

EUROPEAN JOINT COLLABORATION TOWARDS SAFE RADIOACTIVE WASTE MANAGEMENT

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BACKGROUND – EUROPEAN RD&D

- Considerable knowledge in the field of radioactive waste management acquired over the past 40 years
- Collaborative RD&D projects supported by EC through EURATOM



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- Enhanced coordination supported by EC: IGD-TP platform and SITEX network



- Leap forward: EC Policy & Strategy for integration of EU Member-States R&D programmes
 - Replace EU competitive calls for projects by **inclusive European Joint Programmes** (EJP)
- In 2014, EC called for a feasibility study of creating such an EJP in RWM field: JOPRAD (2015-2017)
 - **identify the actors** with key responsibility for directing RD&D on safe RWM
 - engage them in the development of a **shared Vision** and a **shared Strategic Research Agenda**

EURAD (2019-2024): A LEAP FORWARD

“A step change in European collaboration towards safe radioactive waste management (RWM), including disposal, through the development of a

- **robust and sustained science, technology and knowledge management programme that**
- **supports timely implementation of RWM activities and**
- **serves to foster mutual understanding and trust between participants.”**

Ambitions:

- **Complement the national Programmes**
- **Ensure the sustainability of the knowledge**
- **Act as a platform**



5 years
2019-2024



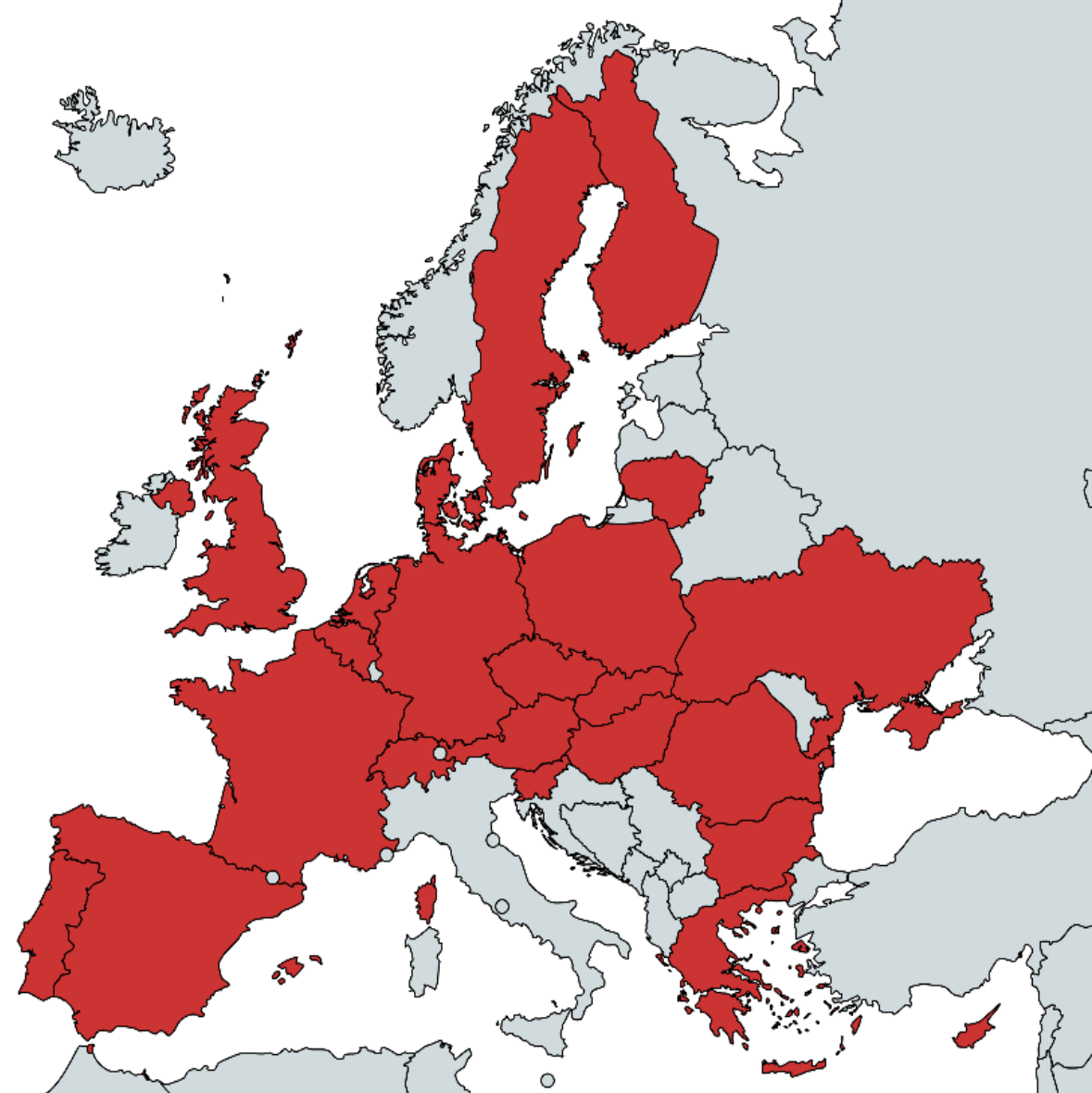
59,9 M€
55 %EC
contribution

A COMMUNITY



115
organisations

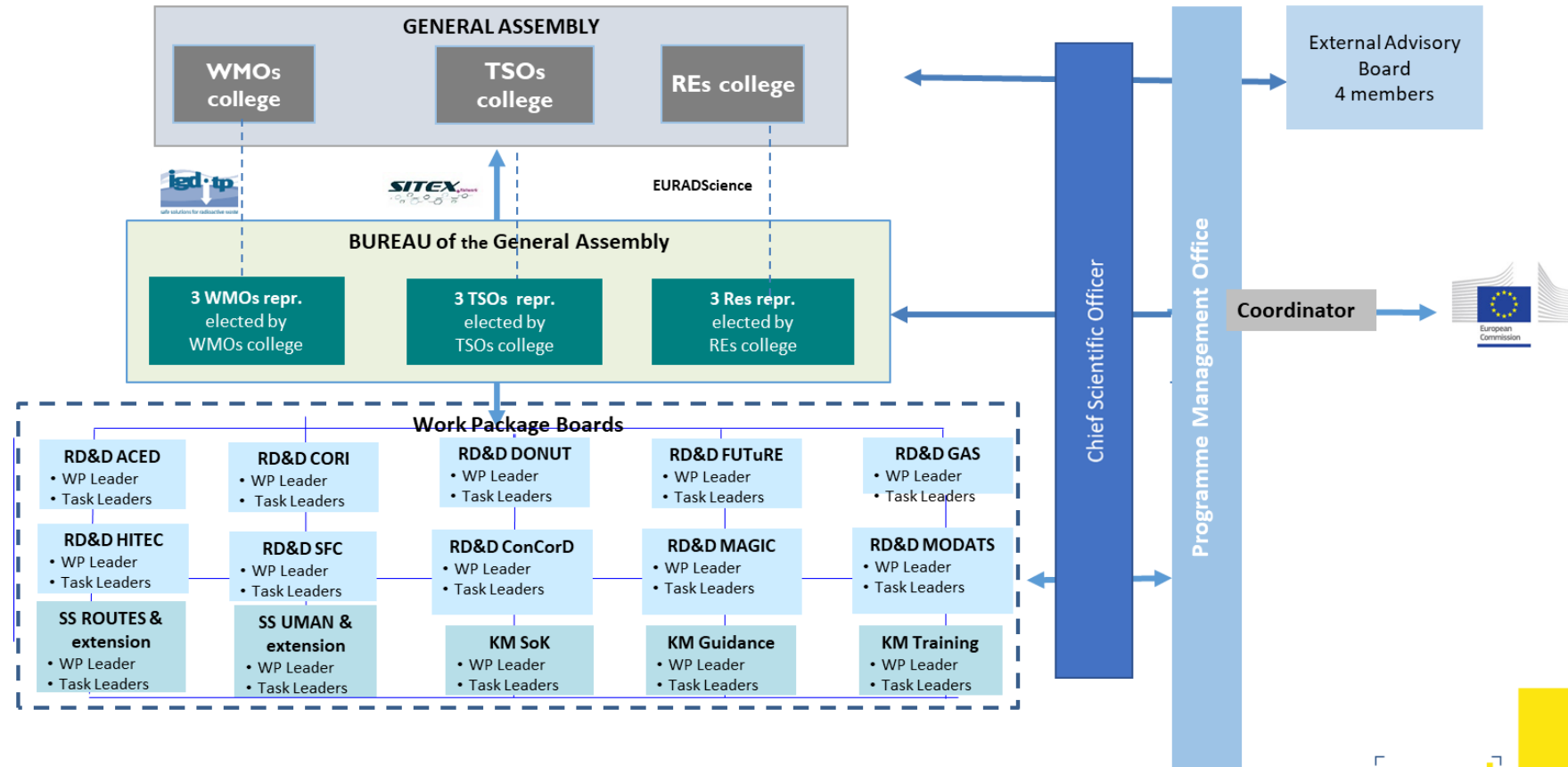
- 51 Mandated actors from 23 European countries representing the following Colleges :
 - Waste Management Organisation (WMO)
 - Technical Safety Organisation (TSO)
 - Research Entity (RE)
- 61 Linked Third Parties (mostly universities and research centres) and 3 International Partners (Canada, Australia and Japan)
- Groups of Civil Society organisations



GOVERNANCE

Governing principles:

- Positive participation
- Maintenance of independence
- Transparent governance
- Scientific excellence
- Balanced Programme
- Added value
- Inclusiveness
- Equitable Financing
- Complementary participation
- Tangible results



DEPLOYMENT – EURAD WORKPACKAGES



17
work packages

- **Research and Development** (10 workpackages)
 - developing and consolidating scientific and technical knowledge
- **Strategic Studies** (2 workpackages)
 - enabling experts and specialists to network on methodological / strategical issues and advance significant challenges in direct link with scientific and technical issues
- **Knowledge Management** (3 workpackages)
 - developing State of Knowledge, developing descriptive methodological guidance and developing/delivering training modules and mobility measures
- **Coordination/Dissemination** (1 workpackage)

~82 % of the budget

SCIENCE & NETWORKING

- **Radioactive waste characterisation, processing and storage**
 - SFC- Spent Fuel Characterization and Evolution Until Disposal
 - ROUTES -Waste management routes in Europe from cradle to grave (with strong interface with PREDIS)
- **Engineered barrier system properties and long-term performance**
 - ACED -Assessment of Chemical Evolution of ILW and HLW Disposal cells
 - ConCorD - Container Corrosion under disposal conditions
 - MAGIC -Chemo-mechanical aging of cementitious materials
- **Geological disposal facility design and the practicalities of implementation**
 - MODATS - Monitoring equipment and data treatment for safe repository operation and staged closure
- **Geoscience to understand rock properties, radionuclide transport and long-term geological evolution**
 - FUTURE -Fundamental understanding of radionuclide retention
 - CORI -Cement-Organic-Radionuclide Interactions
 - GAS -Mechanistic understanding of gas transport in clay materials
 - HITEC - Influence of temperature on clay-based material behaviour
- **Performance assessment, safety case development and safety analyses**
 - DONUT -Development and improvement Of Numerical methods and Tools for modelling coupled processes
 - UMAN - Uncertainty Management multi-Actor Network

~7 % of the budget

KNOWLEDGE MANAGEMENT

1

Roadmap

A common framework to structure knowledge

2

State of Knowledge

What we know and why it is important

3

Guidance

Best practices and lessons learned

4

Mobility & Training

Transfer of experience and know-how

5

Networking & Tools

Connecting people to people, and people to content



INTERACTIONS WITH CIVIL SOCIETY (ICS)

- **Planned at the start of the programme**

- Involvement in the core group responsible for preparing EURAD
- Involvement through the Technical Safety Organisations (TSO) College
- Coordination of the activities within the PMO WP
 - Coordination, organisation, results integration
- Involvement in the two Strategic Studies
 - Waste Management routes in Europe from cradle to grave (ROUTES)
 - Understanding of uncertainty, risk and safety by different actor (UMAN)

- **Followed-up by new activities in the second wave**

- Involvement in one R&D WP
 - Monitoring equipment and Data Treatment for Safe repository operation and staged closure (MODATS)

A STEP CHANGE IN EUROPEAN COLLABORATION

- **Roadmap**
 - High-level guide for RWM activities
 - Draws on knowledge from advanced programmes, promoting knowledge across generations
- **Strategic Research Agenda**
 - Aligned with Roadmap
 - Central tool in addressing emerging challenges in RWM
 - Update introduced a set of drivers to define WPs, moving away from priority-based classifications
- **Effective and collaborative governance**
 - Foster interactions among Colleges
 - Effective representation of diverse points of view that enhanced credibility and results
- **Broad participation**
 - 23 European countries, over 110 organisations and international partners engaged
 - Cross-country collaboration: early-stage programmes accessed advanced knowledge, while advanced programmes shared critical insights
 - Interaction with Civil Society
 - Coordination with PREDIS project and international organisations to further strengthen synergies

KEY ACHIEVEMENTS

- **Scientific excellence**

Comprehensive integration across RWM lifecycle, including:

- Models and insights on nearfield evolution in deep geological repositories
- Significance of numerical models and tools, including DT and AI
- Key data on RN, cement and organics interactions
- Advanced mechanistic understanding of RN retention
- Developed methodologies and protocols for gas transport through clay materials



353 publications



191 deliverables

- **Trust and mutual understanding**

- Workshops with CS → public confidence and awareness
- Strategic Studies as think-tank activities that enabled comprehensive understanding of :
 - Key RWM issues for Small Inventory Member States
 - Uncertainty management, including CS involvement

- **Knowledge transfer**

- School of RWM promoting students
 - Over 150 trainings
 - 99 mobility actions fostering a skilled new generation
- Production of 3 guidance documents
- Production of 25 Domain Insights, 7 Theme Overviews and 2 State-of-Knowledge

EC FINAL REVIEW

Positive

- Clear governance
 - Coherent structure, less administrative workload for WP Leaders
- Colleges involvement
 - Shared vision, programme defined by actors not funding agency
- Roadmap and Strategic Research Agenda
 - 10 years vision, drivers implementation
- Dissemination
 - Annual events, cross fertilisation
 - Useful for member states
- Quality Assurance
 - Strict review process ensuring quality
- Creation of a community
 - Shared culture where people can debate

Recommendations

- End-users
 - Better definition needed
 - Involvement of regulators
- Executive Advisory Board role
 - Clarification of the terms of reference
- Civil society involvement
 - Open to wider community



THANK YOU FOR YOUR ATTENTION

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