EFFRA perspectives

VTT examples

AI in Agile and Cognitive Manufacturing Industry

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Artificial Intelligence for Manufacturing
Framework for the future Manufacturing Partnership (2021 – 2027)

**CO-CREATION THROUGH MANUFACTURING ECO-SYSTEMS**

- **Excellent, responsive and smart factories**
  - Scalable first-time-right manufacturing
  - Agile and robust manufacturing

- **Zero-environmental impact, customer-driven value networks**
  - Demand and customer-driven manufacturing networks
  - Circular economy (symbiotic manufacturing networks)

- **Parallel product and manufacturing engineering**
  - Concurrent, holistic and collaborative product-service engineering
  - Virtual end-to-end life-cycle engineering from product to production lines, factories and networks
  - Manufacturing smart and complex products

- **Human-driven Innovation**
  - Co-creation in European knowledge networks
  - Human & technology complementarity

**ENABLING TECHNOLOGIES & APPROACHES**

- Advanced and smart material processing technologies and process chains
- Smart mechatronic systems, devices and components
- Intelligent and autonomous handling and robotics, assembly and logistic technologies
- De-manufacturing and recycling technologies
- Simulation and modelling (digital twins)
- Robust and secure industrial communication technologies, distributed control architectures
- Data analytics, artificial intelligence and deployment of digital platforms
- New business and new organisational approaches

**IMPACT**

- People
- Planet
- Competitiveness
- Products of the Future
Requirements

There is a need for
- incorporation of domain knowledge into the AI approaches;
- the organisation to transform towards digital manufacturing in general;
- explanation and traceability of the methods used
- handling of missing data or too small amounts of data;
- development of methods with a very low error rate;
- methods with low configuration and engineering effort.

Research must demystify the topic of AI for manufacturing
FCAI: Strategic commitment

**Strategic focus: Aalto University**
- Human-centered living environments
- ICT and digitalisation
- Arts and design knowledge building
- Global business dynamics
- Materials and sustainable use of natural resources
- Health and wellbeing
- Partners and stakeholder networks

**Strategic focus: University of Helsinki**
- Climate action
- Clean energy for the future
- Prosperity from resource wisdom
- Good life
- Improved quality of life and work
- Growth with sustainable innovations
- Industrial renewal
- Innovations empowering industry
- Safety and security
- Resiliency in turbulent world

**Strategic focus: VTT**
- Resource sufficiency
- MATTER AND MATERIALS
- HUMANMIND IN CHANGING WORLD
- LIFE SCIENCE
- MATHEMATICS
- ATMOSPHERE AND CLIMATE
- DIGITAL WORLD
- AGEING AND WELLBEING
- GLOBALIZATION
- SUSTAINABILITY

**AI Impact**
Artificial Intelligence in Agile and Cognitive Manufacturing Industry
Example 1: VTT ProperTune™

- Optimised materials solutions
- Service life increase by 1.5 – 4
- Solution performance increase by 3-7
- Time savings
Example 2: Reboot IoT Factory – AI Foreman

Labor@digital work environment

AI Enhanced capacity planning, “AI Foreman”

Vision of Digital Labor

Competence Matrices and employee performance

Employee Digitalization Technologies

Reboot IoT Factory

Enhanced capacity planning

Preferable work practices

Increased work satisfaction

Productivity
Example 3: PULP MILL optimisation
Savings of 700 truck loads

A real time pulp quality control

Yearly saving of ~ 700 truck load

Competitiveness & sustainability
Example 4: AI Maturity analysis

Where do you stand in AI
Understand elements of AI
Prioritise development steps
Artificial Intelligence in Agile and Cognitive Manufacturing Industry

- Applying AI needs a transition to digital manufacturing
- All levels are affected
- Huge potential
- Manufacturing understanding is necessity
- Strategic commitment - FCAI