

Towards AI powered manufacturing services, processes, and products in an edge-to-cloud-knowEdge continuum for humans [in the loop]

Finnish Industrial Internet Forum (FIIF) –knowEdge seminar,
Tampere, 14.03.2024

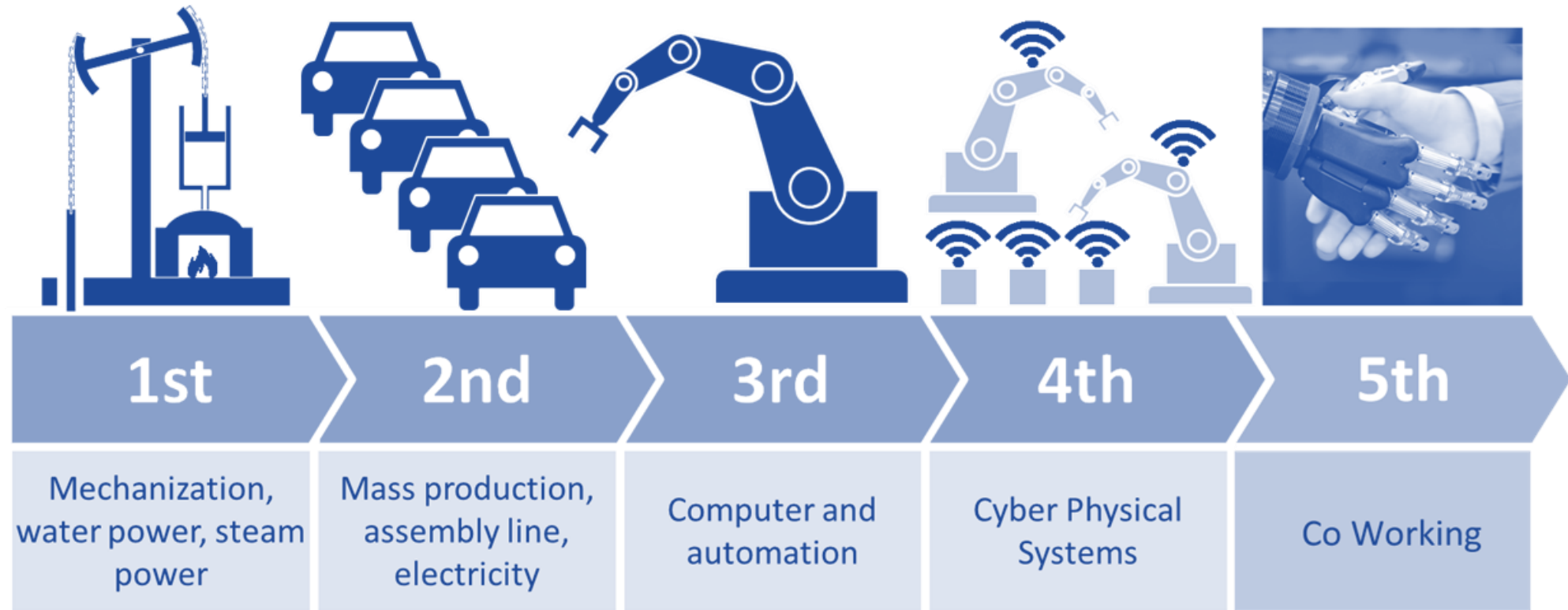
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Introduction

- Manufacturing is a key driver of the European economy, contributing over 20% of the EU's total value-added and directly providing 35 million jobs.
- Europe's excellence in manufacturing processes and systems is vital for maintaining industrial leadership and achieving sustainable growth.
- The ongoing paradigm shift in society, driven by rapid technological advancements, necessitates a focus on sustaining and reinforcing Europe's position in manufacturing.



The manufacturing evolution



Opportunities of digitalisation

- Industry 4.0 requires technical solutions for real-time supervision, monitoring, and control of manufacturing processes to address challenges like mass customization and zero-defect manufacturing.
- Digitalisation of manufacturing systems, enabled by cyber-physical production systems, facilitates continuous improvement in flexibility, productivity and sustainability.
- New tools and methods are required, such artificial intelligence (AI) and machine learning, ICT platforms and standards for collaboration, advanced data management to combine data from various sources, and edge-clouds for decentralised systems.

Human empowerment solutions

- AI plays a crucial role in extracting knowledge from big data and supporting human activity in manufacturing through advanced forecasting and simulation technologies.
- Human workers will continue to play a primary role in manufacturing, with technology empowering them in terms of creativity and decision-making abilities.
- This necessitates the development of distributed manufacturing execution system architectures that integrate humans harmoniously and consider trust. This points to Industry 5.0.



knowEdge Project and Partners



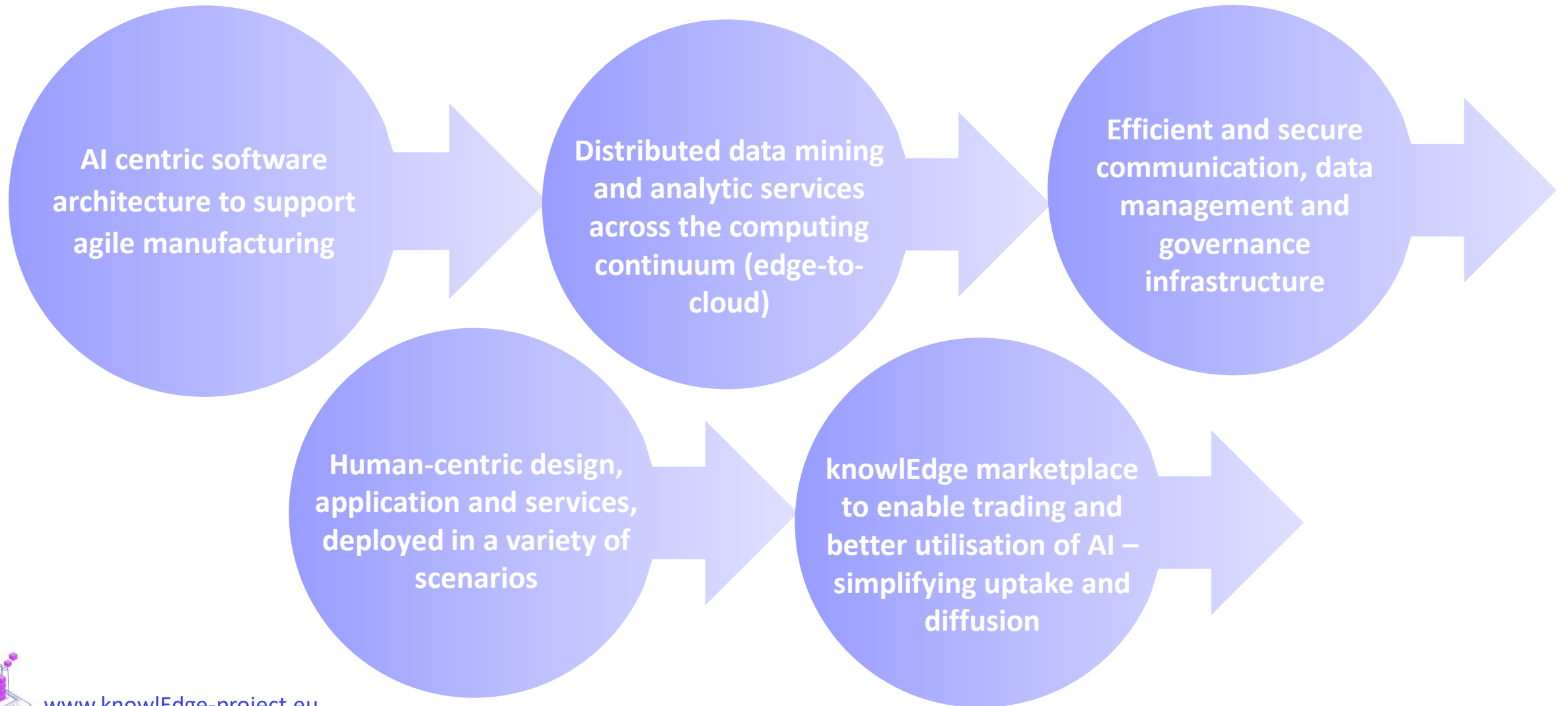
knowEdge consortium

Project no.	957331	Acronym:	knowEdge
Title	Towards AI powered manufacturing services, processes, and products in an edge-to-cloud-knowEdge continuum for humans [in-the-loop]		
Duration	01.01.2021 – 31.03.2024, 39 months		
Consortium	13 partners from 7 countries, one former partner		
Total funding	€ 5 996 151,25		
Call	ICT-38-2020 - Artificial intelligence for manufacturing		
Programme	H2020-EU.2.1.1. - INDUSTRIAL LEADERSHIP - Leadership in enabling and industrial technologies - Information and Communication Technologies (ICT)		

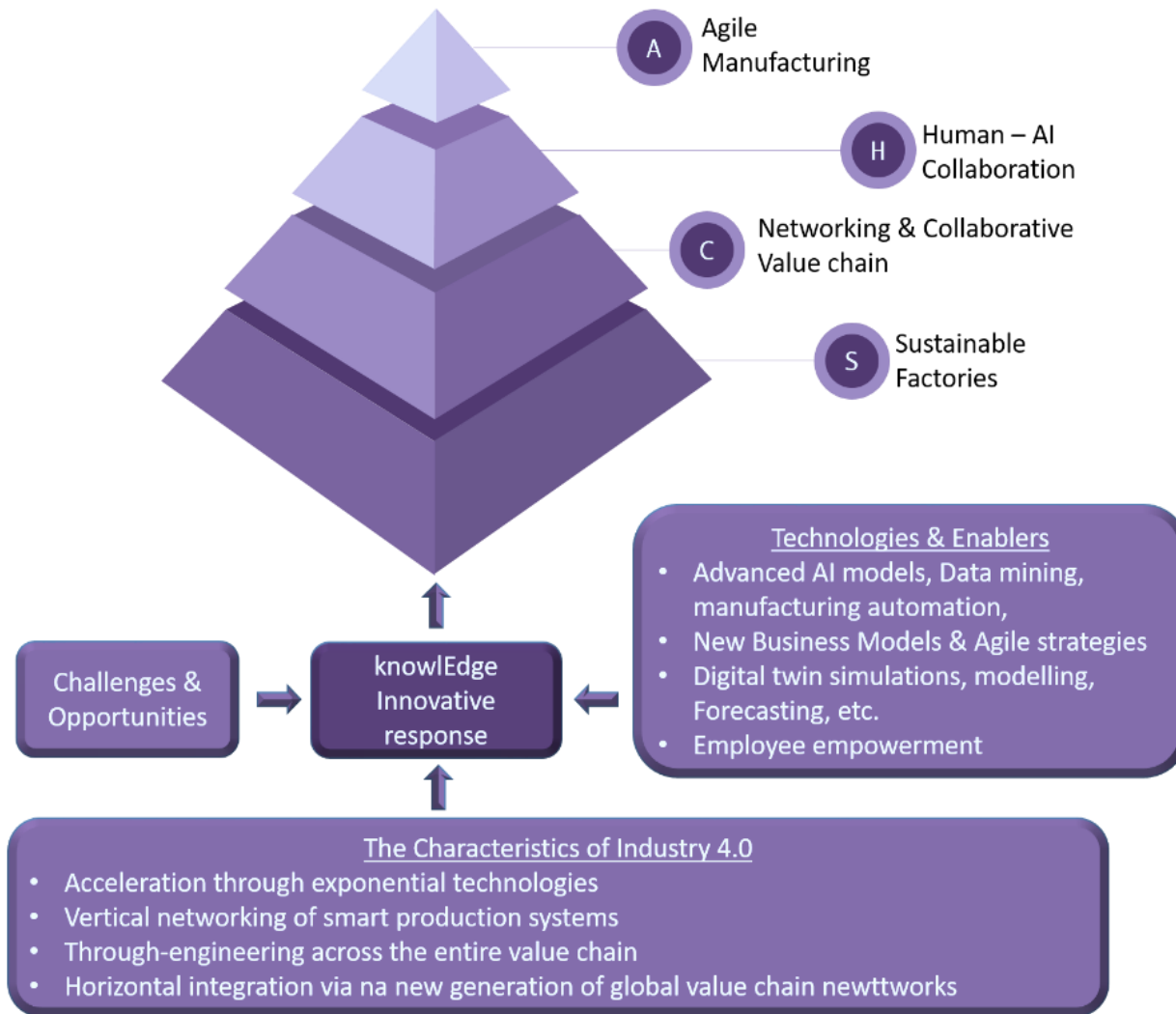


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knowlEdge objectives



Competitiveness and sustainability

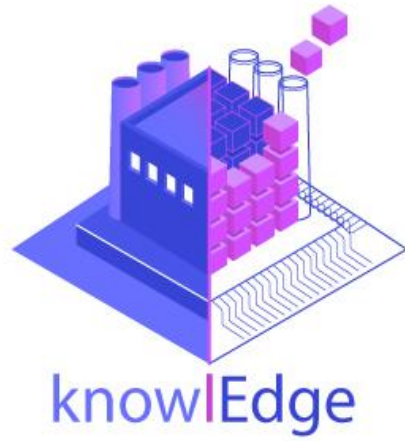


Responding to

- Global competitiveness need
- Increasing customisation
- Disruptions and innovations in markets, processes, technologies
- Transition to digital and sustainable

Creating

- Fusion of technologies
- Customer intimacy
- Human in the loop
- Greater system intelligence
- Innovative approach to meet to future demands



The way forward

Moving European manufacturing forward

knowlEdge addresses strategic research agendas

- **Real-time process supervision, control and simulation**, for precise management and optimization of manufacturing operations.
- **Cognitive manufacturing** support, based on AI to collect historical data, scenario simulation, knowledge and best practices.
- **Human-centred manufacturing**, augmenting capabilities especially in terms of understanding, protecting, supporting and empowering.
- Future manufacturing vision shifts from competitiveness to include **sustainability and resilience**, coping with sophistication and environmental/social requirements – a source of **differentiation**.



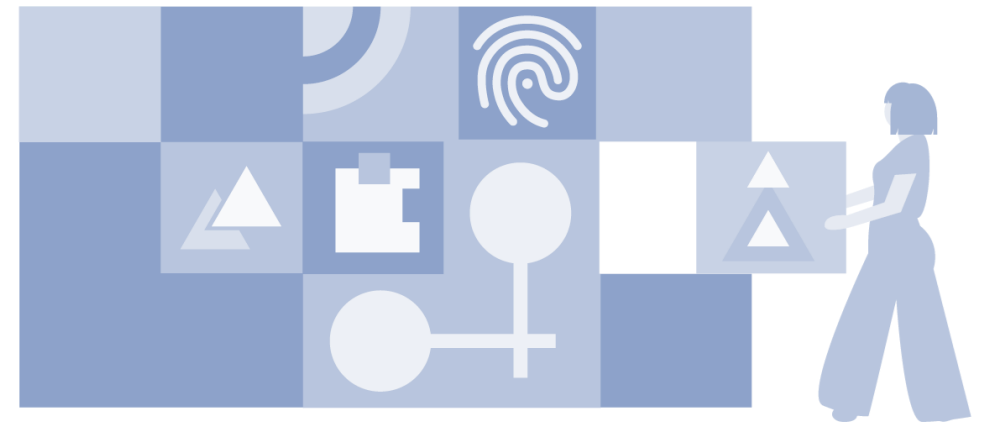
Our expectations

- **Optimizing manufacturing with AI:** Focus on human-centered AI solutions for manufacturing processes.
- **Frictionless AI adoption:** Simplifying AI model deployment and monitoring in real-world industrial settings.
- **Empowering manufacturers:** Bridging the gap in AI deployment, particularly for SMEs in Europe.
- **Transformative impact on manufacturing:** Advancing efficiency, safety, and sustainability through innovative AI methods and systems.



Our target groups

- **Manufacturing industries:** Utilising AI in day-to-day operations with enhanced efficiency, cost reduction, improved quality.
- **Value network partners:** Getting access to real-time information and AI-projected operations.
- **AI-related stakeholders:** Improving capabilities, expand market opportunities.
- **End-users and consumers:** Experiencing improved processes, AI-supported decision-making.
- **Research/academia:** Studying new generation of AI methods, systems, data management.



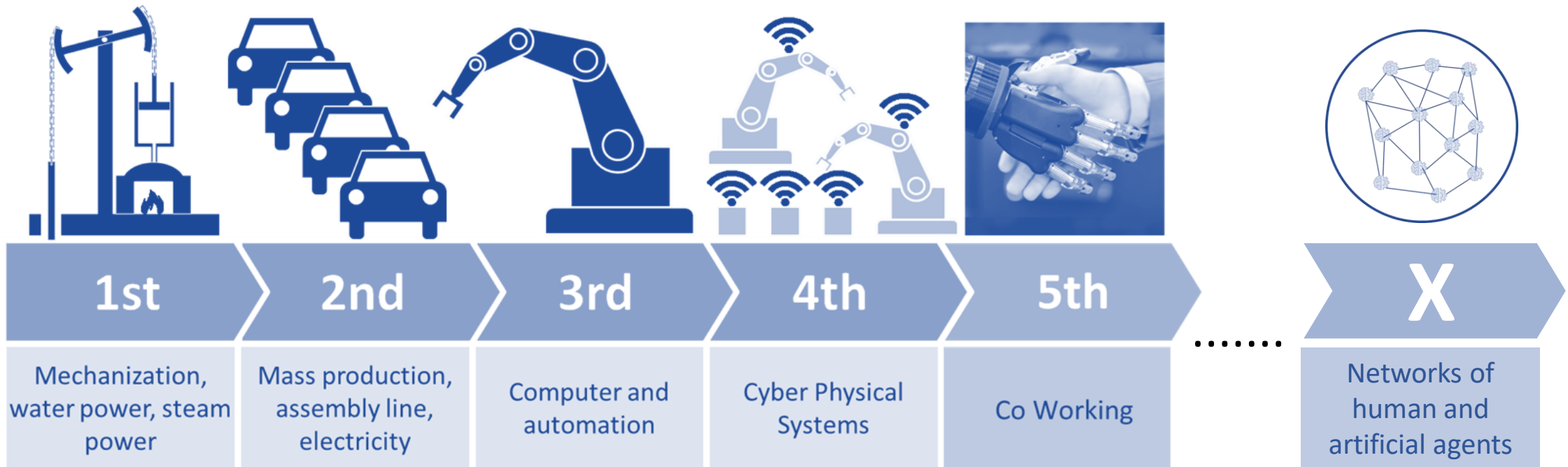


Our vision

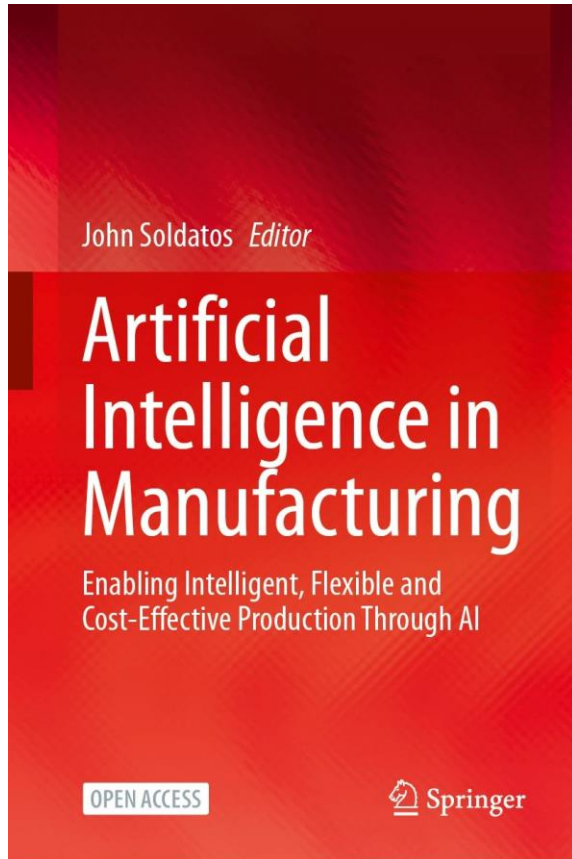
- **Revolutionising manufacturing with AI:** Develop AI solutions for shopfloor analytics and model management, driving automation and efficiency.
- **Integrating emerging technologies for powerful solutions:** Combine AI with blockchain, robots, and IIoT for innovative value chain solutions.
- **Advancing human-AI collaboration for safer, productive work environments:** Foster seamless collaboration for safer, productive environments and flexible operations.
- **Shaping the future of industrial management and technology integration:** Lead the 4th (and 5th) industrial revolution with end-to-end solutions, promoting adoption and laying groundwork for future innovations like the industrial metaverse.



The manufacturing evolution



Creating lasting impact



J. Soldatos (ed.) Artificial Intelligence in Manufacturing: Enabling Intelligent, Flexible and Cost-Effective Production Through AI, Springer 2024

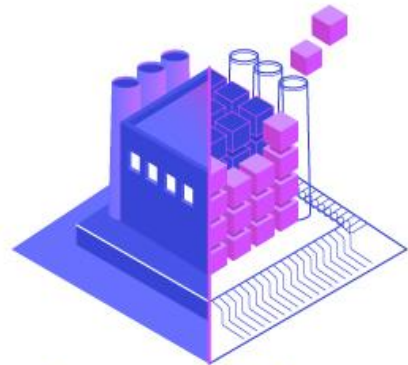
<https://doi.org/10.1007/978-3-031-46452-2>

knowlEdge chapters:

- Designing a Marketplace to Exchange AI Models for Industry 5.0
- Human-AI Interaction for Semantic Knowledge Enrichment of AI Model Output
- A Manufacturing Digital Twin Framework
- Advancing Networked Production Through Decentralised Technical Intelligence
- Boosting AutoML and XAI in Manufacturing: AI Model Generation Framework
- Anomaly Detection in Manufacturing



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Thank you!