EDITO

Almost 6 months since our last newsletter!

It has been an exciting half-year, and in this edition, we are thrilled to share the highlights from the past months. You will get an overview of key achievements, updates on our Work Packages, and insights into the Young Generation network.

Looking ahead, we have a series of engaging training sessions scheduled before summer, by different work packages. Those are perfect opportunities to learn more about what we are doing. Be sure to explore all the advertisements in this newsletter so you don't miss any opportunity.

Annual event n°2

We are glad to announce that the registration for our second annual event is now open.

Join us in Dublin, Ireland, from September 8–10.

Second wave

The European Commission adopted on March 19 the Euratom Work Programme for 2026 and 2027. EURAD-2 is granted 30 million € for 2026-2027 allowing the continuation of the running RD&D Work Packages and the funding of a second wave. More information about the second wave and ways to get involved are available on EURAD-2 website.

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Highlights of the FORSAFF Stakeholder Engagement Seminar in Tallinn, Estonia

by Alan Tkaczyk (UTARTU) & Nadja Železnik (EIMV), FORSAFF Task 6 co-leaders

The second FORSAFF Task 6 multiparty stakeholder seminar was held on 4–5 December 2025 at the Estonian Ministry of Climate in Tallinn. The seminar focused on stakeholder aspects of radioactive waste management in the context of Light-Water Small Modular Reactors (LW-SMRs), convening 50 participants representing WMOs, regulatory bodies, research institutions, industry, and civil society.

The seminar explored the underpinnings for credible, socially legitimate, and technically robust radioactive waste management of LW-SMRs. Throughout the meeting, national and international experts highlighted that long-term feasibility and societal legitimacy of SMR deployment depend on credible waste management strategies established from the outset of programme development. Presentations from Estonia (Ministry of Climate, Ministry of Interior, Fermi Energia) and Finland (TVO, VTT), together with European perspectives such as IGD-TP, ERDO and WP3 ASTRA, underscored that Small Inventory Member States face particular challenges related to institutional capacity, financing, and alignment of new waste streams with existing or planned disposal infrastructures.

Group picture

Interactive panel discussions provided a multi-actor assessment of the evolving SMR landscape, highlighting the interdependence of technical feasibility, transparent governance, and sustained stakeholder engagement. The first panel (IGD-TP, ERDO, TVO, VTT) focused on the status and challenges of RWM for SMRs and Small Inventory Member States, with panellists emphasising uncertainties in SMR waste streams, repository design implications, decentralised waste site acceptability, and public engagement recommendations. A second panel (CIEMAT, VTT, NTW), drawing on FORSAFF Task 4's technical findings, examined emerging waste types, back-end uncertainties, and the need for early vendor transparency in waste stream characterisation.

A highlight of the seminar was the Pathway Evaluation Process (PEP) serious game exercise recently customised for SMRs, which enabled participants to use this structured participatory tool to explore realistic RWM disruption scenarios, such as political instability, cross-border responsibility issues, and unexpected technical developments.

Across PEP groups, a common message emerged: robust, technology-neutral regulation; stable long-term financing; and meaningful engagement throughout the entire lifecycle are indispensable foundations for public trust and sustainable SMR deployment.

In conclusion, the seminar served as an important input to the forthcoming FORSAFF White Paper and sought to integrate technical, regulatory, and societal considerations relevant to emerging nuclear technologies.

FThe first discussion panel (IGD-TP, TVO, ERDO, VTT) expressed views on "Status and challenges in RWM, including SMR and SIMS perspectives."

Predisposal Christmas card competition 2025

As a joint effort of the three WPs involved on predisposal activities - **WP5 ICARUS, WP6 STREAM and WP7 L'OPERA** - a **team-building initiative** was organised to bring together students and postdoctoral researchers across the three Work Packages.

Participants were invited to collaborate on the creation of the **official Predisposal Christmas card**, which was later shared by the WP Leaders with partners and end users as the holiday greeting.

This activity was designed to strengthen connections within the student community and to encourage creative, cross-WP interaction in an informal and enjoyable way.

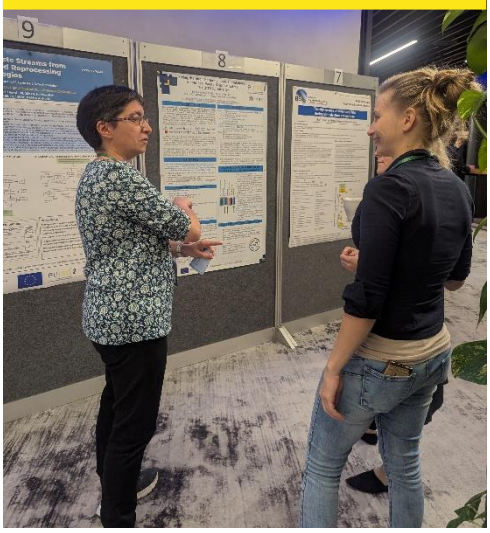
In total, nine proposals containing 16 different cards were submitted. An excellent response that highlighted the community's imagination and engagement.

The winning design, created by **Václav Znamínko** (UJV Řež, Czech Republic), beautifully captures the collaborative and forward-looking spirit of our Predisposal community.

Through the lens

ICS Workshop – CLIMATE (January 2026)

IGD-Tp Exchange meeting (November 2025)



IGD-Tp Exchange meeting (November 2025)

IGD-Tp Exchange meeting (November 2025)

IHLRWM Conference (November 2025)

SUDOKU annual meeting (March 2026)

2nd wave Exchange meeting (November 2025)

External Advisory Board meeting (February 2026)

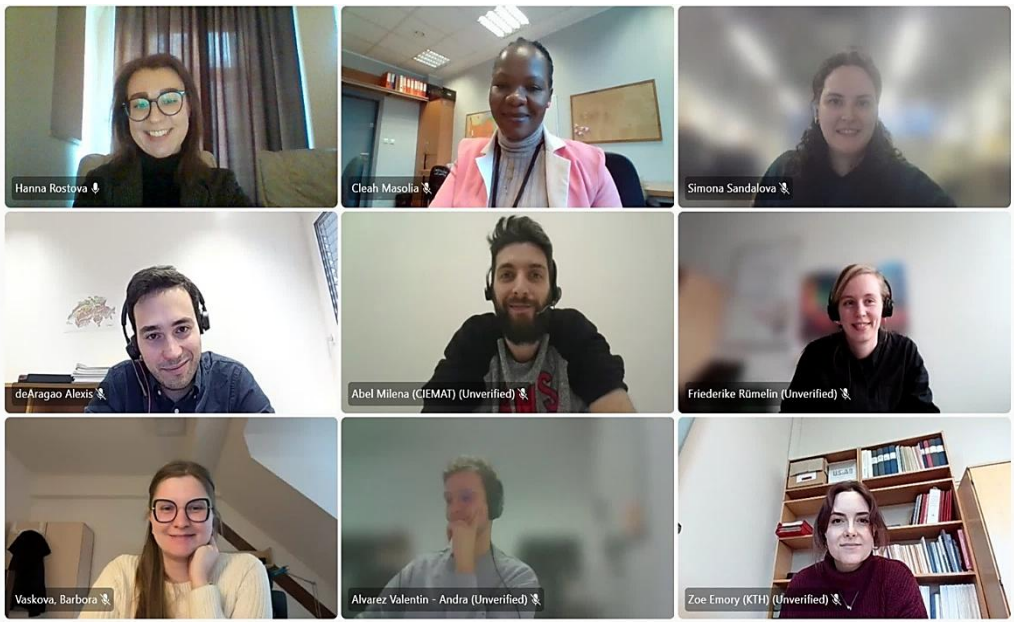
Bureau/PMO meeting (February 2026)

SUDOKU annual meeting (March 2026)

Building the Future of Radioactive Waste Management - The EURAD-2 Young Generation

Authors: Alexis de Aragao, Hanna Rostova, Simona Šandalová

The EURAD-2 Young Generation (YG) community was created under WP2 *Knowledge Management*, and more specifically under Task 4 *Competence building*. Its aim is to contribute to closing the generational competence gap through training the next generation of experts and supporting knowledge transfer to specialists from other areas. Within Task 4, and more specifically sub-task 4.3 focused on *Mentoring & Networking*, the idea of a dedicated YG community took shape and became a structured platform for connection, growth, and collaboration. In this short article we provide a brief overview of our community, the activities that have been implemented and future activities we are planning.



FParticipants and speakers of the first EURAD-2 YG Colloquium session

Goals and vision

The YG activities are built on three main complementary pillars. First, to create a community that connects young researchers across disciplines and work packages, encouraging collaboration and communication beyond organizational boundaries. Second, to highlight young researchers and their work by providing opportunities to present and discuss their research in a supportive environment, exchange ideas, and actively engage in the broader EURAD-2 activities. Third, to increase the competences of the YG members by facilitating peer learning, trainings and organising site visits to EURAD-2 partner organisations. All of these pillars combined should help promote the long-term engagement of young researchers in radioactive waste management, one of the main goals of WP2.

How to join?

Today, the YG community brings together 59 members from 15 countries and more than 30 partner organisations, spanning 15 work packages. Membership is open to MSc and PhD students, post-doctoral researchers, and professionals in intern and junior positions under the age of 35 who are directly involved in the EURAD-2 programme (click here to join).

The organisational team is led by the Leader, Simona Šandalová (Polimi, IT), and the Vice-Leader, Hanna Rostova (NSC KIPT, UA & IMP PAN, PL), who is responsible for event organisation. The team further consists of Anna Golubko (SURAO, CZ) and Cleah Minayo Masolia (IChTJ, PL), contributing to event organisation; Hamza Alaoui (ASNR, FR), responsible for communication; Jingyue Hao (University of Manchester, UK), in charge of the newsletter and communication; and Alexis de Aragao (Nagra, CH), contributing to both communication and event organisation.

Focus and activities

The first YG online meeting was held on October 30, 2025, bringing together 16 participants. The event, led by Simona Šandalová, aimed to introduce members to each other and to lay the foundations for the future community's focus and activities. The meeting was completed with a presentation by Niels Belmans on WP2 activities supporting early-career researchers.

Based on the feedback gathered from participants, a two-fold expectation emerged: a strong YG community would be articulated around events alternating between professional exchange and a more informal, personal interaction. To support the professional exchange, a bi-monthly *colloquium* format has been established. In these *colloquia*, the YG members can present their work and its outcomes and discuss them with everyone within the community. *Site visits*, aligned with research topics, have also been planned. This would notably permit face-to-face interactions, a prerequisite for building a meaningful community. Peer learning and training courses tailored to the needs of YG members, a request of some attendees, could be additionally developed in the near future, conditioned to available resources.

Participants further expressed a wish for a community that favors friendly ties, through opportunities to share experiences, situations and challenges specific to the YG. Informal *Venting Fridays*, organized every 6 weeks, have thus been envisaged, where participants could hang out and chat online, in a relaxed atmosphere.

In addition to the first YG meeting, a text messaging group was created in WhatsApp to facilitate discussions among YG members, collect opinions via polls, and distribute information about upcoming events.

Achievements and outlook

On December 17, 2025, Simona Šandalová and Hanna Rostova, vice-leader of the YG, presented the newborn community at a *Lunch & Learn* presentation together with the representatives of the NEA Integration Group for the Safety Case Next Generation Network (IGSC NGN). This sparked the enthusiasm of more than 100 participants and significantly enhanced the visibility of EURAD-2 YG.

According to the roadmap established during the YG meeting, the first EURAD-2 YG Colloquium session occurred on January 28, 2026, combining community updates with two engaging scientific presentations. Cleah Minayo Masolia (IChTJ, Poland, WP7 L'OPERA) presented her PhD research on geopolymers as innovative materials for radioactive waste immobilisation, highlighting their potential advantages over traditional cement-based matrices. Simona Šandalová (Polimi, Italy, WP6 STREAM & WP7 L'OPERA) introduced her work on novel alkali-activated materials for conditioning challenging radioactive waste, addressing both current limitations and future perspectives, including extensions of the research towards waste forms expected from Generation IV reactors. The session was marked by lively discussion, strong audience engagement, and an interactive activity that added a dynamic and friendly atmosphere. Participant feedback collected at the end of the event will help shape future YG initiatives.

In parallel, a *site visit* to the Bukov Underground Research Facility, Czech Republic, is being organised for April 16, 2026.

The YG community has several other steps planned. This includes an update of the EURADSchool website with respect to EURAD-2 YG subpages; establishing a Charter that defines the identity, mission, vision, and core principles of the community; organising a first *Venting Friday* on March 6, 2026; and organising a panel during the EURAD-2 Annual Meeting in Dublin (8 -10 September, 2026).

The second *EURAD-2 YG Colloquium session* is also scheduled for the end of March.

All past and future activities are summarized in the first YG newsletter (link), published in February 2026.

PREDISPOSAL KNOWLEDGE MANAGEMENT INITIATIVE: EURAD-2 COURSE ON GEOPOLYMERS

As part of a collaborative effort within **EURAD-2 Task 2 (Knowledge Management)**, the three predisposal Work Packages (**WP5 ICARUS, WP6 STREAM, and WP7 L'OPERA)** have jointly developed a **Course on Geopolymers for Radioactive Waste Conditioning**.
By bringing together expertise from all three WPs, this initiative strengthens the transfer of knowledge on innovative waste-conditioning technologies, promotes alignment across European programmes, and supports the development of the next generation of specialists working on predisposal challenges.

This **three-day in-person training** will take place at **SCK CEN in Mol (Belgium)** from **18 to 20 May 2026** and will be open to participants from the **EURAD-2 community**, with priority given to the **EURAD-2 Young Generation**.

The course aims to bridge the gap between **fundamental chemistry** and **industrial-scale application**, offering a balanced mix of:

- Expert lectures on geopolymer synthesis, chemistry, microstructure, and waste immobilisation
- Hands-on laboratory sessions at SCK CEN (fresh properties, calorimetry, mechanical performance)
- Case studies and upscaling workshops (drum-scale performance, QA/QC, NDT techniques)

This training reflects EURAD-2's commitment to building shared learning pathways, reinforcing the Predisposal Knowledge Management framework, and fostering cross-disciplinary skills within the community.

WP5 ICARUS

The next WP5 ICARUS annual meeting will take place on April 28 – 29, 2026 and it will be in-person only. The venue is Jozef Stefan Institute Reactor Centre - Ljubljana. During the meeting, we will report the main outcomes about Non-Destructive Techniques, Destructive Techniques, and Scaling Factors for physical, chemical, and radiological characterization of radioactive waste. We will plan the next activities and focus on specific use cases and intercomparison exercises

ICARUS has actively promoted its research and findings through a variety of dissemination channels.

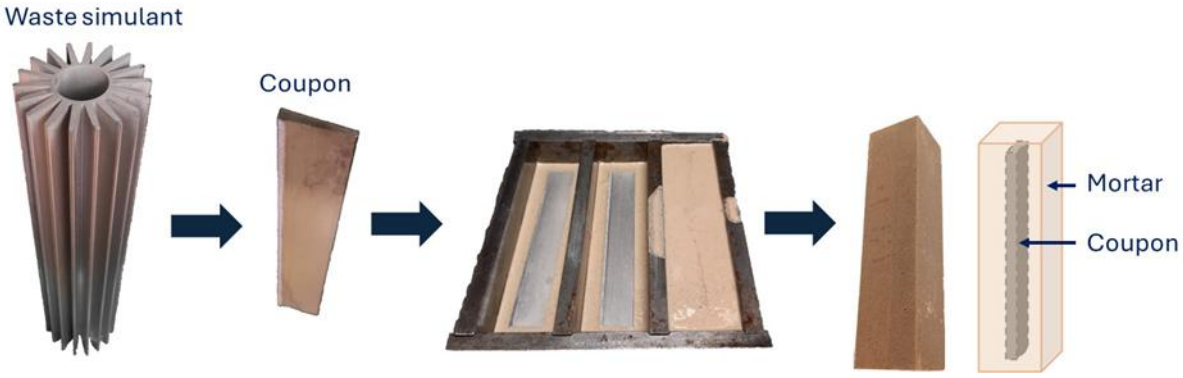
- POLIMI research group has recently published a new paper on the Journal of Radioanalytical and Nuclear Chemistry:
  - A. Broglia, G. Magugliani, L. Fornara, C. Piras, G. Bilancia, F. Galluccio, E. Macerata, M. Mariani, E. Mossini, An optimized radiochemical method for the quantification of ^{36}Cl in irradiated concrete from nuclear decommissioning. Journal of Radioanalytical and Nuclear Chemistry (2025) 334:8807–8815. https://doi.org/10.1007/s10967-025-10584-3
- Mirco Vailati graduated in Nuclear Engineering at POLIMI (October 2025) with a thesis entitled “Development of a non-radiometric method for the determination of ^{99}Tc in spent ion exchange resins”, advisor: E. Mossini, co-advisors: G. Magugliani, M. Mariani.
- Philip Fermsjö graduated in Technology Applied and Computational mathematics at KTH (February 2026) with a thesis entitled “Parameter Inference in CRUD Dynamics Models for Nuclear Reactor Systems”, supervisors: Mattias Sandberg, Elias Jarlebring and Francesco Messi (SKB).
- Andrea Capuano will graduate in Nuclear Engineering (March 2026) with a thesis entitled “A New Selective Extraction Chromatography Resin for the Radioanalytical Characterization of Molybdenum”, advisor: E. Mossini, co-advisors: G. Magugliani, M. Mariani.
- Eya Abed, PhD student at IMT-Atlantique, has recently presented her PhD research at the 12ICI Conference: https://agenda.infn.it/event/41820/. The title of the presentation is: “Development of separation method for difficult-to-measure radionuclides from nuclear decommissioning ”. See the picture below.

WP7 L'OPERA

After the delivery of the initial State-of-the-Art of the work package WP7 L'OPERA, another important deliverable was published, focusing on the definition of the boundary conditions arising from the operation of LILW disposal facilities. By gathering information from the WP partners and End-Users and considering different concepts and designs for near-surface and intermediate-depth facilities, critical parameters were identified for further ageing and modelling studies.

In line with international standards and building on the experience gained in the PREDIS project, specific experimental protocols were developed, including a leaching protocol and an "accelerated" ageing protocol for the assessment of waste forms under study. These protocols aim to simulate their long-term performance over time frames of up to 300 years, corresponding to the institutional control period, by reproducing key degradation processes such as irradiation and thermal cycling.

Due the diverse nature of the wastes (solid and liquid organic waste, metallic waste) and matrices considered for their immobilization (geopolymer, AAMs, MKPCs, NOCHAR), a comprehensive inventory of the systems studied in WP7 L'OPERA has been established and will be periodically updated. Consistent with international standards, a characterization protocol was developed and shared with the WP6 STREAM.



Scheme of immobilization of metallic waste (Mg-Zr alloy used as fuel cladding materials) in MK-geopolymer (courtesy of CEA)

The next annual workshop will be held in Prague (CVUT - The Czech Technical University) on April 14 and 15, 2026, followed by a technical visit of ÚJV Řež and CVŘ research reactor. During the workshop, the main achievements and the progress of the work will be presented. A dedicated meeting for the End-Users and Stakeholder will be scheduled to inform them about the current activities and solicit their feedback.

WP8 SAREC

Latest News & Highlights

- The Work Package is on-going and all tasks are in full stride: The experimental tasks (Task 3,4,5) have all initiated their laboratory work. The modelling task (Task 6) have had an online workshop to discuss and define input parameters, and modelling work has been initiated. With regards to knowledge management (Task 2), the structure for the data base for spent fuel leaching data is already set up.

- In October we met in Madrid for the first Annual meeting - se summary below. Most partners were there in person, as well as End Users, and it was concluded it was good to meet in person and to enjoy the social interactions. We are grateful to CIEMAT for hosting us!

- There have been fruitful interactions with Work Packages DITUSC and CSFD, resulting in input to 2nd wave proposal from DITUSC and information exchange regarding spent fuel leaching with CSFD.

Outlook

- In April 2026, Task 2 leader Olga Riba together with colleagues from Amphos 21 are arranging a training event in Barcelona, Spain. This training concerns modelling using iCP: Interface Comsol-PhreeqC.

- In May, an online workshop is planned with the focus on establishing connections and conveying needs between the different experimental tasks and the modelling task.

- Planning is ongoing for the 2nd Annual WP Meeting or the week 19-23 October, and it will be held in conjunction with the 33rd Spent Fuel Workshop. More details will come soon!

1st Annual WP meeting summary

The meeting was opened by WPL Lena Z. Evis (SKB) together with local host Nieves Rodríguez Villagra and colleagues from CIEMAT. Therese Gard (Co-WPL, SKB) joined online and facilitated remote participation.

Group photo of attendants on the steps of the CIEMAT building

The meeting started with organizational updates, confirming that documentation and project progress are on track, with an online workshop planned for spring. Work Package tasks were reviewed, including advancements in knowledge management, database development, experimental studies, and mechanistic modelling across multiple partners. Several presentations and posters highlighted early-stage experimental and modelling progress, with materials made available in Project Place. End Users had a chance to comment and expressed that even if the project is still in its early phases, we need to remember the importance of avoiding delays at the start. A general observation was that maintaining strong communication is a success factor. The meeting concluded with planning for future events, including the 2nd Annual Meeting in Sweden in October 2026, and a set of follow-up actions for the WPL and partners.

Trip to El Cabril

Many of the participants that attended the 1st Annual WP Meeting also accepted the invitation from ENRESA to visit the facility in El Cabril. After going with high-speed train to Cordoba and a bus trip through the Spanish landscape, we arrived at El Cabril where we were guided by ENRESA to the different part of the facility. An introductory talk set the scene, followed by visits to areas for waste handling and assessment, as well as repository sites for low and intermediate level waste and very low-level waste. We also had some nice food and wine to cap it off! A big thank you to ENRESA for arranging this visit.

View over the El Cabril repository site

WP9 InCoManD

From October 14–16, the InCoManD partners gathered for their first annual event, kindly hosted by the Microbiology Group of the Faculty of Science, University of Granada (UGR).

The meeting brought together 38 participants, including the Board, project partners, and members of the Expert Review Group (ERG).

After just one year, InCoManD is already delivering S&T results. Also, new collaborations have emerged, existing partnerships have been strengthened, and we shared inspiring scientific discussions in an exceptional setting.

A big thank you to our hosts at UGR (Lidia G., Lidia L., Cristina, Fadwa, Mar and Mohamed) and to all participants for making this event such a success. The energy and engagement of this community promise exciting progress ahead!

WP15 DITOCO2030

The DITOCO-2 Work Package released Deliverable 15.5: Digital Twins and Their Gaps in the Radioactive Waste Management (EURAD-2 D15.5 Green Paper on Digital Twins | Eurad). This milestone provides a solid analytical foundation for the forthcoming White Paper, which will outline strategic recommendations and a clear implementation roadmap for advancing Digital Twin (DT) solutions across radioactive waste management, with a particular focus on Deep Geological Repositories (DGRs). Through this work, the team reinforces its commitment to strengthening traceability, transparency, and evidence integration, key pillars that support effective safety case communication and long-term programme continuity within EURAD-2.

On 14 January 2026, the DITOCO2030 community held its second online stakeholder webinar, bringing together WMOs, researchers, practitioners, and end-users. Discussions revealed that digital twin efforts across the sector are still fragmented, highlighting the urgent need for aligned end-user requirements and KPIs, interoperable IT architectures, robust data standardisation, open formats to prevent vendor lock-in, and strong data governance to secure long-term trust. These insights further validate the DITOCO-2 team's mission and direction under EURAD-2.

The National Radioactive Waste Repository (NRWR) in Bátaapáti

Partners will next meet in person in the beautiful city of **Budapest (21–23 April 2026)** for the Annual Meeting, including technical sessions and a visit to the National Radioactive Waste Repository in Bátaapáti.

The DITOCO2030 team remains deeply committed to supporting and advancing the EURAD-2 vision in the years ahead.

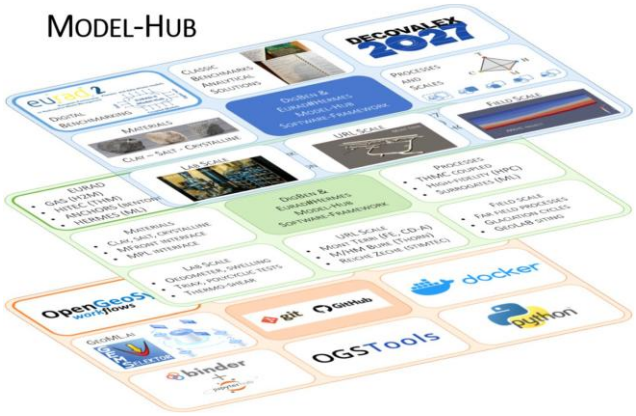
WP 16 HERMES: Frontiers of Model implementation, Code Acceleration and Digital Twins implementation

Data science, including digitalisation and artificial intelligence, has become a key driver of innovation in science, engineering, and industry. These technologies are increasingly transforming the way research is conducted. Alongside process-based modelling approaches, emerging technologies such as high-performance computing and advanced visualisation methods are increasingly leveraging the potential of data science. The current challenge lies in integrating high-quality experimental and monitoring data with advanced modelling concepts and computational tools in order to simulate complex multi-physical and multi-chemical processes across multiple spatial and temporal scales.

In this context, **Digital Twins (DTs)** represent dynamic service technologies capable of mirroring or predicting the behaviour of real-world systems and processes. In radioactive waste management, Digital Twins can integrate multi-physics, multi-scale, and probabilistic simulations to represent existing or future repository systems, including their operational workflows and long-term evolution. The long-term safety of deep geological repositories for radioactive waste depends on the complex interaction of **thermal (T), hydraulic (H), mechanical (M), and chemical (C) processes (T-H-M-C).** These coupled processes govern the evolution of engineered and geological barriers over very long time scales and therefore play a central role in **safety** and **performance assessment studies**.

Within this context, **WP-HERMES** focuses on advancing the realism and predictive capability of coupled THMC models. Despite significant progress in computational methods, the realism of such models remains constrained by computational cost, particularly when considering high spatial and temporal resolution, complex geometries, and strongly coupled multi-physics interactions. These limitations are especially critical when addressing **inverse problems**, such as the interpretation of experimental observations, repository design optimisation driven by safety requirements, or uncertainty quantification. Solving such problems typically requires repeated forward simulations until model parameters converge to values that reproduce observations or provide an optimal design solution.

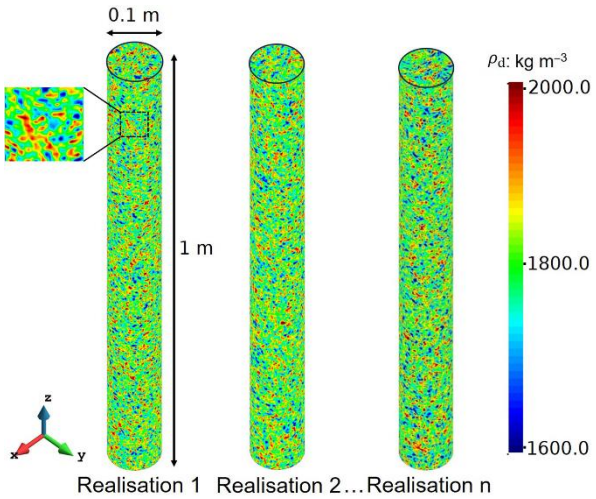
Ensuring the reliability and robustness of numerical simulations therefore requires systematic **benchmarking activities**, which enable verification of model implementations, comparison of results across different numerical codes, and assessment of the influence of computational infrastructure. Benchmarking is a key instrument for ensuring the accuracy, reproducibility, and consistency of simulation results across modelling platforms.



To support collaboration in model development and data integration, **WP-HERMES has established the EURAD-HERMES Model Hub** (https://www.opengeosys.org/6.5.7/hub/), an online platform that facilitates collaborative workflows, code benchmarking, model sharing, and version control. The platform contributes to quality management in numerical modelling and promotes transparent and reproducible modelling practices.

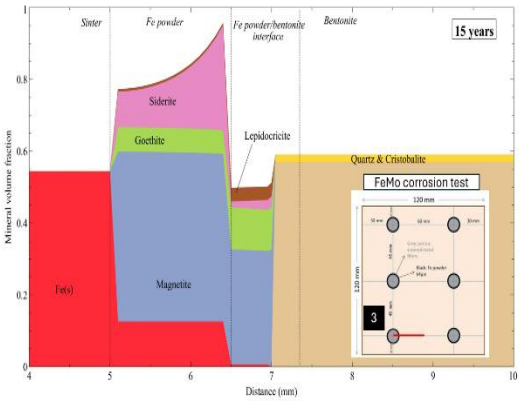
The continued development of **THMC coupled modelling frameworks**, combined with **surrogate modelling techniques**, has the potential to significantly transform radioactive waste management. To

stimulate discussion on the frontiers of digitalisation within the EURAD community, partners from **WP-HERMES** and **WP-DITOCO2030** have contributed to a recent topical papers collection on digitalisation in nuclear waste management and deep geological repositories (DGRs). This collection highlights current advances and emerging challenges in the digital transformation of repository science. A central theme is the integration of high-quality experimental and monitoring data with advanced numerical modelling frameworks in order to develop Digital Twins capable of representing or predicting the performance of repository systems throughout their lifecycle[1].



Significant progress has been achieved in the modelling of **multiphase flow and reactive transport processes**. One example concerns **gas migration in natural clay formations**, where gas transport is strongly influenced by the inherent heterogeneity of the host rock. A recent stochastic analysis of two-phase flow in clays during gas injection experiments explicitly incorporated spatially correlated porosity fields[2]. The results demonstrate that larger sample sizes reduce variability in gas saturation and permeability due to averaging effects. Variability increases under high gas injection pressures but is significantly lower in three-dimensional simulations compared with two-dimensional representations. These findings highlight the importance of accounting for realistic three-dimensional heterogeneity and appropriate sample sizes when modelling gas transport in clay host rocks.

Another important area of research involves **reactive transport modelling of iron corrosion and its interaction with bentonite**, which is relevant for the long-term performance of metallic waste containers. Reactive transport simulations of the FeMo corrosion experiment reproduced the mineral assemblages observed in laboratory experiments, including magnetite, siderite, goethite, and lepidocrocite[3]. These results provide improved understanding of long-term iron–bentonite interactions in water-saturated environments and contribute to the safety assessment of metal waste containment systems.



A three-dimensional thermo-hydromechanical (THM) modelling was performed within the framework of the Full-scale In-Situ System Test (FISST), which represents the full implementation of the KBS-3V waste disposal concept used in Finland and Sweden.[4] The study focuses on the calibration of the most important material properties of bentonite buffers and backfill materials based on laboratory

[1] https://doi.org/10.1007/s12665-025-12750-y
[2] https://doi.org/10.1680/jenge.25.00049
[3] https://doi.org/10.1016/j.surfin.2026.108466
[4] https://doi.org/10.1144/gslspecpub2025-19

experiments. Complementary, a global sensitivity analysis on a geochemical model describing the sorption of americium on organic matter-rich Boom Clay. The results show that uncertainty decreases with an increase in the number of simulations and that a stable parameter ranking can be achieved after sufficient sampling, which supports the calibration and improvement of the model's efficiency.

One of the key challenges in coupled THMC modelling is the **high computational cost associated with detailed geochemical calculations**, which often represent the main runtime bottleneck in reactive transport models. To address this limitation, **high-fidelity surrogate models** are being developed to replace or accelerate computationally intensive components of numerical simulations while preserving the underlying physical behaviour. To optimise and reduce the computational cost of coupled THMC modelling, **EURAD-HERMES is currently conducting a comprehensive benchmark study** that systematically evaluates the accuracy, robustness, and computational efficiency of surrogate models for integration into coupled reactive transport simulations. The benchmark focuses on several key processes relevant to radioactive waste management, including **cement chemistry in engineered barrier materials, iron corrosion and its interaction with bentonite buffers, and chemical interactions at cement-clay interfaces**.

Detailed system descriptions have been prepared, and the first benchmarking results are currently being generated. More than **ten international partners** are participating in this collaborative effort. New research groups are welcome to join the benchmarking exercise.

WP 17 CSFD

The first in-person meeting of WP-17 “Criticality Safety for Final Disposal” took place between 25 – 27th of August ’25 in Budapest, Hungary, and was hosted by PURAM. The meeting was a great success and provided the perfect opportunity to discuss complex technical topics, such as the computational modelling of a generic container concept for the final disposal of spent nuclear fuel, the features, events and processes (FEP) in the post-closure phase of a geological repository that could be relevant for criticality safety, etc. In addition to this technical work, communication strategies were also discussed and the meeting participants could engage directly with the WP-17 End-Users Group in a dedicated online session.

Participants at the WP-17 CSFD in-person meeting in Budapest, August ’25.

The discussions held during the in-person meeting also laid the groundwork for the technical work carried out in WP-17 during the last few months and the key achievements such as:

- Establishing an international group of expert reviewers comprising experts on criticality safety from Belgium, Canada, Japan, South Korea and the US.
- Creating a preliminary draft of a glossary comprising technical terms related to post-closure criticality safety with a view of supporting communication and dissemination efforts.
- Collection of first expert views regarding FEPs relevant for post-closure criticality safety.
- Preparation of a draft review report regarding post-closure criticality modelling approaches, to be published soon.
- Producing the data necessary for carrying out a comprehensive comparison and assessment of spent fuel loading curve derivation approaches.
- Collection of first expert views regarding potential gaps in the experimental data required for validating depletion and criticality codes for post-closure criticality safety assessments.
- Initiating a literature review regarding past efforts to perform consequence assessments for hypothetical criticality events postulated in the post-closure phase of a deep geological repository.

The current status of the WP-17 activities and the next steps were discussed recently in a general WP online meeting that took place on the 24th of February. We are looking forward to presenting our next milestones.

ANCHORS/OPTI Workshop on optimisation: Bridging science, strategy and society

2 April 2026 (8:30-12:30 CET) - Online

Teams link

This event brings together researchers, implementers, regulators, and civil society representatives to discuss optimization related to repository closure and engineered barrier system (EBS), covering experimental uncertainties, data management through the ANCHORS database, lessons from national programmes, and perspectives from regulators and civil society.

EURAD-2 FORSAFF: Results, Insights and Future Directions

6 May 2026 (13.00-16.00 CET) - Online

We would like to inform you of an upcoming event within Work Package FORSAFF which will be held online on 6 May, 2026 from 13.00 to 16:00 CET.

A detailed programme, along with the participation link and registration details, will be shared soon.

Training on climate change fundamentals and modelling, impact on radioactive waste facilities and climate risk assessment

19&20 May 2026 (9:00-13:00 CET) - Online

We would like to inform you of an upcoming event within Work Package CLIMATE: a series of training sessions that will be held online on Tuesday, 19 May and Wednesday, 20 May, each day from 09:00 to 13:00 CEST.

A detailed programme, along with the participation link and registration details, will be shared soon.

ASTRA 3+1 pluralistic workshop

27-29 May 2026 – Ljublana, Slovenia

ASTRA task 6 would like to invite you to the ASTRA 3+1 pluralistic workshop, providing space for interaction of all Colleges and the civil society group. We want to look back and look ahead together on long-term interim storage, deep borehole disposals and NORM and DU waste management. The following activities are planned:

- In the morning of 27 May, a civil society third wing event is being organized: Students from Ljubljana University will join us for a PEP game session. You are cordially invited to join this third wing civil society event.
- The ASTRA 3+1 workshop will take place from 27 May early afternoon to 28 May early evening.
- On 29 May, we offer a technical visit to the landfill sites of former uranium mine Rudnik Žirovski Vrh (RŽV). This visit will start at 8:30. Return to Ljublana is foreseen at about 2:30 pm CET.

Further information will be distributed via the ASTRA mailing list. For questions or registration from participants outside ASTRA you can contact ASTRA task 6 leader Gabriele Mraz: mraz@ecology.at

PHD CORNER

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Supervisor: Dr. Jan Březina

PhD thesis: Multilevel Monte Carlo Method for Models on Mixed Meshes

Can you explain the scope of your thesis / master and the link with the work package you are involved in?

My PhD thesis focuses on reducing the computational cost of uncertainty quantification in groundwater modeling of 3D fractured crystalline rock, which is critical for safety assessments of deep geological repositories. I combine multilevel Monte Carlo (MLMC) methods with discrete fracture–matrix (DFM) models. The primary contribution of my thesis is the development of a deep learning–based surrogate model that replaces computationally expensive numerical homogenization of hydraulic conductivity tensor. This approach enables efficient statistical evaluation of geological uncertainty while preserving the physical fidelity of the macroscale models, thereby directly supporting HERMES work package activities related to machine learning–based surrogates.

What do you wish other people knew about your work scope? Are there any common misconceptions about your research area?

I would like people outside the field to understand that machine learning is not limited to language models or image generation. In scientific research, it offers many powerful applications, particularly for accelerating complex numerical simulations. In my work, machine learning is used to replace a computationally demanding step, thereby enabling analyses that would otherwise be computationally impractical.

How do you think your field will evolve in the next 5-10 years ?

I expect computational methods and resources to continue advancing, enabling the use of more realistic models in practical applications. Machine learning techniques are also likely to become increasingly integrated into traditional modeling workflows.

What are your biggest expectation for your PhD journey ?

As I approach the completion of my PhD, I see the main outcome as gaining a deeper understanding of machine learning and uncertainty quantification. The PhD has also provided me with valuable experience in implementing these methods in practical applications.

What is your first impression of EURAD-2 ?

My experience with EURAD-2 and EURAD has been very positive. These projects provide valuable opportunities to collaborate with researchers from different institutions and to see how theoretical methods can be applied to real safety assessment problems. Thanks to EURAD, I was able to complete a fruitful internship at SCK CEN under the supervision of Dr. Eric Laloy.

If you could collaborate with any scientist, past or present, who would it be?

I do not have a specific scientist in mind. I value collaboration itself more than any particular individual, and I am most inspired by researchers who combine strong theoretical understanding with meaningful practical impact.

Upcoming events

APRIL

02: ANCHORS/OPTI workshop

21-23: iCP Training Course

29: InCoManD webinar on microbial activity

MAY

03-08: EGU 2026

06: FORSAFF: results, insights and future directions

10-15: 20th Radiochemical Conference

13: InCoManD webinar on microbial activity

MAY

18: Webinar Domain Insight LL-ILW containers

19&20: Training on climate change fundamentals and modelling

27-29: ASTRA 3+1 pluralistic workshop

JUNE

09-11: 18th Natural Analogue WG Workshop

15-19: RAD 2026 Conference

Now published

WP2 KM Memo about specifications of the KM platform: Link

WP3 ASTRA Position paper on mutual understanding on alternative RWM strategies: Link

WP3 ASTRA Workshop on building mutual understanding about RWM strategies for long-term storage exceeding the design lifetime: Link

WP3 ASTRA Evaluation of RWM strategies for the disposal of waste bearing naturally occurring long-lived radionuclides: Link

WP13 OPTI Mutual understanding of actors' views about optimisation: Link

WP14 SUDOKU Review of different designs/safety concepts and processes governing the performance of engineered barriers in near-surface disposal facilities: Link

WP15 DITOCO2030 Digital Twins and their gaps in the RWM domain: Link

WP18 DITUSC Green paper: Link

WP18 DITUSC Documentation of the exchange with the EURAD community: Link

Domain Insights:

3.2.2 LL-ILW containers: Link

3.3.3 Plugs and seals: Link

4.1.1 Site descriptive model: Link

4.2.1 Perturbations: Link

4.3.1 Geological and tectonic evolution: Link

4.3.2 Climate change: Link

We are out there

Unidad de Residuos Radiactivos de Alta Actividad (URRAA)
69 abonnés
3 mois • Modifié •

Last week we had the pleasure of holding the first annual #SAREC meeting (WP8 of EURAD-2) at CIEMAT, organised by the Unidad de Residuos Radiactivos de Alta Actividad (URRAA). All the involved partners had the opportunity to share ... plus

Afficher la traduction

Stéphane Brassinnes • 1er
Research Manager
3 mois •

Great milestone for EURAD-2 DITUSC!

We successfully held the first in-person biannual meeting of the EURAD-2 #DITUSC Work Package, followed by the 2nd Open Workshop.
DITUSC stands for Development and Improvement of Thermodynamic Understanding for Use in radioactive waste disposal Safety Cases. The workshop fostered valuable exchanges among partners and associated partners from the three EURAD-2 colleges—Research Entities, Technical Safety Organizations, and Waste Management Organizations—in close collaboration with end-users and stakeholders.

This important step helps pave the way toward a shared vision for improving thermodynamic approaches (and related TDBs) applied in safety cases for radioactive waste disposal.

A big thank you to the preparation team and all attendees for their commitment and insightful discussions!

Special thanks to Subatech/IMT Atlantique, especially T. Suzuki-Muresan and colleagues, for the excellent organization of these two events. Well done!

Afficher la traduction

Margit Fábián • 2e
chemist-physicist at HUN-REN Centre for Energy Research
1 mois •

At the 21st Winter School in Mineral Sciences, I had the opportunity to present our team's latest results on cementitious materials and their critical role in radioactive waste management.
This work is proudly supported by the EURAD-2 project and HUN-REN Centre for Energy Research ✨

Afficher la traduction