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Ulysseus R&I Conference 2025

# Navigating Pathways: Digital Transformation of Industry

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Technical University of Košice, Slovakia



**Abstracts for Technical Session 3:  
Research and Innovation  
for the Decarbonization,  
Sustainability and ESG**



## Technical Session 3: Research and innovation for the Decarbonization, Sustainability and ESG

Session Chair: Erwin Franquet (University Côte d'Azur)

Presentations of research and innovation for the decarbonization of construction activities (through low-emission construction processes and materials in the circular economy), research and innovation for the decarbonization of industry, presentations of innovation and best-practices in sustainability and ESG.

### Université Côte d'Azur as Solutions Promoter for Addressing Climate and Biodiversity Crises

Erwin Franquet (University Côte d'Azur)

Universities have a vital role to play in the challenges raised by the coming scarcity of natural resources and by both the imperious mitigation and adaptation needed measures due to the climate change crisis from one hand and to the biodiversity erosion from the other hand. These temples of knowledge cannot stay away and ontologically speaking must take their part in such hectic times. To achieve such goal a complete and total engagement is required as well as a profound transformation of our operations and functioning. Through some concrete real examples settled at Université Côte d'Azur this talk will try to show how universities can incarnate this new role by presenting novel management and governance tools by the re-organization of research and innovation activities to foster holistic approaches and translational projects by undertaking to don as ambassador for promoting science at the local and international scale and towards the civil society and the stakeholders by rearranging the higher education to deeply and intrinsically integrate the corresponding concepts in all types of teaching and finally by empowering its workers so as to better know and control its biodiversity and energy impacts.

### Co-creating Sustainable Futures: Inter & Transdisciplinary Research in Real-world Lab Context

Tillmann Buttschardt, Doris Fuchs, Cornelia Steinhäuser, Tobias Gumbert and Daniela Pastoors (University of Münster)

Together with Tillmann Buttschardt, Doris Fuchs, Daniela Pastoors & Cornelia Steinhäuser]. Real-world labs (RWLs) have emerged as powerful arenas for sustainability-driven innovation, where academic research and societal practice converge to co-create actionable knowledge. As transdisciplinary research settings embedded in real-life environments, RWLs facilitate the exploration, testing, and scaling of solutions to pressing socio-ecological challenges. This presentation introduces the RWL approach as a dynamic model for transformative research, illustrating how it enables inter- and transdisciplinary collaboration, supports policy-relevant experimentation, and fosters inclusive pathways toward sustainable futures.

Drawing on selected cases from the fields of sustainable resource governance and education, we demonstrate the potential of RWLs to produce tangible impact across diverse domains. In the context of water governance, we highlight a living lab that brings together municipal actors, researchers, and agricultural stakeholders to design participatory models for equitable and climate-resilient water use. In the food systems domain, we present examples where food councils, consumers, and producers co-develop regionally embedded innovations such as food hubs and cooperative distribution models, advancing agroecological transitions and just supply chains. Finally, in the field of sustainability education, we showcase how RWLs enable learners and educators to engage with real-world complexity, enhancing curriculum relevance and fostering competencies for system thinking and collective action. Through these examples, we explore key features that define successful RWLs: long-term stakeholder commitment, open-ended learning processes, iterative experimentation, and the creation of boundary spaces that support mutual trust and knowledge integration. We also reflect on the challenges of institutionalizing RWLs within research systems, including funding, governance, and evaluation metrics. The session will conclude by highlighting how interdisciplinary Research and Innovation (R&I) groups, such as those supported by the Ulysseus Alliance, can act as enablers for RWL-based approaches, connecting university-led knowledge production with societal needs. By embedding science in the everyday contexts of sustainability transitions, RWLs not only foster innovation — they reshape the way we think about the role of universities in shaping livable futures.

## **Integrating Simulation, AI, and Digitalisation for Smart and Sustainable Electric Mobility**

José-Luis Guisado-Lizar (University of Seville)

In the pursuit of decarbonized and sustainable societies, the electrification of transport requires innovative strategies for infrastructure planning. Within the SANEVEC and SAINEVRA projects, funded by the Ministry of Science, Innovation and Universities of Spain, our research group is developing a digital, simulation-based platform that integrates artificial intelligence and environmental modelling to optimize the deployment of electric vehicle (EV) charging stations for sustainable urban and interurban mobility. We have developed a custom-built urban simulator (PySIMTRAVEL) that combines cellular automata and agent-based modelling to capture fine-grained traffic dynamics, EV charging behaviour, and pollution dispersion. In parallel, we are currently exploring the integration of SUMO (Simulation of Urban MObility), an open-source, microscopic traffic simulator, to broaden the applicability and interoperability of our approach. SUMO offers an additional layer of flexibility and realism, especially in handling large-scale, real-city traffic scenarios, and serves as a complementary tool to validate and benchmark our in-house simulation system. This will be enhanced with AI techniques—specifically genetic algorithms and neural networks—to identify optimal charging station layouts that improve traffic flow, reduce environmental impact, and enhance power grid efficiency.

The platform is grounded in a digital twin architecture, incorporating GIS data to replicate urban and interurban topologies and simulate vehicle movement at high spatial and temporal resolution. Air quality models simulate pollutant dispersion (e.g., NO, CO<sub>2</sub> and PM<sub>10</sub>), accounting for weather patterns and urban morphology. This digitalisation process delivers a holistic and data-driven view of the transport-energy-

environment nexus. Our work supports evidence-based planning aligned with ESG principles and climate neutrality goals. By combining advanced simulation tools with open-source platforms like SUMO, we are advancing smart, clean, and sustainable mobility systems—enabling cities and road networks to better plan their transition to a low-carbon transport future.

### **Digital Transformation of HEIs as a Path to Decarbonization, Sustainability and ESG**

Tran The Vu, Truong Cong Vu Hang (University of Da Nang, Vietnam)

Digital transformation offers Higher Education Institutions (HEIs) a strategic pathway toward sustainability, decarbonization, and the integration of Environmental, Social, and Governance (ESG) principles. By adopting digital ecosystems, universities can reduce energy consumption, optimize operations, and advance paperless processes, thereby lowering their carbon footprint. Beyond infrastructure, digital technologies also reshape teaching, learning, and research, embedding sustainability into both academic practice and institutional governance. For HEIs in Vietnam, and particularly the University of Danang, digital transformation presents an opportunity to align with global sustainability agendas while strengthening accountability and social responsibility. This study highlights the role of digital innovation in enabling HEIs to pursue green growth, identifies challenges in implementation, and discusses opportunities for universities to act as leaders in sustainable development.

## More Information

**Conference Page:** <https://ulysseus.eu/events/navigating-pathways-digital-transformation-of-industry-conference-2025/>

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