

SWEN RTR 2025

**Research Group Retreat Report
Majelletta, Italy — July 15–17, 2025**

SWEN Software Engineering Research Group
Università degli Studi dell'Aquila, Italy

Executive Summary

The first SWEN Research Group Retreat, held in Majelletta from July 15 to 17, 2025, marked a foundational moment for the group’s scientific coordination and long-term strategic planning. Throughout four main thematic sessions and several informal exchanges, participants engaged in in-depth reflection on current challenges and emerging opportunities in software engineering research—particularly at the intersection of model-driven engineering, large language models (LLMs), and collaborative academic practices. The retreat followed a structured and engaging program (see Table 1) designed to balance focused discussion sessions with opportunities for networking, reflection, and community building. Key activities included open debates on the future of software engineering, topic-specific breakout discussions, wrap-up sessions, and evening working slots dedicated to tool demonstrations and planning. A guided excursion to the Parco Nazionale della Majella offered a relaxed environment for informal exchange and strengthened the group’s cohesion.

This report synthesizes the content and outcomes of the retreat, drawing from both formal sessions and transcribed discussions. The document proceeds as follows: it begins with a section on LLM applications in academia and industry, summarizing the key themes that emerged from focused discussions. It then turns to group strategy and planning, highlighting structural and organizational decisions taken during the retreat. Subsequent sections discuss internal coordination, outreach efforts, and research infrastructure. The final part of the report presents the SWEN Three-Year Research Manifesto, which defines the group’s strategic research directions for 2025–2028. Each section reflects the collective thinking, proposals, and aspirations shared by the participants during the retreat.

LLM Applications in Academia and Industry

A major thread of discussion revolved around the transformative potential of Large Language Models (LLMs) in software engineering. While acknowledging the growing influence of foundation models like GPT in both industrial and research contexts, participants emphasized the need to evaluate their utility with a critical lens. Several concrete application areas were identified:

- Code comprehension and documentation, particularly for legacy systems
- Test generation and bug localization
- Software architecture recovery, such as microservice identification
- Code and model generation from requirements

However, ethical and epistemic concerns were also voiced, especially regarding reproducibility, hallucination, intellectual transparency, and the unknown boundaries of LLM-generated knowledge. These discussions underscored the need for rigorous empirical studies to assess the performance trade-offs of LLMs in software tasks, and for methodological safeguards to ensure responsible use in academic settings.

Group Strategy and Planning for Academic Engagement

The academic group planning session focused on how to consolidate and coordinate the activities of the SWEn group across labs and individuals. A consensus emerged on the need to formalize roles, responsibilities, and collaborations through a shared planning document. The document should specify ongoing projects, task ownership, deadlines, and student supervision opportunities. A proposed timeline set the completion of the first consolidated version by mid-September 2025, aligning with the start of the academic year. Participants emphasized the importance of making research opportunities visible and accessible to students, especially at the bachelor's and master's levels. As a concrete action, the group proposed organizing recurring "Thesis Days", informal gatherings where students could meet researchers, learn about available thesis topics, and engage in informal discussions. This initiative aims to demystify research for junior students and enhance recruitment into master's and PhD programs.

Scientific Communication and Internal Coordination

An important concern raised was the need for coherent and systematic internal communication. Participants noted that key scientific achievements, such as awards or successful grant applications, are often underreported within the group. To address this, a lightweight protocol for internal updates was discussed, allowing members to share news, updates, and opportunities efficiently. Suggestions included:

- A shared, editable internal dashboard or communication board
- Quarterly review sessions for research progress
- Peer-to-peer information sharing through lab meetings

The group also highlighted the need for a common, consistently updated manifesto or project booklet that describes SWEN's activities, mission, and structure. This would serve both as a communication artifact for external stakeholders (e.g., students, collaborators, evaluators) and as a reflection tool for internal alignment. It was emphasized that such a document should remain short, visually engaging, and focused on current priorities and projects.

Social Media and Scientific Visibility

Participants recognized that social media presence is increasingly relevant for outreach, recruitment, and networking. While there was some skepticism about certain platforms (e.g., Facebook or TikTok), the group agreed on the utility of LinkedIn and Instagram for disseminating research updates, event announcements, and calls for collaboration. To this end, participants recommended:

- Using content from the manifesto as a source of regular posts
- Appointing a small rotating team of volunteers to manage accounts
- Leveraging visual materials (e.g., retreat photos, infographics, charts)

The goal is not only to increase visibility but also to create a sense of coherence and recognizability across SWEn’s digital presence, including presentation slides, flyers, and project templates. Branding consistency was identified as a strategic asset.

Research Infrastructure and Collaboration Practices

Across multiple sessions, the group reflected on its research methodology, tooling infrastructure, and collaboration modes. In particular, the Work Package Structure Planning Meeting clarified the group’s priorities over the next three years. A detailed research manifesto was developed (included at the end of this document), structured around five work packages:

- Pre-deployment design and analysis of software systems
- Post-deployment system monitoring and adaptation
- Modeling languages and supporting tools
- Data management
- Societal and educational impact

These work packages cover a wide range of topics, from multi-dimensional software architecture analysis (balancing green computing, performance, and ethics) to the reuse of LLM-based agents and development of layout-sensitive modeling tools like JJodel. The manifesto reflects SWEn’s multi-perspective approach to system design, monitoring, and evolution, and its commitment to building interoperable, semantically rich tools for software engineering.

Next Actions

The retreat concluded with concrete planning for follow-up actions:

- Finalize the strategic planning document by mid-September 2025
- Organize the first Thesis Day at the beginning of the fall semester
- Launch the SWEn social media initiative, starting with retreat highlights
- Draft and circulate the first edition of the SWEn Manifesto (included below)
- Plan the second retreat, tentatively scheduled for February or March 2026

Participants expressed strong support for making the retreat a recurring institutional event and highlighted the positive effects of dedicated time for collective reflection and community-building.

The remainder of this report includes detailed descriptions of the discussions, the research manifesto, and the organizational structure of the SWEn group.

Time	July 15 – Tuesday	July 16 – Wednesday	July 17 – Thursday
09:00		Session 4 - Opening + Agenda - Introduction of the Coffee Table Discussion	Session 7.1 – Board Meeting (Alfonso) see: Meeting luglio-17-2025 Session 7.2 – Swen Community Meeting (Daniele + Juri)
10:30		<i>coffee break</i>	<i>coffee break</i>
11:00	<i>Check-in</i>	Session 5 Wrap-up Session	Session 8 Closing session Results Next Steps
13:00	<i>Lunch</i>	<i>Lunch</i>	<i>Checkout</i>
15:00	Session 1 - Welcome and Opening - Presentation of the Workshop Objective - Overview of the Group Activities - Introduction of Participants (round-table)	Guided Excursion Parco Nazionale della Majella	
17:00	<i>Coffee break</i>		
17:30	Session 2 <i>Open Discussion: The Future of Software Engineering (from the Swen Perspective)</i>		
18:30	Presentation of the next session		
20:00	<i>Dinner</i>	<i>Dinner</i>	
21:30	Session 3 Questions & Answers	Session 6 Soft entertainment or working slot (e.g., tool demo, venue discussion)	

Figure 1: Retreat Program

Key Themes and Outcomes

LLM Applications in Software Engineering

Participants examined how LLMs (Large Language Models) can augment both academic and industrial software engineering. While acknowledging current limitations (e.g., opacity, hallucinations), the group recognized their potential in automating software documentation, generating tests, aiding reverse engineering, and reconstructing microservice architectures. Emphasis was placed on responsibly integrating these tools into workflows and assessing their impact on productivity and reproducibility.

Thesis and Student Engagement Strategies

A recurring topic was how to improve engagement with students at both bachelor's and master's levels. The group proposed the institution of regular (semester-based) "Thesis Days" to present research opportunities and facilitate informal interaction. Concerns were raised about the accessibility of current thesis listings and the need for clearer, more engaging communication platforms.

Internal Coordination and Communication

Several discussions focused on improving internal visibility and coordination among researchers. Suggestions included creating a shared, living document that maps research tasks, responsibilities, and collaboration opportunities—targeting a consolidated version by September. The group stressed the importance of timely updates, peer recognition, and improved knowledge sharing mechanisms.

Outreach and Scientific Visibility

Recognizing the need for greater visibility, especially in recruitment and collaboration, the group considered developing a short printed or digital booklet (or manifesto) to showcase research areas, projects, and values. This material would be complemented by a structured social media presence, with targeted content for students, peers, and external stakeholders. A strong emphasis was placed on brand identity and consistency in communication materials across conferences and platforms.

Sustainability and Planning

Participants expressed the desire to institutionalize the retreat as a recurring event, ideally held twice a year (e.g., mid-February and mid-July). This would support both long-term planning and the consolidation of the research group's identity and strategic agenda.

Retreat Discussions

LLM Applications in Academia and Industry

This session explored the practical integration of Large Language Models (LLMs) such as GPT in software engineering workflows. The discussion emphasized:

- The use of LLMs in code generation, documentation, and architecture inference
- Limitations of current LLMs in terms of reliability and explainability
- Emerging practices for combining LLMs with formal models and traditional engineering tools

Debates highlighted the tension between the generative capabilities of LLMs and the need for validation, traceability, and control in engineering processes. The need for education on the responsible use of such technologies was also acknowledged.

Academic Group Planning Meeting

This session focused on improving visibility, communication, and student engagement. Proposals included:

- Introducing periodic thesis proposal events (e.g., “Master’s Thesis Days”) open to both bachelor and master students
- Consolidating lab activities in a shared digital and printable booklet for visibility and outreach
- Establishing consistent branding and using social media channels for sustained communication

Concerns were raised about maintenance of resources, such as lab data and the website. A clear communication protocol and an editorial team for public-facing materials were recommended.

Three-Year Research Manifesto

The SWEN Research Manifesto defines the strategic research directions of the group for the period 2025–2028. It is organized into five Work Packages (WPs), each addressing core challenges in software engineering with particular emphasis on pre-deployment analysis, post-deployment adaptation, language engineering, data management, and societal impact.

Foundational Concepts

The research is framed around the software lifecycle and system views:

- **Pre-deployment Views:** These concern the design, simulation, and analysis of systems before execution. Analysis is static (structure) or dynamic (behavior), and may support predictive or prescriptive insights.
- **Post-deployment Views:** These include system monitoring, continuous deployment, adaptation at runtime, and evolution.
- **Semantics and Simulation:** Many techniques (e.g., simulation) require precise formal semantics to be effective.

Workpackages

WP1: Pre-deployment Design and Analysis

- T1.1 Multi-dimensional non-functional analysis:** Analysis of systems considering trade-offs among energy efficiency, performance, fairness, and ethical properties using static analysis, utility functions, and constraint solvers.
- T1.2 Multi-view software architectures:** Design of architectures supporting multiple concerns (green, modular, secure) with integrated visual notations.
- T1.3 LLMs for code and models:** Investigation of LLMs in code generation, summarization, optimization, and predictive modeling, balancing effectiveness with computational costs.
- T1.4 LLM-based software agents:** Architectures for business processes using agents powered by LLMs and conversational workflows.

WP2: Post-deployment Monitoring and Adaptation

- T2.1 Architecture reconstruction:** Using LLMs to infer architecture from running systems, especially in microservices.
- T2.2 Continuous deployment and AIops:** Integration of system monitoring and AI-driven operations to support deployment pipelines and real-time analytics.
- T2.3 Runtime adaptation:** Leveraging Models@Runtime to guide system self-adaptation.
- T2.4 Evolution and co-evolution:** Maintaining consistency across evolving models and APIs, supporting round-tripping with code.

WP3: Modeling Languages and Tools

- T3.1 Reuse of LLM-based agents:** Methods for capturing and reusing agent behavior and prompts in engineering workflows.
- T3.2 Jjodel Platform:** A SaaS modeling environment with support for multi-view modeling, simulation, collaborative editing, semantic analysis, layout-sensitive syntax, and IoT integration.

WP4: Data Management

- T4.1 Data architectures:** Structuring data collection and usage in SE contexts.
- T4.2 Data contracts:** Ensuring agreements on data format, meaning, and quality across stakeholders.
- T4.3 Ethics and fairness:** Ensuring that data-driven decisions respect fairness and transparency.

WP5: Societal Impact

- Use-case scenarios in cultural heritage preservation and territorial monitoring
- Contributions to software engineering education and outreach

Participants

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- Antinisca Di Marco
- Antonio Bucchiarone
- Claudio Di Sipio
- Daniele Di Pompeo
- Davide Di Ruscio
- Eoan O’Dea
- Federico Di Menna
- Federico Martusciello
- Gennaro Zanfardino
- Giordano D’Aloisio
- Gizealew Alazie Dagnaw
- Henry Muccini
- Idrees Ahmad
- Juri Di Rocco
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- Lorenzo De Tomasi
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- Massimo Tivoli
- Michele Tucci
- Muhammad Asad
- Muhammad Imran
- Muhammad Umar Zeshan
- Muhammad Waheed Khan
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