ConnectedFactories project & pathways

Chris Decubber, EFFRA

ConnectedFactories 2
**KEY ENABLERS AND CROSS-CUTTING FACTORS**

- Skills and engineering tools
- Skills for operation of the technologies
- Added value / optimisation focus
- Business models / financial investment
- Interoperability / standards
- Security
- Technology – building blocks

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**PATHWAYS**

- Autonomous Smart Factories
- Hyperconnected Factories
- Collaborative Product-Service Factories

- Security
- Circular Economy
- Data spaces

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**PATHWAY - AUTONOMOUS SMART FACTORIES**

- Spreadsheets, communications and process control
- Data analysis
- Software defined networks
- Data collection and analysis
- Data analysis

**PATHWAY - HYPERCONNECTED FACTORIES**

- Data integration
- Smart manufacturing
- Process optimisation
- Security

**PATHWAY - COLLABORATIVE PRODUCT-SERVICE FACTORIES**

- Product design
- PLM systems
- Service-oriented product design
- Service innovation and new business models
- Product service innovation

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**Industrial state of play in manufacturing**

**Cases that illustrate advanced state of the art**

**Approaches & cases from research & innovation projects**
PATHWAY – HYPERCONNECTED FACTORIES

1. General purpose software
   EXCEL/WORD Based SCM, CRM
   Administrative transactions digitalised

2. Dedicated software in silos
   Dedicated ERP Software Implemented
   Dedicated SCM Software Implemented
   Data acquisition/monitoring/analysis (SCADA) – isolated systems
   Product information digitalised

3. Intra-factory integration
   SCM-ERP Software Connected
   ERP-MOM Software Connected
   IoT enabled SCADA, MOM-MES, ERP (...) connectivity

4. Inter-factory integration with (long term) value network partners
   SCM-ERP Software connected to SCM-ERP software of some suppliers
   High level Planning of manufacturing
   Forecasting of required capabilities (link with Autonomous Smart Factories)

5. Inter-factory integration with new value network partners
   Common digital platform used for tenders and bidding (dynamically connecting to new suppliers/customers)
   Dynamic detailed scheduling and rescheduling
   Visibility of work in progress at the supplier’s site
PATHWAY - COLLABORATIVE PRODUCT-SERVICE FACTORIES

1. Product, no Service
   - CAD Systems
   - PDM Systems

2. Product and disjoint Service
   - PLM Systems (integration of CAD and PDM)
   - CRM Systems

3. Service-enabled Product Design
   - Voice of Suppliers
     - Customers / Users
   - Service orient. Product Design
     - Integration of PLM and CRM

4. Product Service Innovation
   - Closed loop PSS Design
     - Connected to user’s data
   - Service Innovation and new Business Models

5. Product Service Symbiotic Evolution
   - Digital Platforms for next generation PSS Systems lifecycle management

Product-Oriented Organizations based on highly qualified professional knowledge for design-manufacturing

Products are considered along their own lifecycle. Complex interactions between Lifecycles considered

PSS Design Engineering open to customers and final users. Advanced services integrated

Manufacturing companies integrate innovative services in their value proposition

PSSs induce Digital transformations at all levels: technical, organizational and procedural. Collaborative PS Factories
Produced by the ConnectedFactories 1 project

https://www.connectedfactories.eu/pathways-digitalisation-manufacturing
**Key Enablers and Cross-Cutting Factors**

- Autonomous Smart Factories
- Hyperconnected Factories
- Collaborative Product-Service Factories

**Pathways**

- Autonomous Smart Factories
- Hyperconnected Factories
- Collaborative Product-Service Factories

**Industries state of play in manufacturing**

**Cases that illustrate advanced state of the art**

**Approaches & cases from research & innovation projects**

- Security
- Circular Economy
- Data spaces
DMP Cluster
Digital Manufacturing Platforms Cluster

6 Innovation Actions from DT-ICT-07-2018-2019 calls + ConnectedFactories 2 CSA

- Presentations – here
- Recording - here
Past Webinar: Standards for digital manufacturing

• Presentations - [here](#)
• Recordings - [here](#)
# Data Space Pathway (draft)

<table>
<thead>
<tr>
<th>Dimensions / Levels</th>
<th>Level I No Data Control</th>
<th>Level II Data Silos</th>
<th>Level III Data Bridges</th>
<th>Level IV Data Interoperability</th>
<th>Level V Data Valorization</th>
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</thead>
<tbody>
<tr>
<td>Data Management</td>
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<td>Data-driven Business Models</td>
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<td>Data Protection</td>
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<tr>
<td>Data Processing</td>
<td>Data are generated, processed and visualized by CPPS and II4.0 systems</td>
<td>Enterprise Applications (ERP, SCM, PLM, CRM) collect, store and visualize Data</td>
<td>Complex applications require data from different sources</td>
<td>Al-driven applications; Digital Assistants; VR/AR</td>
<td>Data Economy and Industrial Data Platforms</td>
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<td>Data Analytics</td>
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<td>Data Visualization</td>
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<tr>
<td>Data Sharing</td>
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</table>
## Circular Economy Pathway (draft)

<table>
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<tr>
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<th>1</th>
<th>2</th>
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<th>4</th>
<th>5</th>
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</thead>
<tbody>
<tr>
<td><strong>Products</strong></td>
<td><strong>Products</strong></td>
<td><strong>Material used to should be the minimum amount required to respect product functionalities and design (resource sufficiency)</strong></td>
<td><strong>Systematical identification of possibilities to reuse, refurbish and remanufacture</strong></td>
<td><strong>Ecodesign of products (must be easy to be disassembled, repaired, remanufactured and its components should be recyclable)</strong></td>
<td><strong>Changing business model towards product-service-systems and X as service approaches at ecosystem level</strong></td>
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<tr>
<td><strong>Process</strong></td>
<td><strong>Quality monitoring to avoid unnecessary scraps</strong></td>
<td><strong>Production processes must require limited amount of energy</strong></td>
<td><strong>Transportations modes (reverse logistics), internal recycling of materials</strong></td>
<td><strong>Building industrial synergies/closed loop models</strong></td>
<td><strong>Circular systems and process at value network/ecosystem level</strong></td>
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<tr>
<td><strong>Platform</strong></td>
<td><strong>Information technologies to gather processes data</strong></td>
<td><strong>Company systems integration (e.g. ERP, MRP, PDM, PLM...)</strong></td>
<td><strong>Disassembly and Remanufacturing enabling technologies introduced on the shop-floor</strong></td>
<td><strong>Digital platform integration enabling the interaction among value-chain actors</strong></td>
<td><strong>Collaborative business processes and workflows are used over the product life cycle</strong></td>
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<tr>
<td><strong>People</strong></td>
<td><strong>Ad-hoc engagement of individuals, not comprehensive engagement</strong></td>
<td><strong>Engagement and awareness raising, systemic empowering through champions</strong></td>
<td><strong>Cultural transformation and qualified people (skills)</strong></td>
<td><strong>Circular suppliers selection and value network level indicators</strong></td>
<td><strong>Sustainable government requirements and European Green Deal?</strong></td>
</tr>
<tr>
<td><strong>Partnership</strong></td>
<td><strong>Contractual</strong></td>
<td><strong>Code of conduct</strong></td>
<td><strong>Circularity objectives</strong></td>
<td><strong>Capabilities to</strong></td>
<td><strong>Digital</strong></td>
</tr>
</tbody>
</table>
Next events

Cybersecurity Webinar, 20 January 2021
Thank you!

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https://www.connectedfactories.eu/