LOGISTICS 4.0 AND THE INTERNET OF THINGS

Workshop “Platforms for connected Factories of the Future”
Thorsten Hülsmann · 5th of October 2015
Fraunhofer IML and EffizienzCluster

Fraunhofer Institute for Material Flow and Logistics
- Founded in 1981 in Dortmund
- More than 200 Scientists and 250 Student Assistants
- Turnover of 25 Million € (2014)
- There of 40% from Industry, Trade and Services

EffizienzCluster LogistikRuhr
- Founded in 2010
- 120 Companies (Including Volkswagen, Daimler, Bosch, Würth) and 12 Research Institutes, 37 Projects, Programme Volume of 100 Mill. €
- Goal: to Increase Efficiency by 25% through Autonomization of Logistic Processes in Manufacturing, Production, Retail and Logistics Services, Safeguard the Leading Role of Europe in Logistics Performance
Industrie 4.0: Developments towards Smart Factory

Intelligent Transport Items
- Sensor Intelligence
- Communicating
- Energy Harvesting

Cellular Transport Systems
- Autonomous Driving
- Self-controlled Behaviour
- Swarm Intelligence

Rack Racer
- Autonomous Vehicle
- Diagonal Movements in the Shelf
- Bionic Shape
Logistics 4.0 · Internet of Things · Everything is autonomous!

PEOPLE
arrange, control, interlink…

TRUCKs
deliver goods autonomously

CONTAINER
organize their supply chain and global networks

SHELFs
organize their replenishment

BINs
display what to pick

AGVs and TRUCKs
interact like a swarm
Significant future areas for the implementation of industry 4.0

- CUSTOMERS (B2B, B2C)
  - high flexibility
  - intuitive operation
  - Human-robot cooperation
  - intelligent control

- SUPPLIERS
  - complete cross-linkage
  - Cyber-physical Systems
  - self-configuration
  - additive manufacturing

- LOGISTICS
  - built-in intelligence
  - Real-time capability
  - traceability
  - completeness

- INNOVATIVE PRODUCTION SYSTEMS
  - Cyber Security
  - Cloud Computing
  - Big Data
  - Wireless und mobile Vernetzung

- PRODUCT DESIGNER
- EQUIPMENT SUPPLIER
BMWi Study – Industrie 4.0 Technology- and Research Areas
Six leading German Research and Innovation Programmes of the Federal

- Produktion
- Logistik – Lager, Intralogistik, Versand,...
- Planung und Steuerung
- Produktentwicklung
- Nutzung
- Anlagen- und Verfahrensentwicklung
- Fabrikplanung
- Supply Chain Management
- Zulieferer
- Instandhaltung
- Produktionsengineering
- Wissen und Bildung
- Distribution
- Beschaffung
- Geschäftsmodelle & Strategie
- Forschung und Entwicklung
- End of Life
- Auftragsabwicklung
- After Sales Services

Volume in Euro

- Spitzendüster-Wettbewerb
- IKT 2020
- Forschung für die Produktion von morgen
- AUTONOMIK für Industrie 4.0
- AUTONOMIK - Autonome und simulationsbasierte Systeme für den Mittelstand
- microTec Südwest
Logistics and SCM for European Competitiveness in Manufacturing and Services

- Increase Share from Industrial Manufacturing of European Union GDP from about 16 Percent to above 20 Percent.[1]

- **Logistics Connects Europe's Manufacturing Networks**

- Coordination of Value-adding Networks in Manufacturing, Trade, Retail and Service

- Innovation in **Logistics Technologies, Enterprise-IT and Management** are Required

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Research and Innovation to Promote Industrial Value Creation

- Information and Communications Technologies (ICT)
- Factories of the Future (FoF)
- Sustainable Process Industries (SPIRE)
- Robotics
- Mobility for Growth

- Smart Industrial Creation of Value is more than Manufacturing and Transport
- Adaptable Value-added Company Networks Based on the Factories and their Systems are Required to Realize the Full Potential of CPS and Smart Factories
- Smart Supply Chains and Services Will Link Customers and Markets to Smart Design and Smart Operations Being already Part of the FoF Roadmap
Sub-Project “Cloud Services” has the goal to realize the integration of different cloud-based service and operations platform.

Based on:
- Virtual Fort Knox for Manufacturing Services
- Logistics Mall for Logistics and SCM Services
INDUSTRIAL DATA SPACE
Industrial Data Space: on demand networking

All data are protected and under Control of their owners. No central platform. Data and services are linked and shared on demand.
Coherence of Plattform Industrie 4.0 and related Platform Initiatives

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- Smart Services
- Data
- Networks, Transmission
- Real time systems

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Social Manufacturing and Logistics
Humans and Machines in joint Social Networks

SAP HANA

SAP HANA APPLICATION

SAP IoT Connector
(on board)

SAP HANA IoT EDITION CORE

SAP IoT Client
(user interface)
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