SEAKNOT

Newsletter #3

**Visit the SEAKNOT website
to discover our latest project outputs:**

Visit our website

A word from the Coordinator

This third year marked a dynamic and successful phase for the SEAKNOT project, with substantial progress across all Work Packages (WPs). WP1 (PIRTSA) advanced the transition from technical-area rankings to phase-based ranking of phenomena, consolidating key issues across in-vessel and ex-vessel accident phases. WP2 (VAAD) progressed in creating the Relational Severe Accident Database, integrating over 500 experimental tests and developing the first prototype of the Severe Accident Database Directory. WP3 (SAINET) defined the scope of the European Severe Accident experimental infrastructure network and initiated discussions for potential collaboration with international initiatives. WP4 (KNOS) successfully strengthened SEAKNOT's mission in knowledge spreading, outreach, and the long-term preservation of European expertise in severe-accident research by organising dedicated knowledge spreading activities.

Keep reading to discover the latest achievements across our WPs.

Luis E. Herranz
SEAKNOT Coordinator

Work Packages in Action

WP1 PIRTSA – Phenomena Identification Ranking Table on Severe Accidents

The third year of the project meant a crucial transition for this WP: moving from rankings in the technical area domains (i.e., in-vessel, ex-vessel, containment and source term) to phase ranking, in which the highly ranked issues within all the technical areas are orchestrated in two main groups referring to all phenomena occurring during the in-vessel phase of an accident and the ex-vessel phase of an accident. The initial total number of highly ranked phenomena in the technical area domains barely exceeded 50. However, it is expected that after their aggregation and screening by the Source Term objective set in the PIRT methodology, such a number undergoes a substantial reduction. This transition is presently being consolidated.

WP2 VAAD – Phenomena Identification Ranking Table on Severe Accidents

The methodology for assessing the experimental data was further refined and optimized through feedback from related assessment tasks in the third year of the SEAKNOT project. A strategic decision was made to revise the objective of the VADD, transforming into a Relational Severe Accident database (RSAD). In this revised concept, the collected data are systematically categorized according to their relevance, quality, and applicability for subsequent validation activities. Meanwhile, more than 500 tests and test series have been collected and evaluated in the database. In order not to duplicate work unnecessary, the database will provide links to several existing and internationally acknowledged databases of the severe accident domain, e.g. SARNET database DATANET, the STRESA database (Storage of Thermal REactor Safety Analysis Data) and the CCVM (Containment Code Validation Matrix).

In coordination with WP1 PIRT, high-priority phenomena have been successfully aligned with the database collection process, providing essential input for the user of the SADD (Severe Accident Database Directory) and ensuring continued integration and accessibility of validation data across the SEAKNOT project. A first working prototype of the SADD has been developed and is currently hosted on UNIPI servers, running on Debian-based virtual machines using the Apache web server, with a MariaDB database and a PHP/JavaScript codebase. The prototype features a desktop web interface that supports both free-text and parameter-based searches, which can be combined for more refined queries.

The main functionalities of the current SADD include:
- user interface: a clean visual design combined with an intuitive layout ensure accessibility and ease of use;
- facilities page: it displays a scrollable list of all available experimental facilities, accompanied by an integrated map view. Each facility entry provides a direct link to a dedicated information page;
- phenomenology section: it presents a list of phenomena in alphabetical order, with each item leading to associated facilities and tests grouped by type;
- search module: it enables users to perform open or filtered searches using parameters and keywords, with autocomplete functionality and keyword highlighting to assist the search experience.

WP3 SAINET – Severe Accident experimental Infrastructure NETwork

The perimeter of the European infrastructure SAINET (Severe Accident experimental Infrastructure NETwork) has been defined during the third year of SEAKNOT project. It has been decided that the network shall cover all the aspects of experimental Severe Accident R&D, i.e. in and ex-vessel corium, source term and containment issues, including experiments related to severe accident mitigation processes/systems and to post-accident D&D. The experimental infrastructure will cover a wide range representative of severe accident situations using simulant materials to prototypic materials and even irradiated materials.

Geographically, SAINET will be focused on organizations located in Europe or associated countries, as well as those participating in the SEAKNOT project as associated partners. Nevertheless, a possibility to introduce infrastructures from third countries in SAINET will be assessed in the frame of SEAKNOT project.

Discussion have started with other international initiative networking activities in the frame of severe accident research to asses if connexions would be fruitfull for SAINET: IAEA NEXshare program (a forum to put in contact experimental facilities operators and potential end-users), OECD/NEA ATHENA program (NEA activities in thermalhydraulics), OFFERR European partnership (hosted by SNETP).

WP4 KNOS – Knowledge Spreading Activities

WP4 has been particularly active this year in advancing SEAKNOT's knowledge-sharing goals, with activities including::

- **The organisation of two advanced education and training events:** the **Short Course on Severe Accident Phenomenology (SAP 2025)** and the first edition of the **Severe Accident Summer Camp (SASCamp 2025)**.
- **The execution of a mobility and mentoring programme,** enabling nuclear students and early-career researchers to gain direct experience in partner institutions.
- **Outreach and engagement** of the nuclear safety community through the **First SEAKNOT Open Workshop** and a series of **Communication and Dissemination actions**.

SAP 2025 – Severe Accident Phenomenology Short Course

June 23–27, 2025, at Forschungszentrum Jülich (FZJ), Germany

After SAP 2023 in Madrid, the second edition of SAP short course attracted 61 participants. The program of the course was based on in-depth lectures on SA progression, mitigation strategies, and lessons from "historical accidents". Special focus was set on uncertainty in source term quantification, SA codes, and advanced reactor technologies (i.e., SMRs). Participant evaluations were overwhelmingly positive, confirming SAP as a cornerstone for Knowledge and Know-how Transfer in the SA area.

SASCamp 2025 - Severe Accident Summer Camp

June 30–July 4, 2025, at Forschungszentrum Jülich (FZJ), Germany.

With a new hands-on training approach, unlike traditional front-of-class teaching, SASCamp introduced a residential camp format, where small groups tackled real-world SA challenges under expert guidance. The focus areas were aligned with SAP lectures: In-Vessel, Ex-Vessel, Containment, Source Term, and Accident Management. This first edition of SASCamp was a great success, gathering 21 participants from well-balanced mix of backgrounds, including R&D specialists, university students, and representatives from industry and TSOs. As expected, SASCamp resulted to be a very valuable complement to SAP to train the new generation.

Mobility Programme and Mentoring Activities

A key WP4 objective is to **promote mobility** among SEAKNOT institutions. During this third year, the **mobility scheme was fully implemented**, resulting in four successful long-term exchanges (lasting about six months) and eleven short actions (one week each) related to SAP 2025 and SASCamp participation. Early career researchers received hands-on training in numerical simulations and SA code validation, focusing on modelling for SA areas identified in WP1 as needing close attention.

First SEAKNOT Open Workshop – Shaping the Future of Research in SA Area

This **First SEAKNOT Open Workshop**, hosted by Becker Technologies on 1 October 2025, marked the conclusion of WP4's third year. Under the theme **"Shaping the Future of Research in SA Area – Be There!"**, it attracted a diverse audience of researchers, industry representatives, regulators, and students with over 50 participants. The event was open to participants

outside SEAKNOT in virtual mode, promoting the dialogue on the "*European roadmap for severe accident research*" and enhanced SEAKNOT's visibility as a hub for collaboration and innovation in nuclear safety.

Outlook and Future Dissemination Activities

SEAKNOT will further develop its Communication & Dissemination initiatives, including the **Zenodo** community, called **SEAKNOT**, established to facilitate the wider open distribution of the project's outcomes. So far, two scientific articles have been published under SEAKNOT in this third year, and two further journal papers are just available online:

Inverse uncertainty Quantification in the Severe accident Domain: Application to Fission Product release
G. Tinfena, M. Angelucci, L. Sargentini, S. Paci, L.E. Herranz
Nuclear Engineering and Design 436 (2025) 113954

Seaknot: Looking ahead of severe accident research
L.E. Herranz, S. Gupta, S. Paci, P. Piluso
Annals of Nuclear Energy 218 (2025) 111390

Sensitivity Analysis in Severe Accident Simulations: A Historical Perspective
M. Angelucci, S.A. Cancemi, S. Paci, L.E. Herranz
Progress in Nuclear Energy, Volume 192, February 2026, 106142.

Identification of European experimental facilities for severe accident research within EU SEAKNOT-project: Analysis and mapping
V.H. Sanchez-Espinoza, P. Piluso and L.E. Herranz
EPJ Nuclear Sci. Technol., 11 (2025) 75

Upcoming events

Two major events are planned for 2026:

ERMSAR 2026 – European Review Meeting on Severe Accident - The organization of the Conference will continue after the initial activities concentrated on:
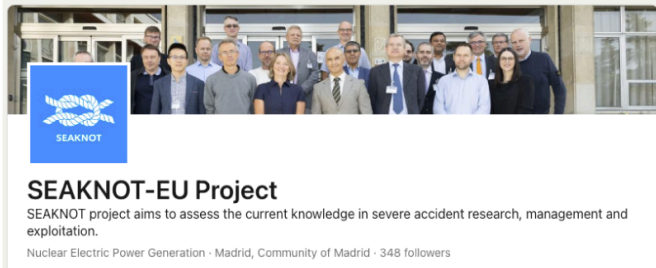- Building the collaborations with IAEA and NEA.
- Establishing an agreement with Annals of Nuclear Energy journal for a special issue featuring selected papers from the conference.
- Oversight of abstracts and finale papers submission process - 190 abstracts have been submitted, compared to 115 for ERMSAR 2024, underscoring a significant increase in interest for the event. Around 60% of the abstracts were from Europe, reflecting the global appeal of the conference.

Second SEAKNOT Open Workshop – Building on the success of the first edition, SEAKNOT will organize a second open workshop in Madrid on September 30, 2026, to present project final results, and further strengthen collaboration between research and industry communities.

Check out our event calendar

Keep in touch

A **LinkedIn account** is actively used to share updates about SEAKNOT, highlight its latest results, and keep the community informed about upcoming initiatives.

Join us on LinkedIn and share SEAKNOT updates within your network!

Get in touch: **contact@seaknot-project.eu**

Visit our website

SEAKNOT © 2024