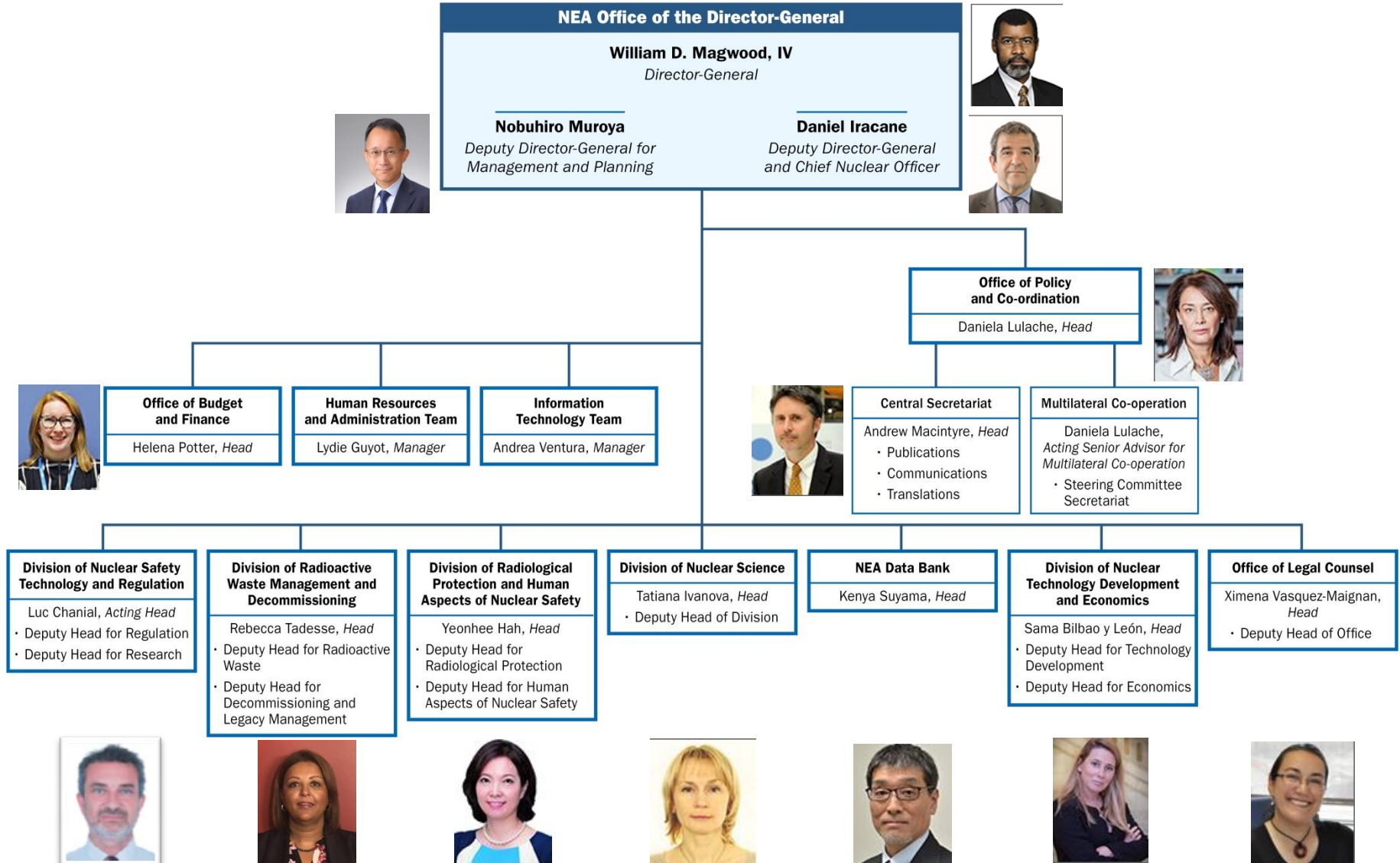
Develop authoritative assessments and forging common understandings on key issues as input to government decisions on nuclear technology policy.

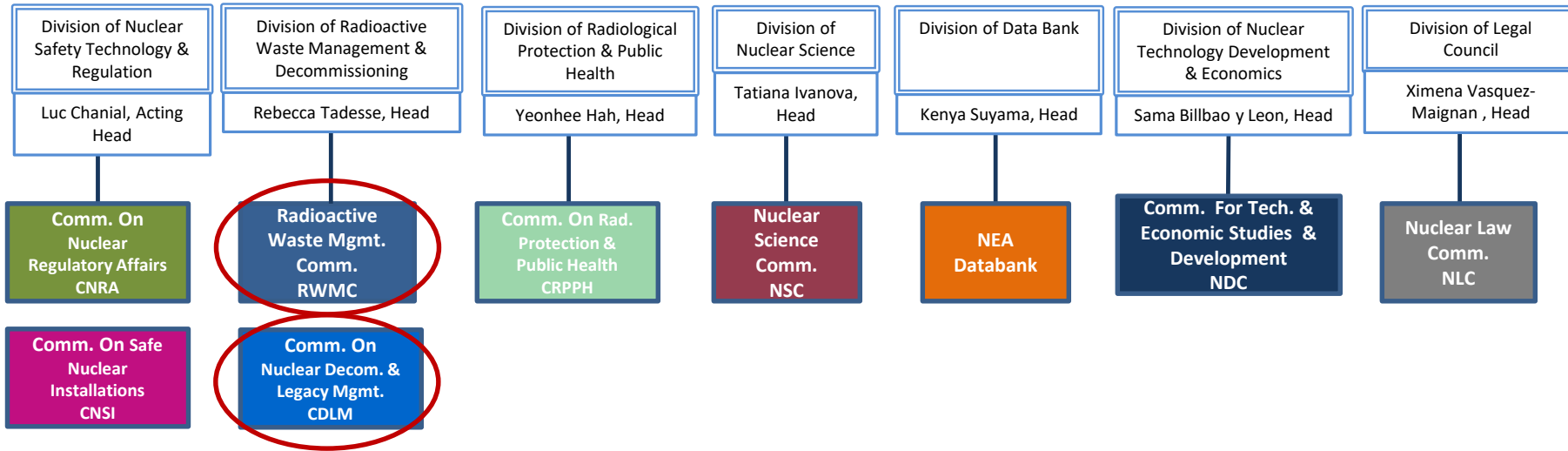
Conduct multinational research into challenging scientific and technological issues.



**33 NEA countries operate about 84% of the world's installed nuclear capacity**

## NEA Organizational Chart





## Committee on Nuclear Decommissioning & Legacy Management (CDLM)

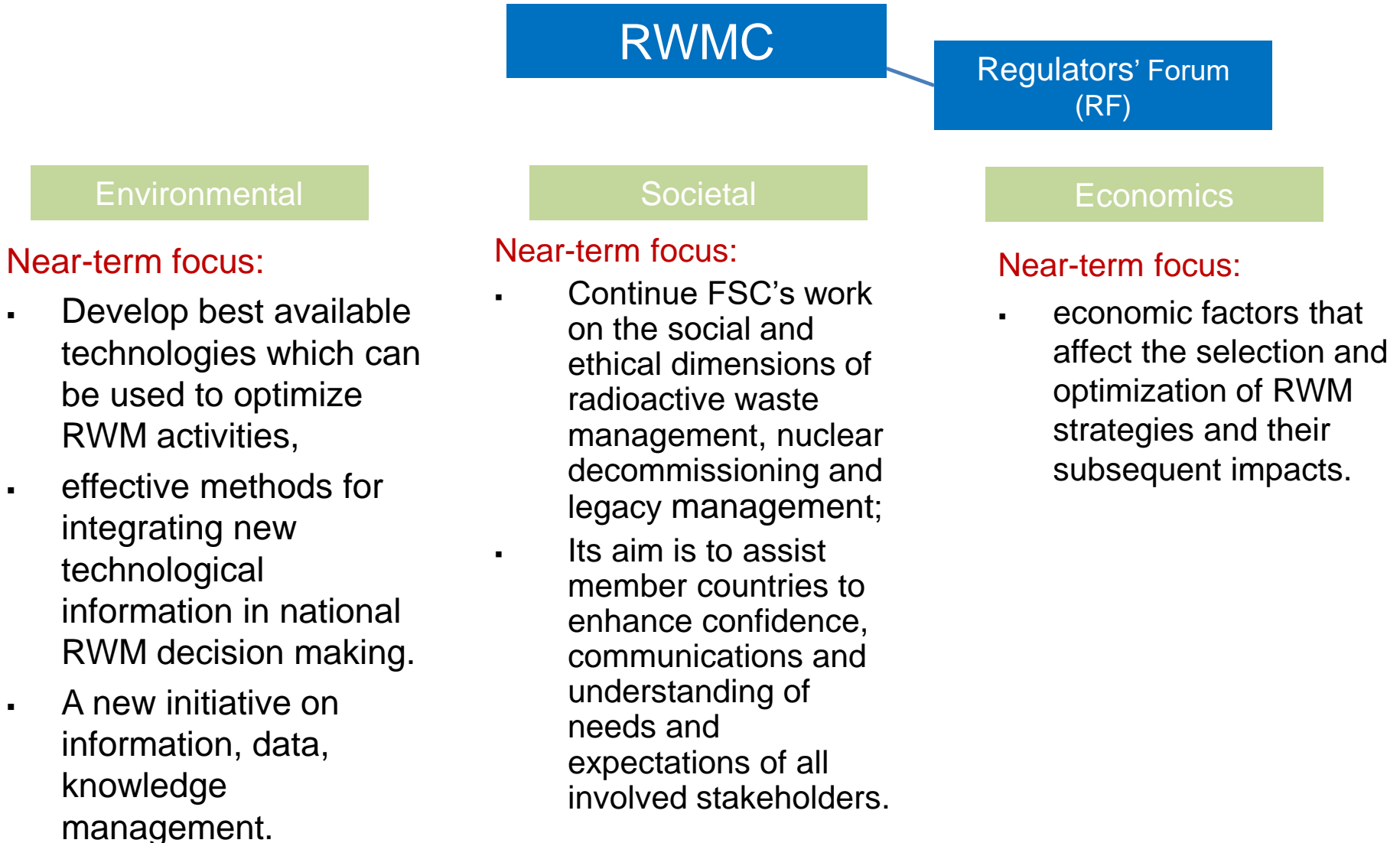
- Approved by the NEA Steering Committee in April 2018.
- The CDLM covers the decommissioning of all types of nuclear facilities and reactor types; as well as the management of legacy waste and waste sites from historical nuclear activities.
- **Objectives**
  - share experiences and knowledge;
  - establish best practices in decommissioning and legacy management;
  - improve understanding of decommissioning costs and uncertainty treatment; and
  - identify research needs and collaboration opportunities.
  - IDKM for decommissioning

## RWMC Vision Statement

The RWMC's vision to manage RW using a holistic approach. Specifically:

- Advance the state-of-the-art on technical, economic and societal aspects of radioactive waste management, also to foster exchange information and experience on RWM policies and practices among members;
- Identify and analyse key issues in policy and strategy for optimisation of the management of spent fuel and all types of radioactive waste generated during various activities.
- Promote cooperative efforts such as the setting up of joint international R&D projects or the development of databases, and to promote initiatives to retain relevant competencies and knowledge.
- Offer, upon request, a framework for the conduct of international peer reviews and international expert feedbacks of national activities in the field of radioactive waste management.

## Managing RW using a holistic approach – 3 key aspects





## **NEA Activities Related Information Data and Knowledge Management**



## Why nuclear is interested in IDKM

- Worldwide interest and request for the development of new tools for efficient and performant IDKM on both short and long term;
- Nuclear sector, incl. RWM, is highly demanding in IDKM:
  - Nuclear data, information and knowledge are very expensive in terms of human, time and financial resources due to its intrinsic complexity and nature;
  - The pioneering nuclear generation has now retired, the generation trained during the nuclear expansion period are approaching retirement, and new generations are hard to emerge due to the national policy contrary to, or simply uncertain about, the use of the nuclear energy;
  - Nowadays, there is a high risk to fail (partially or totally) the transfer of the data, information and knowledge, gained with so many efforts, to the next generations (risk of loss).

***We “forgot” how to go to the Moon. We should do not forget how to build nuclear power reactors, how we generated or how we disposed waste...***

## Why RWM is interested in IDKM

National programmes for RWM tend to run for decades. This timescale is an additional crucial factor for IDKM in this domain:

- **Data** – They increase in number, type and quality as national programmes proceed through the successive stages of repository commissioning.
- **Information** – Users have to be confident with data and able to access and understand the associated information for the long-term.
- **Knowledge** – The (explicit and implicit) knowledge that RWMOs acquire during the national programmes development has to be transmitted from generation to generation of workers to reduce the risk of loss.

In addition to the long development of national programmes, the final repositories are to remain safe from hundreds of years to millennia, while future generations have to be able to take their own-informed decisions...

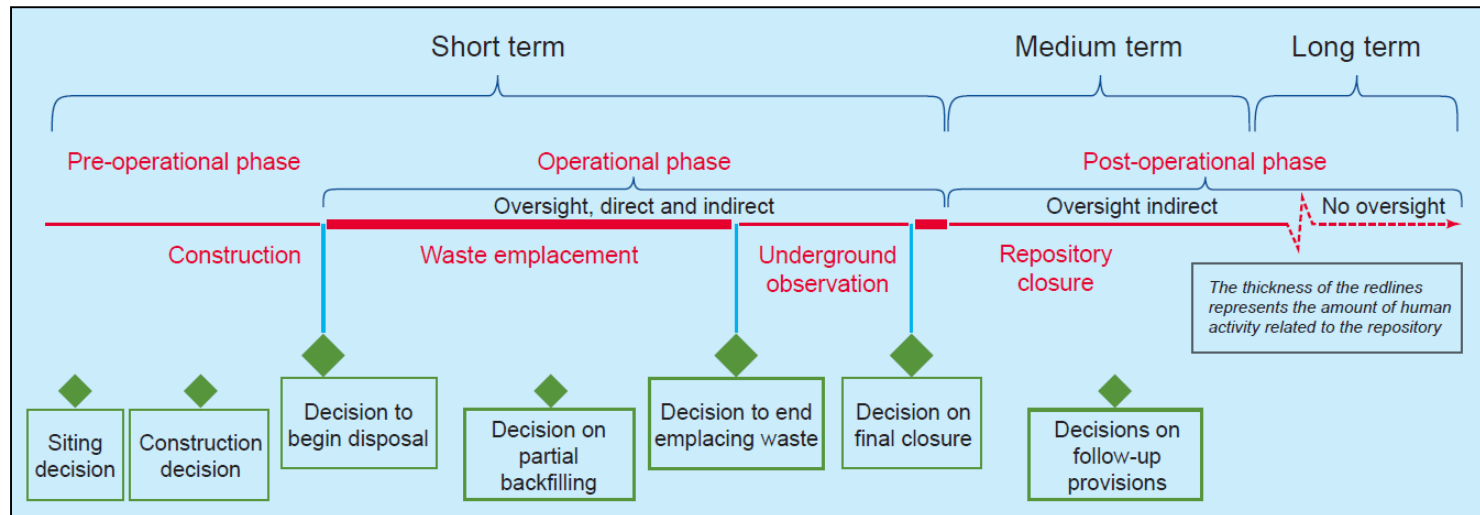
## Recent activities at NEA in the IDKM

### RepMet (2014-17) [homepage](#)

- *Radioactive Waste Repository Metadata Management;*
- Investigation of a family of tools and techniques under the heading of metadata to be implemented in national programmes in order to keep confidence in data and maintain understandable the information in short term.

### RK&M (Phase I: 2011–14, Phase II: 2014–18) [homepage](#)

- *Preservation of Records, Knowledge and Memory across Generations;*
- Definition of a set of complementary and synergic mechanisms for the preservation of RK&M about a radioactive waste repository on the medium- and long-term (Phase II).



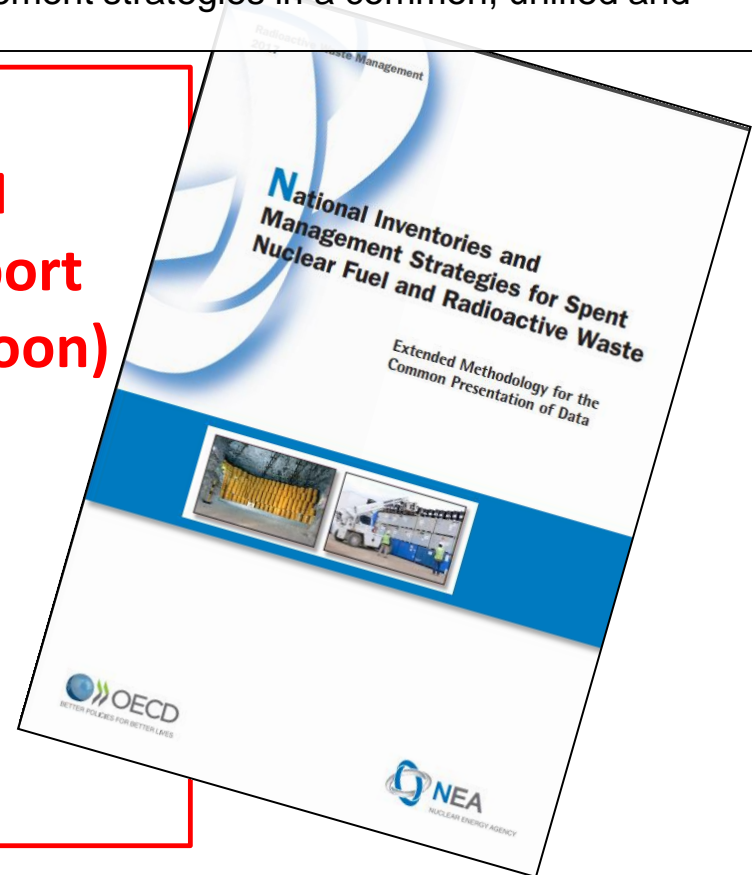
## Recent activities at NEA in the IDKM (2)

### EGIRM (Phase I: 2014-16, Phase II: 2017-18) [homepage](#)

- *Expert Group on Inventorying Reporting Methodology;*
- Development of an innovative methodology for presenting data and information about spent fuel and radioactive waste national inventories and management strategies in a common, unified and unified format.



**RK&M  
Final Report  
(coming soon)**



## New activities at NEA in the IDKM

- **IDKM Workshop** (22-24 January 2019)
- Development of the “**IDKM Roadmap**”, a document collecting activities for which the country member representatives have expressed willingness and interest to carry out under the RWMC auspices
- The NEA Radioactive Waste Management Committee (RMWC) has approved the creation of the “**IDKM Working Party**”. It will act as:
  - A group managing and coordinating all of the activities included in the IDKM Roadmap that the same group will maintain and update based on rising needs of RWMOs and innovations in the IDKM area;
  - A *neutral forum* for the exchange of experiences, lessons learned, common needs and challenges in IDKM among RWMOs, nuclear regulators, TSOs and other stakeholders;
  - A *platform* following major innovations and trends, emerging technologies and consolidating best practices in all forms of the dynamic area of IDKM, in order to assist member countries in their understanding and applications to the RWM field.

## **NEA Activities Related to Competency Management**

## Background (1)

- A growing need exists for strong and comprehensive knowledge management programmes for nuclear regulatory bodies, specifically in the areas of radioactive waste management and decommissioning, to ensure long-term safety.
- Considering the long timeframe of radioactive waste management activities, members of the Regulators' Forum (RF) have expressed their concern for the potential loss of current radioactive waste and decommissioning knowledge and expertise.
- A questionnaire developed by the Secretariat and adopted by RF Bureau was disseminated.



## Background (2)

- The questions were designed to collect information on;
  - Current policy and strategy of competency management in RF countries,
  - methodology to foresee a necessary competency in future,
  - activities on competency and knowledge management,
  - training, tools or other information available for others, and
  - the priority level for enhancing competency in regulatory activities.

## Key results from survey (1)

- There is a need to keep necessary competency to address their mission.
- Competency management policy is developed by regulatory bodies or stipulated in the law.
- Regulators rely on the technical competency of their TSO's
- The need for competency management has changed in the last 10 years.
- Need for more focus on knowledge management and development of new expertise to address new responsibilities placed on the regulators (decommissioning, phase-out strategies, new reactor types, and long-term storage and disposal facilities).

## Key results from survey (2)

- Need to review necessary competency in line with their missions.
- Need for retiring staff to maintain their knowledge within the organisation and supply necessary competency.
- Participation in international meetings/workshops to gain competencies required in the field of waste management and decommissioning.
- Bilateral or multilateral agreement on staff training is valuable, although it can be difficult if the regulatory systems are different between countries.
- On the job training is important. Challenge is how to transfer “know-how” and “experience”.
- RF is a valuable platform for effective communication/interaction with interested parties; best (most effective) practices in the transfer of knowledge/competencies for regulators.

# Competency Management of Regulators Workshop

- Workshop Date February 25-26, 2019 at NEA
- Workshop objective
  - Focus discussion on the core concepts of competency management,
  - Identify effective mechanism for building competency,
  - Identify members needs is support of the development of national framework of regulators' competency management.

## Other NEA Activities related to Radioactive Waste Management

## New initiative on the application of RRS in nuclear back-end

RWMC approved the establishment of a new initiative on RRS application in the nuclear back-end.

### Objectives:

- Promote the exchange of information on RRS development and application amongst the participants; collection and analysis of inputs from all participants;
- Study the main and emerging challenges for the RRS application. Identify the main factors influencing RRS development and application. Arrange the identified factors and develop a road map (a plan of actions) to support the development in the area of provision of the nuclear back-end programmes with RRS;
- Develop recommendations (road map) to members on establishing a framework, allowing the wider application of RRS in the nuclear back-end area. Strive to achieve shared approaches and standards, where appropriate;
- Support the development and implementation of common procedures, rules, standards, etc. that can facilitate the process of RRS application amongst the potential users of the systems.

## Potential participants

Members should be senior technical specialists who have considerable experience and knowledge in the development and application of RRS:

- representatives of decision-makers;
- research and development institutions/organisations in the field of RRS;
- test sites, laboratories and facilities;
- regulatory bodies (various) and technical supporting organisations to the regulatory bodies;
- developers of the main and auxiliary elements for maintenance and repairing of RRS;
- RRS producers, suppliers and service providers;
- soft and electronic elements developers;
- environmental organisations and public communication experts;
- other relevant specialists.

The CDLM will be invited to be part of the initiative as well as the CRPPH and other NEA STCs. Communication with NI-2050.

International organisations (IAEA, EC, WNA, others) and initiatives (e.g. SHARE) will be invited.



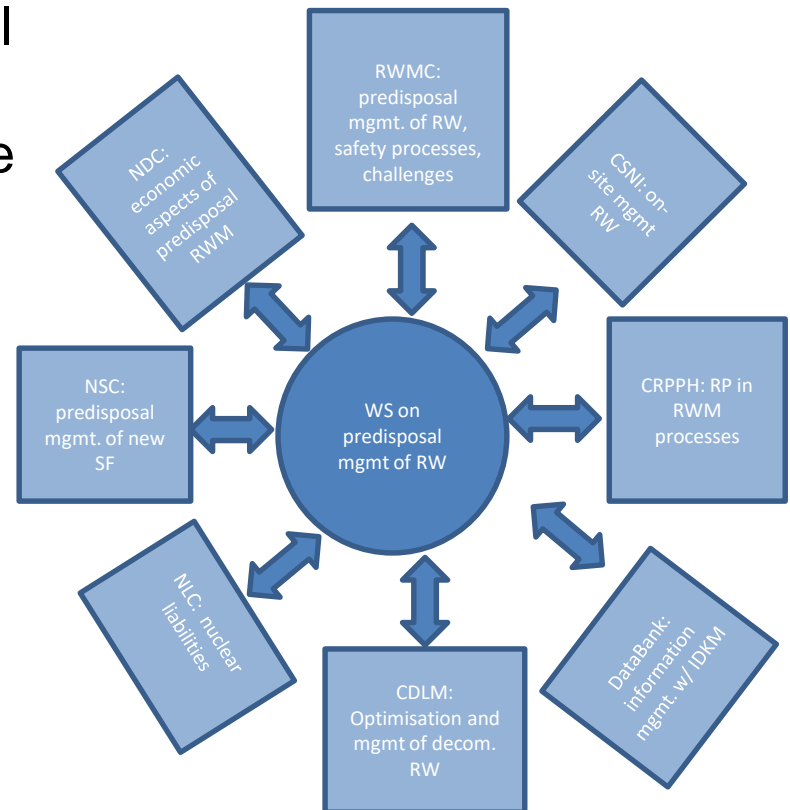
## Predisposal Management Workshop

### Objectives:

- To review the latest RW treatment/conditioning technologies within the RWM community, R&D needs, technical and social challenges in predisposal management.
- To better understand the impact of various factors, i.e. legal, technical, economics, societal, etc. on predisposal management and future WAC.
- To identify work topics for continuing the RWMC predisposal work, and potential collaborations with relevant STCs.

### Next step:

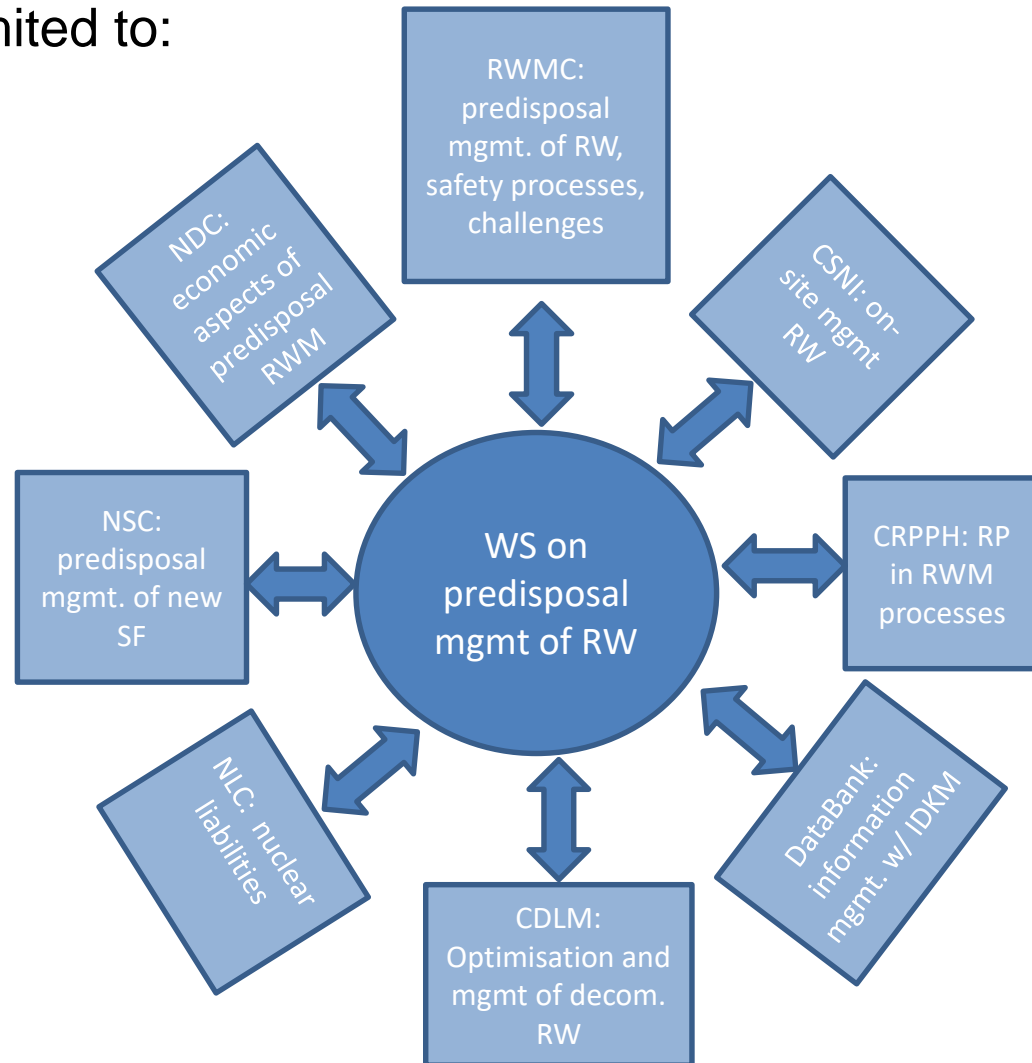
- assemble a PC to plan for an NEA workshop, with all relevant STCs.
- WS to be held in Q1-Q2 2020.



## Predisposal Management Workshop

Collect and analyse inputs in developing future predisposal mgmt. work.  
Inputs may include, but are not limited to:

- RWMC: to present current treatment experiences, R&D needs, challenges
- CDLM: optimization challenges, mgmt. of decom/legacy waste
- CRPPH: radiation protection in RW treatment processes
- NDC: economic aspects of predisposal mgmt.
- CSNI: challenges of on-site RWM and change of ownership
- NSC: predisposal mgmt. of SF from new reactors
- NLC: nuclear liabilities (incl. transportation).
- Databank: data management (jointly w/ IDKM).



## Building Constructive Dialogues Between Regulators and Implementers in Developing Deep Geological Repositories and Other Disposal Projects for Radioactive Waste (RIDD)

- The aim of this new initiative (RIDD) is to develop best practices for structuring stakeholder interactions in the decision-making process of managing radioactive waste.
- Best practices will be defined based on existing national experiences and best practices as identified by international organizations such as the NEA, IAEA, EC, and ICRP.
- Best practices should be in line with the RWMC Statement.
- The main idea is to develop sustainable strategies for the management of all radioactive waste types from their production to final disposal.

## RIDD – Work Scope

- 1<sup>st</sup> phase 2019-2020: focus on building constructive R-I dialogues in RW disposal projects.
- Proposed mode of operation: regular informal meetings to engage R-I dialogue in a collaborative setting, with opportunities for open discussion. Presentations, discussion outcomes and lessons learned will be documented and used to develop the final report.
- The RWMC may consider dialogues with other stakeholders in other radioactive waste management activities/projects in future phases.
- Future phases will identify best practices for structuring effective stakeholder dialogues in the following project areas:
  - Geological disposal
  - Other types of disposal, i.e. underground and near surface disposal
  - Decommissioning and dismantling
  - Transportation infrastructure development
  - Interim and long-term storage

## The Nuclear Education Skills and Technology (NEST) Framework:

- Building-up practical experience and expertise by exposing the next generation to real-world problems, through hands-on activities in multi-disciplinary and multi-national contexts;
  - International co-operation allows identifying and accessing a critical mass of capacities (infrastructures, construction or decommissioning projects, innovative activities...);
  - Establishing links between Universities, Research Institutes, Industry and Regulatory bodies.
- 
- 15 organisations from 10 countries are signatories to the NEST Framework Agreement (entry into force 15 February 2019).

## The NEST CLADS Project



Collaborative Laboratories for Advanced Decommissioning Science

NEST-CLADS will be dedicated to advanced remote technology for decommissioning under intense gamma-ray radiation environments. The proposed project is divided into two stages:

- a *short program* consisting of seminars, site tours, and practical exercise. This will be held at the Nahara Remote Technology Development Centre of JAEA where students will be able use virtual reality to understand the circumstances inside a reactor building, virtual operations by simulated remotely operated robot.
- a *long program* mainly based on research tasks.



*Virtual reality and simulation system in Naraha Remote Technology Development Center of JAEA*

### NEST Management Board

**Leading organisation:**  
JAEA/CLADS

### NEST Fellows:

Graduate and Postgraduate students and young professionals

### Participating Organisations:

The University of Tennessee, **US** (Prof. William R. Hamel)  
Lawrence Berkeley National Laboratory, **US** (Dr. Kai Vetter)  
McMaster University, **Canada** (Prof. Shinya Nagasak)

**Organizations under consideration :** University of Birmingham, **UK** (Prof. Rustom Stolkin), Lancaster University, **UK**, Savannah River National Laboratory, **US** (Dr. Jeffery C. Griffin), Platform for Basic Research on Decommissioning, **Japan**, University of Manchester, **UK**, NNL, **UK**, CEA, **France**, KAERI, **Korea**...



POCATOM

## The NEST PDC UGR Project

The **NEST-PDC UGR** project addresses the main issues of **RW management, including characterization, decontamination and disposal**. It will focus on decommissioning of Uranium Graphite Nuclear Reactors. Hands-on training will consist of several activities which will make use of the fully-fledged infrastructure, **pilot & experimental facilities** present at the sites:

- Specially-manufactured equipment for i-graphite remote sampling
- Graphite incineration facility
- RW repository mock-up models for investigation of geological barriers



*Pilot facilities for testing technology of i-graphite treatment*

NEST Management Board

Leading organisation:  
"PDC UGR" JSC

NEST Fellows:

Graduate, Postgraduate students and young professionals

Interested Participating Organisations

**Universities:**

- Seversk Technological Institute/MEPhI branch, **Russia**;
- National Research Nuclear University MEPhI, **Russia**;
- National Research Tomsk Polytechnic University (TPU), **Russia**;
- Faculty of Chemistry, Lomonosov Moscow State University (MSU), **Russia**;
- Politecnico Milano, **Italy**.

**Industry:**

- ROSATOM, **Russia**;
- Sogin Latina NPP, **Italy**.

**Regulator:**

- Siberian Department of the Federal Environmental, Industrial and Nuclear Supervision Service "ROSTECHNADZOR", **Russia**.



## Thank you for your attention



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