Session: Research Priorities for Digitization of Industries
Date: 26th November 2020

Presentation:
ECS SRIA 2021 - Digital Industry, Olli Ventä, VTT
The new structure of the ECS-SRIA

1. Foundational Technology Layers
   - 1.1 Process Technologies, Equipment, Materials and Manufacturing
   - 1.2 Components, Modules and Systems Integration
   - 1.3 Embedded Software and Beyond
   - 1.4 System of Systems

2. Cross-Sectional Technologies
   - 2.1 Artificial Intelligence, Edge Computing and Advanced Control
   - 2.2 Connectivity
   - 2.3 Architecture and Design: Methods and Tools
   - 2.4 Quality, Reliability, Safety and Cybersecurity

3. ECS Key Application Areas

[Diagram showing the structure with sections for Mobility, Energy, Digital Industry, Health and Wellbeing, Production and Natural Resources, Industry 4.0, Digital Society]
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Contents of chapter

1. Scope
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   1. External requirements
   2. Societal benefits
3. Strategic advantage for EU
4. Major challenges
   1. Responsive and smart production
   2. Sustainable production
   3. Artificial Intelligence in Digital Industry
   4. Industrial service business, life-cycles, remote operations, and teleoperation
   5. Digital twins, mixed or augmented reality, telepresence
   6. Autonomous systems, robotics
5. Synergy with other themes
   1. About engineering tools
   2. About Trust, security, Cybersecurity, safety, privacy
   3. About digital platforms, application development frameworks

This project has received funding from the ECSEL Joint Undertaking (JU) under Grant Agreement no. 830845. The JU receives support from the European Union’s Horizon 2020 research and innovation programme and Ireland, Finland, Spain and Germany. The output reflects the views only of the author(s), and neither ECSEL JU nor the European Union can be held responsible for any use which may be made of the information contained therein.
**Scope**

**DIGITALISATION OF**

- Discrete manufacturing
- Process industry
  - Energy (own chapter)
- Machines, robots
  - Farming machines, etc. (own chapter)
- Supply chains, value chains and lifecycles
- Functions across business levels
Major challenge 1: Responsive and smart production

Key focus areas

• Robust optimal production, scalable first-time-right production

• Mass customization and personalized manufacturing, customer-driven manufacturing, mastering the complexity of products, processes and systems

• Resilient and adaptive production, including the shortening of supply chains and modular factories

• Cognitive production

• Manufacturing as a service

• Standardisation
Major challenge 2: Sustainable production

Key focus areas

- Lifecycle assessment: LCA
- Monitoring flows of energy, materials and waste
- Human-centred manufacturing, Extended human capabilities enabled by big data and AI
- Human safety, competence and quality of work
- Human–machine interfaces and machine-to-machine communications
- Green Deal
Major challenge 3: Artificial Intelligence in digital industry

Key focus areas

- European AI framework
- AI in manufacturing
- AI for decision-making
- AI for monitoring and control
**Major challenge 4:**
*Industrial service business, lifecycles, remote operations and teleoperation*
Major challenge 5: Digital twins, mixed or augmented reality, telepresence

Automation basic design with consistent instrumentation data

Verification of process design

Verification of automation design

"Living" automation drawings

Engineering Project

Operating & Maintenance Industrial Plant

Virtual Plant

Simulation tested automation application

Training simulator

O&M simulator

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ECSEL Joint Undertaking
Electronic Components and Systems for European Leadership
Major challenge 6: Autonomous systems, robotics

Key focus areas

- Autonomous functions of systems
- Safety and security in autonomous systems
- Requirements management and conceptual modelling of autonomous systems
- Human machine interaction in autonomous systems
- Verification and validation, digital verification and validation (V&V)
- Digital design practices
- Simulators and autonomous systems
- Autonomous capabilities development in a digital environment
Synergy with other themes

Topics dealt with in other chapters of the SRIA but are very important for Digital Industry, as well. They could have been listed as Major Challenges here, too.

Examples:
• About engineering tools
• About trust, security, cybersecurity, safety, privacy
• About digital platforms, application development frameworks
• ... or other combinations of foundational and cross-sectional technologies in this SRIA, serving digitalization of industry
Comments to:

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Thank you!

1.1.2021-
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Discussion (Q&As)

Title: Industry4.E Workshop - Research Priorities for Digitisation of Industries

Time: 11.30 to 13.00

Date: 26th November 2020
Collaboration & Innovation Opportunities 2021-2022

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