

INTERNATIONAL CONFERENCE ON MANAGEMENT OF INNOVATION AND ENTREPRENEURSHIP

Conference Theme

PARALLEL TRANSFORMATIONS:

Responding to the AI Revolution and Global Crises through innovation and Entrepreneurship

Special Track Proposal

Track Title <i>Please provide a concise and engaging title for the proposed track</i>	Managing Digital Transformation and Open Innovation in Shipbuilding: AI, Machine Learning and Digital Twins across Design, Prototyping and Manufacturing
Track Description <i>Please provide a detailed description of the proposed track (approximately 800–1,000 words), outlining:</i> • Motivation and relevance of the track; • Key research challenges and emerging issues addressed • Track's contribution to the conference theme • Examples of topics and research questions that would fit within the track	Motivation and relevance of the track The proposed track explores how Artificial Intelligence (AI), Machine Learning (ML), Digital Twins and Open Innovation are reshaping design, prototyping and manufacturing processes in the shipbuilding industry. Shipbuilding represents a particularly meaningful context for investigating digital transformation because it combines highly complex products, long development cycles, customized and low-volume production, stringent regulatory requirements, distributed supply chains and the integration of multiple engineering disciplines. At the same time, the sector is under increasing pressure to improve productivity, shorten development times, reduce environmental impacts, enhance flexibility and resilience, and accelerate the transition toward more sustainable vessels and production systems. Digital technologies are progressively connecting design, simulation, prototyping, manufacturing, assembly, operation and maintenance, enabling increasingly integrated digital threads across the product lifecycle. AI and ML can support data-driven design, process optimization, predictive modelling, quality control and decision-making, while Digital Twins can provide dynamic virtual representations of products, structures, processes and production systems. However, the value generated by these technologies does not depend solely on their technical performance. Their successful implementation requires new organizational capabilities, governance mechanisms, knowledge-sharing practices and collaborative models. Shipbuilding can therefore increasingly be interpreted as an Open Innovation ecosystem in which shipyards, suppliers, SMEs, technology providers, universities, research centres, start-ups, classification societies and other stakeholders jointly contribute to the development, validation and adoption of innovative solutions. The track places Open Innovation at the core of this transformation. Shipyards rarely possess internally all the competencies required to develop advanced AI systems, Digital Twins, innovative materials, manufacturing technologies and integrated digital infrastructures. Innovation increasingly emerges through collaborative networks in which external technological knowledge is combined with internal engineering, manufacturing and operational expertise. Key research challenges and emerging issues addressed Several technological, managerial and organizational challenges emerge from this transformation. A first challenge concerns the integration of heterogeneous data generated throughout design, prototyping, production and operation, frequently stored in fragmented or legacy systems. Interoperability, data quality, model validation and reliable digital threads remain critical issues.

A second challenge is the transition from isolated digital applications toward integrated AI-enabled and Digital-Twin-based environments supporting engineering and manufacturing decisions. Scalability, explainability, trust, cybersecurity, intellectual property, data ownership and model reliability become particularly relevant when digital systems operate across organizational boundaries.

The organizational dimension is equally important. AI and Digital Twins may modify engineering workflows, decision-making processes, competence requirements and relationships between humans and digital systems. Understanding how these technologies can complement expert knowledge, rather than merely automate existing activities, is especially relevant in knowledge-intensive sectors such as shipbuilding.

Open Innovation also introduces challenges related to knowledge transfer, absorptive capacity and ecosystem governance. Organizations must identify mechanisms for acquiring and integrating external knowledge while managing confidentiality, intellectual property and competitive interests.

Finally, digital transformation may significantly contribute to sustainability and resilience. AI-assisted optimization, virtual testing, Additive Manufacturing, digital prototyping and data-driven process control can reduce material consumption, physical prototypes, production waste, energy use and development time. Digital Twins may further support lifecycle-oriented decisions integrating design, manufacturing, operation and end-of-life considerations.

Contribution to the MINE 2027 conference theme

The proposed track directly contributes to the MINE 2027 conference theme by examining the intersection between the AI revolution and the need for industrial organizations to respond to complex technological, environmental and competitive challenges. Shipbuilding offers an exemplary setting in which digital transformation, sustainability pressures, supply-chain disruptions, international competition and organizational resilience converge.

Rather than considering AI, ML and Digital Twins merely as technological tools, the track investigates how they can generate value when embedded within appropriate innovation strategies, organizational capabilities and collaborative ecosystems. It therefore connects technological transformation with innovation management and Open Innovation, exploring how organizations can convert emerging digital technologies into sustainable industrial capabilities and competitive advantage.

By bringing together researchers from innovation management, engineering, manufacturing, information systems and entrepreneurship, the track aims to foster interdisciplinary dialogue between technological development and the managerial and organizational mechanisms required for its successful implementation.

Examples of topics and research questions

Contributions may address, but are not limited to:

- AI- and ML-driven engineering design, simulation, optimization and decision-making;
- Digital Twins and digital threads across design, prototyping, manufacturing, assembly and lifecycle management;
- AI-enabled development of advanced materials, lightweight structures and complex assemblies;
- Digital and virtual prototyping and their impact on experimentation and development processes;
- Additive Manufacturing, advanced and hybrid manufacturing within digitally integrated shipbuilding;
- Data-driven process monitoring, predictive quality and manufacturing optimization;
- Open Innovation models connecting shipyards, suppliers, SMEs, start-ups, universities and research centres;
- Collaborative innovation ecosystems, technology transfer and industry-university cooperation;



	• Knowledge integration, absorptive capacity and organizational learning; • Human–AI collaboration, digital skills and workforce transformation; • Business models and organizational capabilities for AI and Digital Twin adoption; • Data governance, interoperability, cybersecurity, intellectual property and trust; • Digital transformation for sustainable, circular and resilient shipbuilding; • Assessment of the technological, economic, organizational and environmental impacts of digital innovation; • Barriers, drivers and maturity models for digital transformation in shipbuilding and maritime manufacturing. Research questions that fit within the track include: • How can AI, Machine Learning and Digital Twins be effectively integrated across design, prototyping and manufacturing? • How can Open Innovation ecosystems accelerate the development, validation and adoption of digital technologies in shipbuilding? • Which organizational capabilities and governance mechanisms are required to manage collaborative digital transformation? • How can organizations integrate external digital knowledge while protecting intellectual property and strategic know-how? • How does human–AI collaboration affect engineering decision-making, organizational learning and innovation performance? • How can digital technologies simultaneously improve productivity, sustainability, resilience and human-centred innovation? The track welcomes conceptual, empirical and methodological contributions, including case studies, comparative analyses, surveys, frameworks and research emerging from industry-university collaboration. Although shipbuilding represents the primary application domain, contributions addressing closely related maritime manufacturing and engineering ecosystems are also welcome when they provide relevant insights into digital transformation and collaborative innovation.
Keywords Please provide 4–6 keywords that best characterize the proposed track. Separate keywords using a semicolon (;)	Shipbuilding; AI-Driven Design; Digital Twins; Digital Prototyping; Advanced Manufacturing; Open Innovation Ecosystems
References Please include the key references supporting the relevance and positioning of the proposed track	1. Bordbar A, Tadros M, Nazemian A, Aung MZ, Georgoulas K, Louvros P, Boulougouris E. Digitalisation of Shipyard Production Planning: A Review of Simulation, Optimisation, AI, and Digital Twin Methods (2010–2025). <i>Journal of Marine Science and Engineering</i> 2026; 14: 396. doi: 10.3390/jmse14040396. 2. Ye C, Dashtimanesh A, Jeong Y, Yunusa H. A Review on Digital Twin Application in Integrated Ship Design and Production for Decarbonisation. <i>Ocean Engineering</i> 2026; 359: 125925. doi: 10.1016/j.oceaneng.2026.125925. 3. Liu J, Zhang Y, Liu Z, Leng J, Zhou H, Gu S, Liu X. Digital Twins Enable Shipbuilding. <i>Alexandria Engineering Journal</i> 2024; 107: 915–931. doi: 10.1016/j.aej.2024.09.007. 4. Zhang X, Chen D. Shipbuilding 4.0: A Systematic Literature Review. <i>Applied Sciences</i> 2024; 14: 6363. doi: 10.3390/app14146363. 5. Campana EF, Di Piazza MC, Di Summa M, Ferro E, Massoli P, Sacco M, Soldovieri F, Vaglieco BM, Bassan N, Castino A, Debenedetti M, Guglia P. CNR–Fincantieri Joint Projects: A Successful Example of Collaboration between Research and Industry Based on the Open Innovation Approach. <i>Journal of Open Innovation: Technology, Market, and Complexity</i> 2020; 6: 15. doi: 10.3390/joitmc6010015. 6. Burgess J, Fanner R, McLening C. Implementing an Open Innovation Process in the Premium Marine Industry. <i>Proceedings of the Design Society</i> 2024; 4: 215–224. doi: 10.1017/pds.2024.24. 7. Khan S, Goucher-Lambert K, Kostas K, Kaklis P. ShipHullGAN: A Generic Parametric Modeller for Ship Hull Design Using Deep Convolutional Generative



	Model. <i>Computer Methods in Applied Mechanics and Engineering</i> 2023; 411: 116051. doi: 10.1016/j.cma.2023.116051. 8. Garcia R, Wigger KA, Rivas Hermann R. Challenges of Creating and Capturing Value in Open Eco-Innovation: Evidence from the Maritime Industry in Denmark. <i>Journal of Cleaner Production</i> 2019; 220: 642–654. doi: 10.1016/j.jclepro.2019.02.027. 9. Papanikolaou A, Boulougouris E, Erikstad SO, Harries S, Kana AA. Ship Design in the Era of Digital Transition: A State-of-the-Art Report. <i>Proceedings of the 15th International Marine Design Conference (IMDC 2024)</i> 2024: 1–40. doi: 10.59490/imdc.2024.784. 10. Chairi M, Marabello G, Corigliano P, Palomba G, Di Bella G. Adopting Additive Manufacturing in Shipbuilding: Managing the Transition to Innovative Design, Structures and Materials. <i>Progress in Marine Science and Technology</i> 2025; 10: 909–918. doi: 10.3233/PMST250109.
Track Chairs Please identify between 2 and 5 Track Chairs. For each Track Chair, provide: • Full Name • Affiliation • Country • Email address • Research interests (optional)	Guido Di Bella Affiliation: Department of Engineering, University of Messina Country: Italy Email: guido.dibella@unime.it Research interests: Advanced Manufacturing; Additive Manufacturing; Digital Twins; Sustainable Manufacturing; Composite Materials; Shipbuilding Technologies Simone Panfiglio Affiliation: Sicilia NAVTEC – Research Consortium for Technological Innovation, Sicily, Commercial and Pleasure Maritime Transport Country: Italy Email: simone.panfiglio@gmail.com Research interests: Shipbuilding Innovation; Technology Transfer; Collaborative R&D; Digital Transformation; Advanced Manufacturing; Maritime Innovation Ecosystems Giulia Palomba Affiliation: Department of Engineering, University of Messina Country: Italy Email: giulia.palomba@unime.it Research interests: Lightweight Structures; Advanced Materials; Structural Design and Optimization; Mechanical Characterization; Additive Manufacturing; Marine Structures
Short biography of each organizer Please provide a short biography for each Track Chair (maximum 200 words per biography)	Guido Di Bella Guido Di Bella is Associate Professor of Manufacturing Technologies at the Department of Engineering, University of Messina, Italy. His research activities focus on advanced and sustainable manufacturing, Additive Manufacturing, joining technologies, composite materials and Digital Twin approaches, with applications in the naval, energy and aerospace sectors. He is responsible for the Living Lab for Additive Manufacturing (LIVINGAM) at the University of Messina and has extensive experience in national and international research projects involving universities, research centres and industrial partners. His research increasingly addresses the integration of digital technologies, advanced materials and innovative manufacturing processes within sustainable and collaborative industrial environments. He is also actively involved in technology transfer, industry–university cooperation and research activities related to the digital and sustainable transformation of shipbuilding and maritime manufacturing. Simone Panfiglio Simone Panfiglio is an engineer at Sicilia NAVTEC, the Sicilian Technological District for commercial and pleasure maritime transport, where he is involved in the technical coordination and management of research, development and innovation projects in the maritime and shipbuilding sectors. His activities focus on connecting industrial companies, universities, research centres and technology providers within collaborative R&D initiatives

	aimed at improving the technological competitiveness and sustainability of the maritime industry. He has coordinated partner activities and managed projects involving shipyards, major industrial companies and research institutions. His interests include technology transfer, digital transformation, advanced manufacturing, sustainable shipbuilding and collaborative innovation ecosystems. He is also involved in research and dissemination activities concerning innovative shipbuilding technologies, including reverse engineering, advanced joining processes, Machine Learning and digitally enabled manufacturing. Giulia Palomba Giulia Palomba is a researcher at the Department of Engineering, University of Messina, Italy. She holds a PhD in Engineering and Chemistry of Materials and Constructions, with research focused on lightweight structures for marine applications. Her scientific interests include structural design and optimization, advanced and lightweight materials, mechanical characterization and innovative manufacturing technologies, with particular attention to naval and marine applications. Her research combines experimental, numerical and design approaches for the development and assessment of lightweight and high-performance structures. She is involved in research projects and industry–university collaborations addressing innovative materials, structural solutions, Additive Manufacturing and sustainable technologies for the maritime sector. Her activities contribute to the integration of advanced materials, optimized structural design and innovative manufacturing approaches within the broader transition toward more efficient and sustainable shipbuilding.
Corresponding Track Chair <i>Please indicate the Track Chair who will serve as the primary contact person for all communications with the Conference Organizing Committee</i>	Guido Di Bella

