ECS-SRA Digital Industry

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ECS Our digital future 2018

Organised by:
AENEAS, ARTEMIS-IA, EPoSS, ECSEL-JU &
European Commission

Associated organiser:
EUREKA

Scoping Digital Industry

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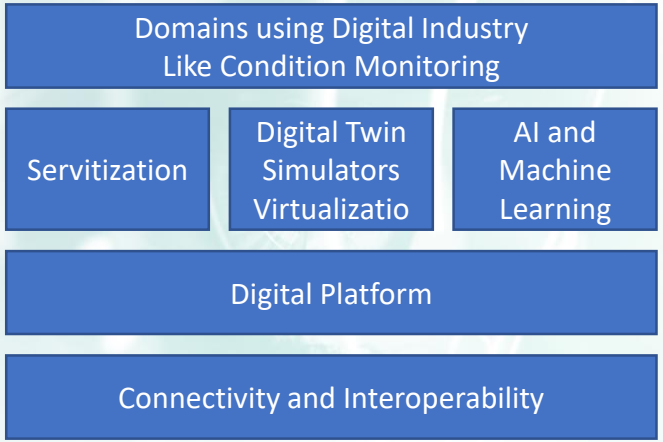
By ***Industry*** we mean:

- Process industry, manufacturing, machines
- Factories, worksites, factory networks, value chains
- Near machine/process, …., production lines, plants, enterprise networks
- Lifecycles: design, build, test, deliver, operate, maintain, upgrade, recycles
- Product, process, services point-of-views
- Including smart farming, food value chains (new in 2018)

By ***Digital*** we mean:



Digital Industry - Relevance

- Digital Industry will require new applications and methods to get current factories work at the **maximal flexibility & efficiency** and optimized production level. As there will be less workers they should get more information.
- The only way to support information flow is to use **new innovations** and **integrate them to normal work flow**. This means that user should have access to information as he/she needs it.
- This kind of easy access requires still **security** and a lot **back-end server capacity** to process information ready to be used. Optimal system will setup itself according the designed and installed system.
- This means we should have **self-organizing intelligence** at the factory level.
- Disruption can happen as **wireless sensors** and **new field connectivity** solutions are needed with industrial internet. Cloud based network and integration will change value chain. One challenge is to use this kind of network fast and dynamic way.

Digital Industry - Major Challenges

1. Developing **digital twins**, simulation models for the evaluation of industrial assets at all factory levels and over system or product life-cycles;

2. Implementing **AI and machine learning** to detect anomalies or similarities and to optimise parameters;

3. Generalising **condition monitoring**, to predamage **warning**, on-line **decision-making support** and standardisation of communication scenarii to enable **big data collection across** huge (remote) **sites**;

4. Developing **digital platforms**, application development frameworks that integrate sensors/actuators and systems.

Digital Industry - Game Changers

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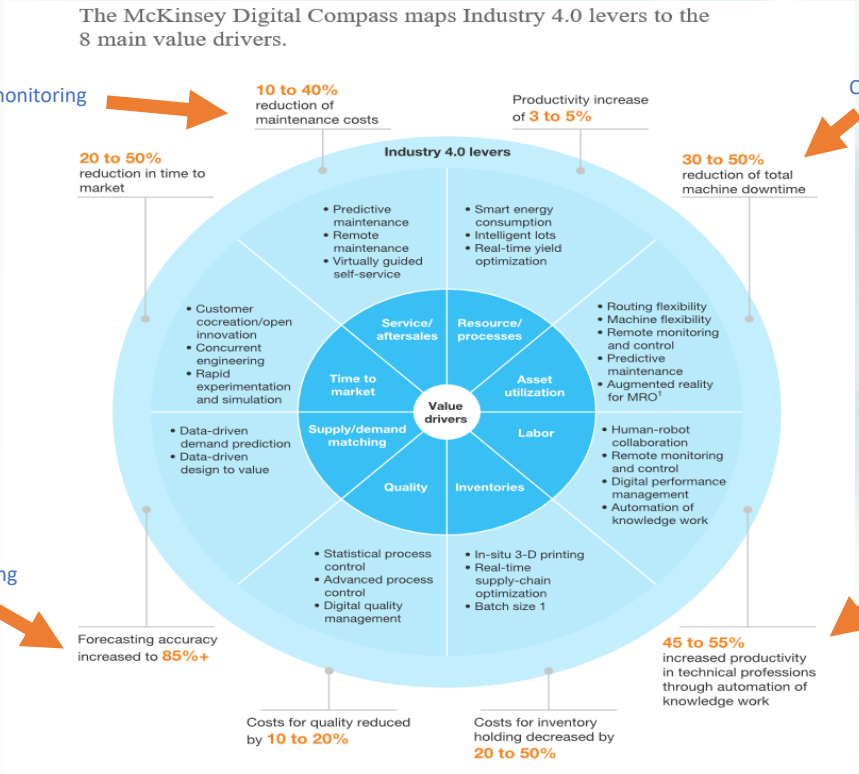
Technological New Paradigms

- Advances in computing: Facing a new software complexity
- Increased connectivity
- Heterogeneous integration / comprehensive smart miniaturised systems
- Additive manufacturing / 3D printing
- Micro Nano Bio Systems (MNBS)

Business Model & Societal New Paradigms

- Everything as a Service
- Faster and shorter innovation cycles
- New transaction mechanisms for improved trust and security: Blockchain
- Virtual networked enterprise
- Vertical Integration & leadership
- When Consumers become prosumers

Digital Industry - Compared to wider scope



Digital Industry - Areas for R&D&I for the Challenges

- Simulation, virtualization, digital twins
  - Multi-domain, tools-connected, simulation-based design
  - Tracking mode simulation, model adaption based on measurements
- Artificial Intelligence
  - automated design features, technologies to connect intelligence
  - High TRL level analysis, prediction and optimization, decision support
- Digital platforms
  - Move focus on the industrial or engineering applications. Engineering tools.
  - High level, outperforming applications and systems, for the actual industrial and business needs
  - Prepare for the era of 5G in communication technology, and especially its manufacturing and engineering dimension
  - Interoperability cross platforms
- Solve the cyber-security problems.
  - Only safe, secure, and trusted platforms are accepted and survive in industry.
  - Data ownership, openness, privacy, IPR in multi-stakeholder situations

Digital Industry - Expected achievements

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- Industrial cases, solution examples, state of art technology
  - Agile projects, from fast prototypes to real use case solution
- Machine learning & AI integrated to solve problems and guide user
  - Existing platforms and algorithms
  - Show with real examples how to use these
- Digital platforms used to integrate new sensors (wirelessly) and new applications
  - Digital twins helping in simulation & condition monitoring
  - Condition monitoring with machine learning & AI

Industry4.E lighthouse and CSA-Industry4.E

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1. **Lighthouse group:**
   - Andrew Lynch, Irish Manufacturing Research (IMR)
   - Chris Decubber, EFFRA
   - Eduardo Beltran, Mondragon Corporation
   - Knut Hufeld, Infineon Technologies
   - Olli Ventä, VTT
2. **ECSEL CSA project: CSA-Industry4.E**
   - Time: 2 yrs, 2018-20, Vol. 500k€
   - Consortium: IMR (coord.), VTT, Mondragon Univ., Steinbeis, AquaTT
   - Analyse roadmaps, SRA:s, strategies, PPP documetation, etc., related to Digital Industry
   - Discuss with projects about contents, gaps, etc.
   - Bring projects together, community building
   - Reach out wider audiences
   - Create input to further versions of ECS SRA
   - Visit CSA-Industry4.E booth in this and future events!

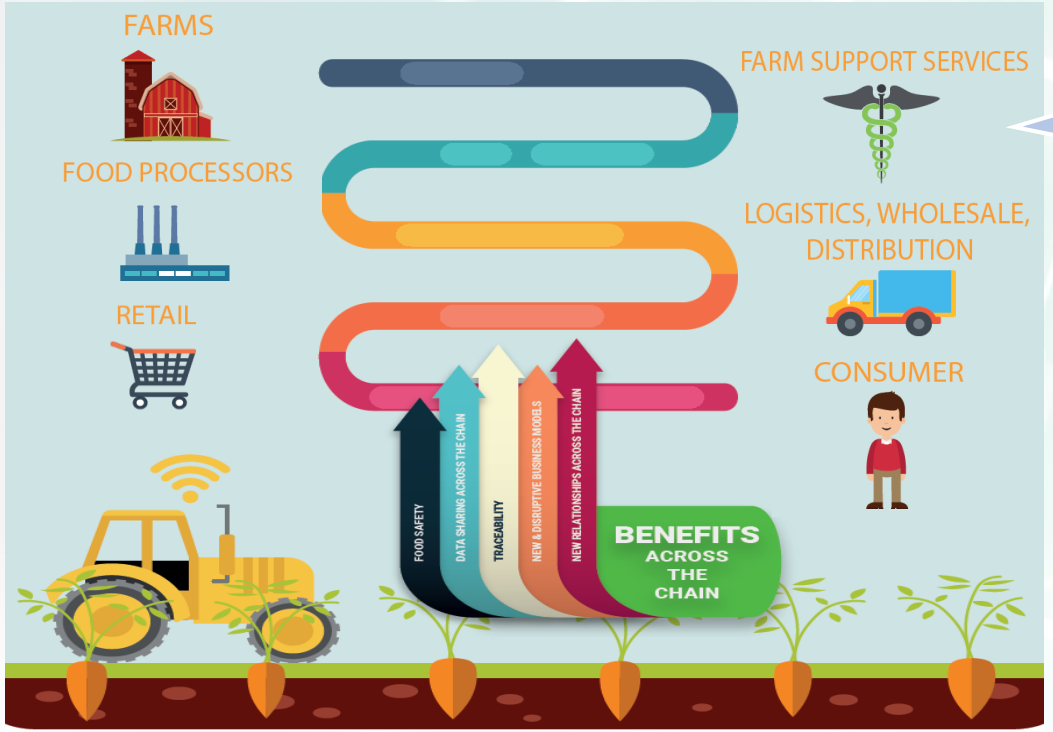
- Productive4.0
- MANTIS
- SWARMs
- SemI40
- DELPHI4LED
- I-MECH
- SCOTT
- iDev40
- AFarCloud
- ConnectedFactories

Digital Farming and Food value chains

The Agrifood (digital) Value chain

Benefits:

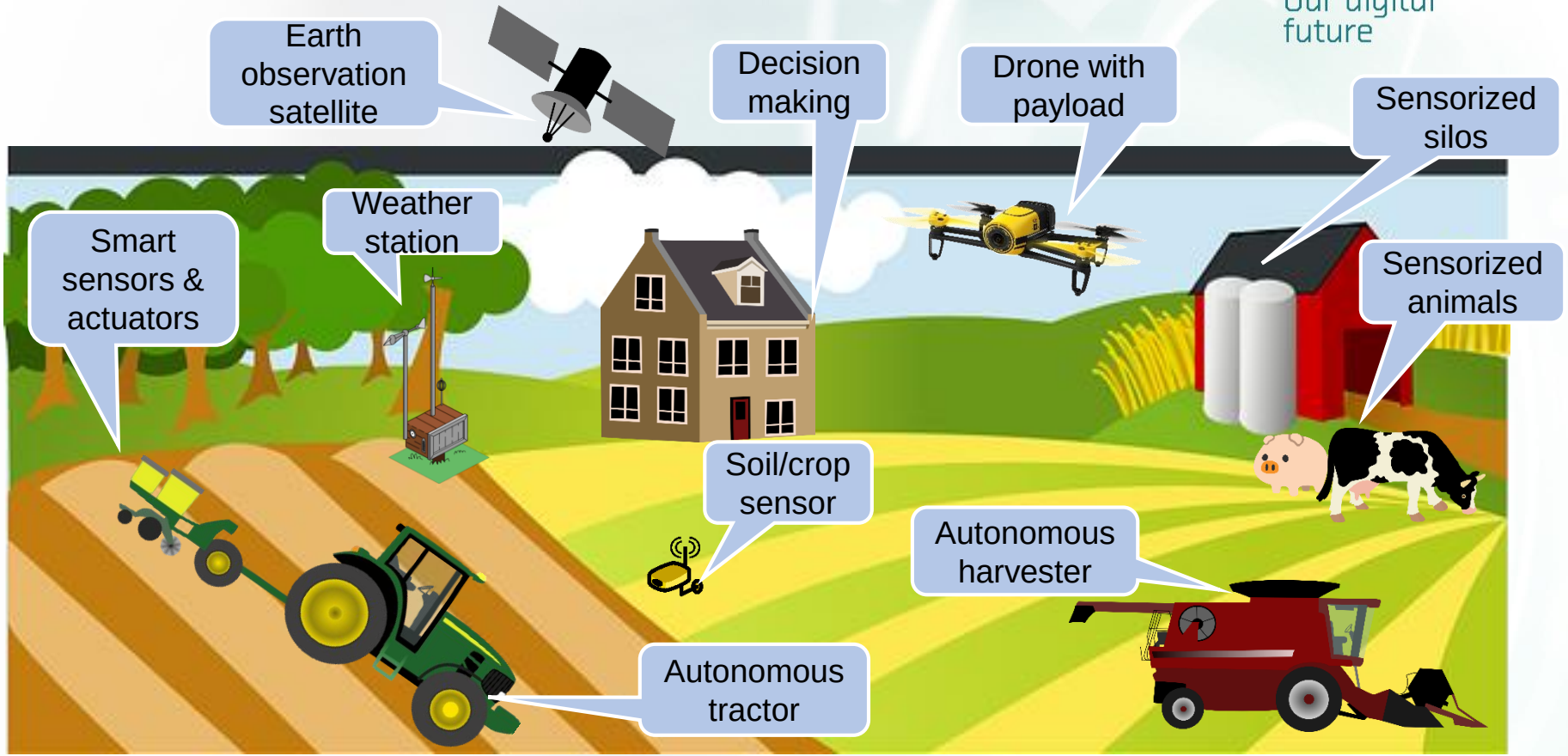
- Higher productivity
- Reduced environmental footprint
- Improved animal and farmer welfare
- Enhanced food traceability



Digital farming

AIOTI Courtesy

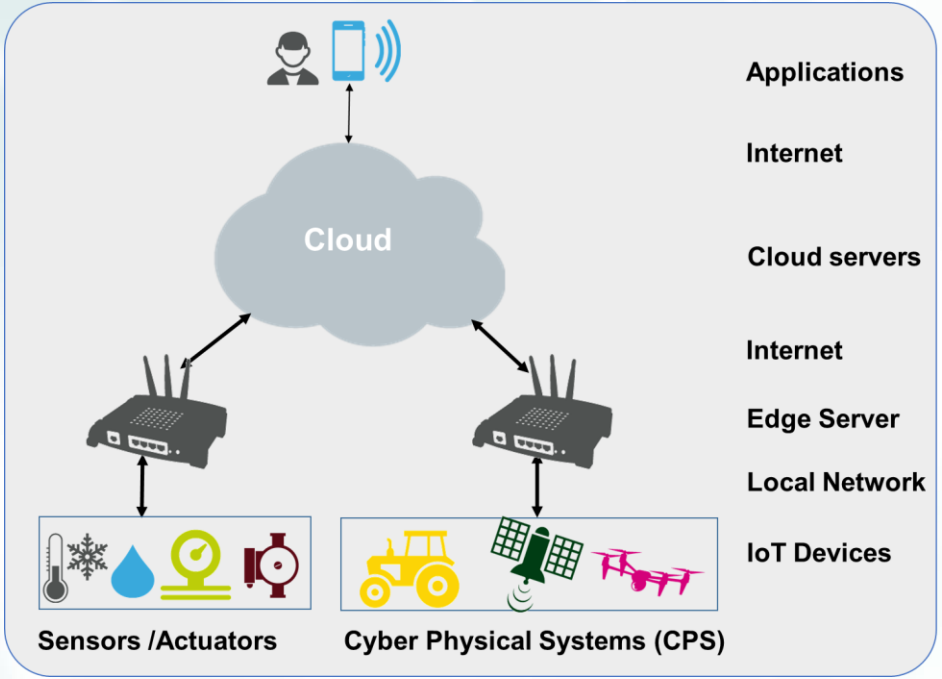
Digital Farming Technologies



AIOTI Courtesy

Digital Farming - Areas for R&D&I for the Challenges

- Connectivity
  - Long-range communication technologies optimized for M2M communication
- Next-generation IoT devices
  - Higher integration, AI and ML capabilities, high reliability, low power, small form factor and lower cost
- Interoperability-by-design
  - At device, platform, semantic and application levels
- IoT configuration and orchestration
  - For (semi)autonomous deployment and operation
- IoT security and safety:
  - Certification, security-by-design
- Decision making:
  - Based on artificial intelligence, modeling and analytics, in Cloud as well as in Edge/fog settings



Digital Farming - Expected Achievements

- Availability of a new generation of smart farming-ready intelligent IoT components, devices, platforms and applications
- High degree of interoperability, configurability, orchestrability, reliability, safety and security
- Europe to stand out as global leading supplier of smart-farming technology during 2020-2030.

Digital Industry - Time Frame

- From NB-IOT 2018-2019 connectivity to real 5G 2020
  - New connectivity, providing more information from old & new devices
- Condition monitoring applications on cloud
  - 2018 as connectivity provide new way to store data
  - 2018-2019 Machine learning algorithms running and detecting, also on Edge level
  - 2020 AI based reasoning as expert
- Digital twins
  - 2018 Building models based on new data
  - 2019 Connecting these to machine learning
- Digital platfroms used to connect all above and providing building blocks and glue
  - 2018 prototypes and API OPS ways to connect platforms & clouds
  - 2019 Meta platform that can use YAML/JSON descriptions programmatic online integration and interoperability