

MIM 2025 – Invited Session Proposal

Digital Product Passports as a Catalyst for Circular Manufacturing and Sustainability

Sustainability and circularity principles are key drivers of innovation within modern manufacturing ecosystems, and the integration of digital technologies can accelerate this transformation. One of the critical barriers to achieving circularity is the "information barrier," which hampers transparency and resource efficiency across product lifecycles. The Digital Product Passport (DPP) emerges as a powerful solution, offering a transformative tool to overcome this barrier by enhancing the flow of information throughout the manufacturing process.

This session will explore how DPPs can promote circularity practices in the manufacturing sector, facilitating the development of sustainable manufacturing systems. By enabling transparency, resource efficiency, and optimized lifecycle management, DPPs can help slow, close, and narrow resource loops. We invite research contributions on the theoretical foundations of DPPs, their role in advancing circularity in manufacturing, as well as discussions on the challenges and opportunities of implementing DPPs across various industries. Case studies highlighting innovative DPP applications and their impact on circularity are especially welcomed.

Topics of interest include, but are not limited to:

- **DPPs and Circular Transition:** Strategies for leveraging DPPs beyond regulatory compliance to reduce waste, enhance resource recovery, and optimize R-strategies such as reuse, remanufacturing, and recycling.
- **Data Modelling for DPPs:** Information requirements, data models, ontologies, knowledge graphs, and other data structures needed to support the effective use of DPPs.
- **Digital Architectures for DPPs:** Exploring digital solutions and architectures—such as Asset Administration Shell, Industrial Data Spaces, and blockchain—that enable the implementation of DPPs.
- **DPP Empirical Cases:** Industrial case studies that showcase the application of DPPs within specific manufacturing ecosystems, demonstrating their role in enhancing circularity and sustainability.
- **DPP Adoption Drivers and Barriers:** Analysis of factors influencing DPP adoption, including drivers, barriers, capabilities, mechanisms, and the costs and benefits of DPP implementation.
- **Measuring DPP Impacts:** Frameworks and metrics to assess the impact of DPPs on sustainability and circularity goals, including their measurable contributions to resource efficiency and lifecycle optimization.
- **Human and social aspects of DPPs:** Integration of human factors, skills and social sustainability considerations in DPP design, deployment and operation.

This session seeks to bridge theoretical insights with practical applications, fostering a deeper understanding of how DPPs can facilitate the transition toward circular and sustainable manufacturing.

Organizers

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