Towards a Manufacturing as a Service Framework: Decentralized Value Chains with Embedded Volume and Variety Dynamics

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Abstract. This presentation explores the Manufacturing as a Service (MaaS) model through the Tec4MaaSEs (T4M) initiative. It introduces a framework where manufacturing and production procedures are offered as on-demand services by leveraging advanced Industry 4.0 and Industry 5.0 technologies to establish a sustainable and flexible network of distributed value chains. Central to this approach is a highly adaptable Digital Twin (DT) architecture that adjusts to changes in supply and demand, fostering collaboration and optimization across varied manufacturing situations and among different stakeholders. The effectiveness of the proposed approach is tested in three distinct real-world value networks, each exhibiting unique volume and variety characteristics. The T4M MaaS Platform supports adaptability and boosts performance under different supply and demand circumstances. This initiative underscores the significant impact of the volume-variety principle in designing MaaS ecosystems and offers practical insights to enhance collaboration, resilience, and sustainable industry methods.

Keywords. Smart manufacturing · Industry 4.0 · Digital Twins · Digital Transformation · Circular and Resilient Value Networks · Explainable AI

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