

Workshop 7 - Generative Artificial Intelligence for Manufacturing

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The Artificial Intelligence for Manufacturing Network (AIM-NET) overview

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LMS

*Laboratory for
Manufacturing Systems
& Automation*

AIM-NET composition

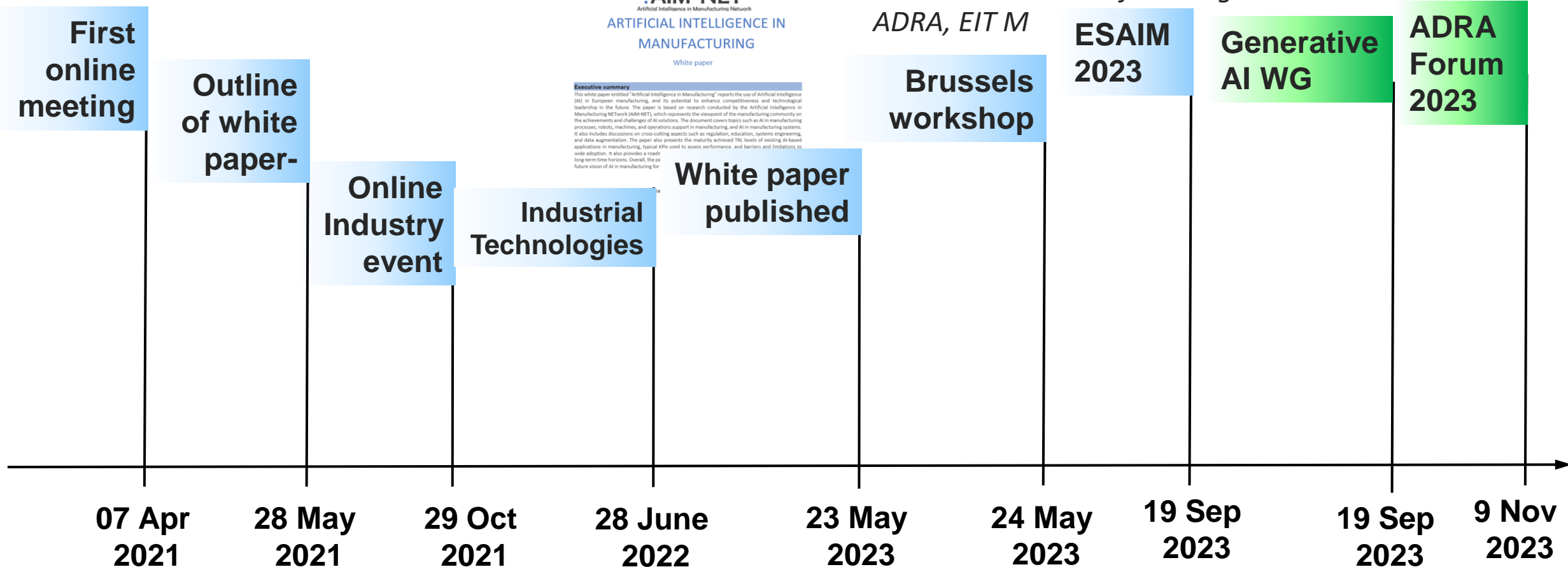


Manufacturing as a “user of AI” point of view is missing

A coordinated effort is needed

- scale up from lab to Factory
- align AI strategy and business goals
- leverage engagement of AI talent and training
- ensuring adoption and value creation

AIM-NET Milestones



Executive summary
This white paper entitled "Artificial Intelligence in Manufacturing" reports the use of Artificial Intelligence (AI) in European manufacturing, and its potential to enhance competitiveness and technological leadership in the future. The paper is based on research conducted by the Artificial Intelligence in Manufacturing Network (AIM-NET), which represents the viewpoint of the manufacturing community on the achievements and challenges of AI solutions. The document covers topics such as AI in manufacturing processes, robots, machines, and operators support in manufacturing, and AI in manufacturing systems. It also includes discussions on cross-cutting aspects such as regulation, education, systems engineering, and data augmentation. The paper also presents the maturity achieved TRL levels of existing AI-based applications in manufacturing, typical KPIs used to assess performance, and barriers and limitations to wide adoption. It also provides a road to long-term time horizons. Overall, the paper presents a future vision of AI in manufacturing for

European
Symposium of
AI in
Manufacturing

AIM-NET
EC, EFFRA,
ADRA, EIT M

AI application in industry

Systems level

- AI for supply chain management and planning
- AI for Multi-Process quality control
- AI for Dynamic Production Planning
- AI for autonomous factory control



Workstation level

- AI for Human Machine Interaction
- AI for Machinery Maintenance
- AI for Perception, Reasoning and Decision making
- AI for Dynamic Motion Planning



Process level

- AI for process monitoring and anomaly detection
- AI for Quality inspection
- AI for Process Parameters Selection
- AI for Tool wear prediction
- AI for Dynamic Adaptive Control



Generative AI for seamless Human Augmentation

Challenges/Needs:

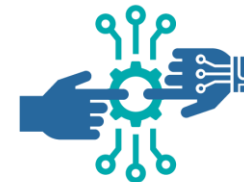
- Cobots as co-workers to Human
- Zero robot programming
- Natural interaction in manufacturing

Solution:

- Product design and process plan
- Integrate LLMs and a behavior tree-based system control

Benefits:

- Reduce programming
- Faster reconfiguration
- Inclusiveness



CONVERGING

Pitch/Interventions (~ 5 min each)

Sotiris Makris (LMS) - Introduction and welcome - The Artificial Intelligence for Manufacturing Network (AIM-NET) overview

Kosmas Alexopoulos (LMS) -Generative AI for Manufacturing current state and outlook

Mildred Puerto (TECNALIA) - AI services for a resilient manufacturing

Santiago Muiños Landin (AIMEN) - Generative AI for sustainable product design

Heli Helaakoski, Jurmu Marko (VTT) - Generative AI applications in manufacturing industry

Rolandas Lepardinas (MiV) - Robots, Additive Manufacturing and Virtual Twins for Generative Production

Davide Rua Carneiro (INESC-TEC) - How Generative AI will change decision making process in manufacturing

Elena Urkia (IDEKO) - AI Applied to Manufacturing

Mikkel Labori Olsen (DTI) - Closing the Loop: Enhancing Circular Manufacturing with Generative AI

Bart Meyers (Flanders Make) – Cherishing the expert’s knowledge: a hybrid method for generating design alternatives

Andres Salvador Paradela Estevez (CTAG) – Applications of Generative A.I. in Manufacturing Digital Twins

Mostafizur Rahman (MTC) – Generative AI Services in Manufacturing: Capabilities, Limitations, Risks and Mitigations, and the Role of AI Governance

Discussion

The presentations will be shared to the organisers of ADRF. Feel free to share a publishable version if needed

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