CULTIVATING INNOVATION – TRANS4NUM INSPIRE HACKATHON HIGHLIGHTS

Summary

The trans4num INSPIRE Hackathon 2024 fostered innovation and collaboration in sustainable nutrient management, integrating Nature-Based Solutions (NBS) with digital tools to strengthen research-practice connections and international cooperation.

The need

Despite the proven benefits of NBS, their adoption in agriculture remains slow due to limited awareness, complexity, and a lack of decision-support tools. Farmers, researchers, and policymakers need practical, data-driven solutions to integrate NBS into real-world farming systems.

Hackathons provide a fast-paced, collaborative environment where multidisciplinary teams co-create and test innovative solutions. Hackathons accelerate problem-solving, foster knowledge exchange, and produce actionable results, unlike traditional research projects. Engaging farmers, researchers, and technology experts ensures that solutions are both scientifically sound and field-ready.

The trans4num Hackathon focused on leveraging AI, geospatial data, and digital tools to improve nutrient management, biodiversity, and ecosystem resilience. It also aimed to strengthen international collaboration, particularly between Europe and China, where different agricultural systems face similar sustainability challenges.

By bridging the gap between research and practice, hackathons accelerate innovation, empower young professionals, and drive the real-world adoption of NBS for a more sustainable agricultural future.

trans4num INSPIRE HACKATHON 2024

Funded by the European Union

The benefits

The trans4num INSPIRE Hackathon 2024 accelerated innovation in sustainable nutrient management by fostering collaboration between **farmers, researchers, and technology experts**. It provided a platform for developing and testing practical solutions, ensuring that NBS and digital tools could be effectively applied in real agricultural settings. The event helped bridge the gap between scientific research and practice, enabling participants to co-create scalable and impactful innovations.

Key outcomes included AI-driven geospatial analysis, agent-based modeling, and interactive NBS toolkits, all aimed at improving nutrient efficiency, biodiversity, and ecosystem resilience. The hackathon also played a crucial role in strengthening international cooperation, particularly between *Europe and China*, by facilitating knowledge exchange and setting the stage for future joint initiatives in sustainable agriculture.

Beyond generating innovative solutions, the hackathon empowered participants by expanding their skills and professional networks. It provided hands-on experience with cutting-edge technologies, encouraged interdisciplinary problem-solving, and raised awareness about the importance of NBS in modern farming. By combining technology, research, and stakeholder engagement, the event contributed to shaping policy, research, and practice, ensuring that sustainable nutrient management becomes a core element of future agricultural systems.

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trans4num solution

The trans4num INSPIRE Hackathon 2024 was a collaborative event designed to accelerate innovation in sustainable nutrient management by integrating NBS, digital technologies, and data-driven approaches. It followed the INSPIRE Hackathon format, encouraging open collaboration and using AI, geospatial analysis, and decision-support tools to develop practical, scalable solutions.

The hackathon began with a **Call for Challenges**, inviting researchers and practitioners to define key problems related to nutrient efficiency, biodiversity, and ecosystem resilience. This was followed by a **Call for Participants**, attracting a diverse mix of students, researchers, and professionals. Throughout the Hacking Phase, teams collaborated with expert mentors, leveraging open data and technical support to refine their solutions. The event concluded with a **Final Evaluation**, where a jury assessed projects based on innovation, impact, feasibility, and scalability.

The winning solutions addressed critical agricultural challenges. The Gold-winning team developed an agent-based modelling tool to assess NBS adoption in different farming contexts, aiding policymakers and researchers. The Silver-winning team applied AI-driven geospatial analysis to enhance rural development and precision farming, improving land-use planning and nutrient management. The Bronze-winning team created an interactive NBS demonstration toolkit, bridging the gap between scientific knowledge and practical application through hands-on experiments.

Other projects focused on cloud-free crop monitoring, high-precision meteorological forecasting, and regional nutrient balance modelling, all contributing to trans4num's goal of enhancing agricultural sustainability. While participation from Chinese partners was limited, the hackathon laid the groundwork for stronger international collaboration in future editions.

By fostering interdisciplinary teamwork and digital innovation, the trans4num hackathon generated high-impact solutions that engaged the next generation of agricultural innovators. It advanced the adoption of NBS in real-world farming systems.

What were the challenges / limitations in the implementation process?

The trans4num Hackathon highlighted key challenges that offer valuable lessons for future editions. Participant engagement varied, with some challenges failing to attract interest, highlighting the need for better alignment with expertise and interests. Consortium engagement, particularly from Chinese partners, was lower than expected, requiring stronger incentives and clearer communication. Some participants lacked the necessary expertise, suggesting a need for pre-hackathon training and better selection. Future hackathons should ensure tighter challenge selection, stronger participation strategies, and improved incentives for greater impact.

What kind of resources do you need to implement the proposed solution?

Successful implementation requires access to high-quality datasets, particularly in geospatial, meteorological, and soil health data, through partnerships with research institutions and industry stakeholders. Expanding technical training and mentorship will help participants develop the necessary expertise for complex challenges. Strengthening international collaboration, especially with Chinese partners, can improve engagement through hybrid formats and regional hubs. A targeted outreach strategy focused on universities, research institutions, and industry players will attract a diverse participant base and ensure the long-term impact and scalability of hackathon solutions.

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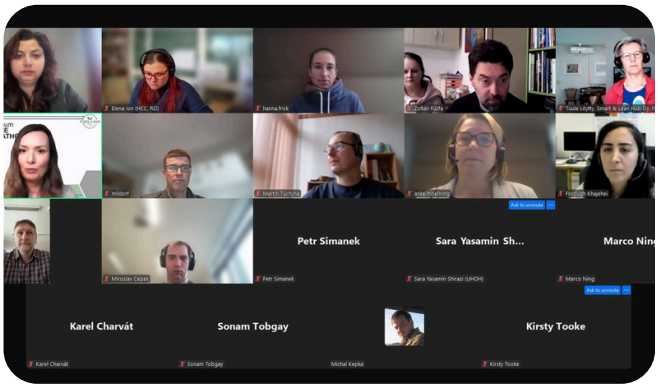
More information

- On the trans4num dedicated Hackathon page you will find more information about the challenges and the mentors, as well as the final reports from the trans4num INSPIRE Hackathon teams.
  - trans4num INSPIRE Hackathon
- Watch the videos for the winning challenges
  - Gold award - Fundamentally different case studies of nature-based solutions - how can they be integrated into a common agent-based modelling approach?
  - Silver award - AI-Enhanced Geospatial Analysis for Rural Development Challenge
  - Bronze award - Development of spectacular experimental and demonstration tools and content to establish and spread the use of NBS
- The INSPIRE Hackathon history and past editions from the organisers Plan4All
  - INSPIRE Hackathon



Learn more about the project at https://trans4num.eu/en/

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