LOGISTICS 4.0 AND CHALLENGES FOR THE SUPPLY CHAIN PLANNING AND IT

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Dr. Sevket Akinlar, Fraunhofer IML
LOGISTICS 4.0 AND CHALLENGES FOR THE SUPPLY CHAIN PLANNING AND IT

Agenda:

- Fraunhofer-Institute for Material Flow and Logistics
- Industry 4.0: Examples from applied research in logistics
- Industry 4.0: Challenges for Supply Chain Planning and IT
The Fraunhofer-Institute for Material flow and Logistics in Dortmund

- Founded 1981
- More than 200 scientists
- 250 postgraduates and students
- 24.3 Mio. € turnover, of which 40% from the industry (2012)
- Branch offices and project centers in Frankfurt on Main, Hamburg, Prien
- Cooperation with HSG St. Gallen (Switzerland), Georgia Tech (USA), Lisbon (Portugal), Shanghai (China), Rio de Janeiro (Brazil)

OUR DIVISIONS:

- MATERIAL FLOW SYSTEMS
- ENTERPRISE PLANNING
- LOGISTICS, TRAFFIC AND ENVIRONMENT
The Fraunhofer IML in profile

- Services from planning to realization
- Customized individual solutions
- Capable of innovation, creativity and scientific competencies
- Long-standing know-how about consultancy, projecting and realization
- A partner for all tasks in the field of material flow and logistics
- Future-proof investments according to the latest state of the art
Sections of Fraunhofer IML

SECTION MATERIAL FLOW SYSTEMS
- Information Logistics and Assistance Systems
- Intralogistics and IT Planning
- Automation and Embedded Systems
- Machines and Facilities, Packaging and Trade Logistics
- AutoID- and RFID-Systems Software Engineering

SECTION ENTERPRISE LOGISTICS
- Enterprise Planning, Supply Chain Engineering
- Production Logistics
- Plant and Service Management
- International Enterprise Development
- Procurement and Finance in Supply Chain Management

SECTION LOGISTICS, TRAFFIC, ENVIRONMENT
- Environment and Resource Logistics
- Traffic Logistics
- Health Care Logistics
- Project Center Aviation Logistics
- Project Center Traffic
- Mobility and Environment
- Center for Maritime Logistics and Services
LOGISTICS 4.0 AND CHALLENGES FOR THE SUPPLY CHAIN PLANNING 4.0

Agenda:

• Fraunhofer-Institute for Material Flow and Logistics
• **Industry 4.0: Examples from applied research in logistics**
• Industry 4.0: Challenges for Supply Chain Planning and IT
Cyber Physical Systems in logistics – swarm-intelligence in cellular transport systems
Example: CPS in logistics – condition monitoring
LOGISTICS 4.0 AND CHALLENGES FOR THE SUPPLY CHAIN PLANNING 4.0

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- Industry 4.0: Examples from applied research in logistics
- Industry 4.0: Challenges for Supply Chain Planning and IT
Industry 4.0 – Understanding and meaning for the Supply Chain Management

Today the main focus is on the smart factory but what is the meaning for the supply chain management?

- The internet of things leads to a high transparency regarding the status of the supply chain and its nodes.
- The amount of information increases rapidly with the automatic acquisition of data/events.
- Standardized event information in high quality can be distributed within the supply chain with methods of the internet of things.
- But: transparency is not enough, the right conclusions have to be drawn at the right points.
Industry 4.0 – Understanding and meaning for the Supply Chain Management

- Supplier
- LSP
- OEM
- LSP
- Customer/Retail

- Wrong shipment
- Capacity shortage
- Supply bottleneck
- Globalization
- Delays
- IT-Blackout
- Quarantine Customs
- Maintenance
- Machine breakdown
- Material defect
- Product life cycle
- Strike
- Availability of personnel
- Transparency
- Traffic
- Cataclysm
- Traffic
- Delays
- Maintenance
- OEM
- LSP
- Customer/Retail

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Industry 4.0 – Understanding and meaning for the Supply Chain Management

„Which information is important?“ „How do I have to plan?“ „How can I use the information?“

A lot of information but what is the right conclusion?
Industry 4.0 – Understanding and meaning for the Supply Chain Management

Hypothesis regarding the SCM in the Industry 4.0:

- In spite of the desired autonomy of systems a planning will still be required
- The actual management structures have to be adapted according to the decentralized approach of industry 4.0.
- For the decentralized management planning information has to be standardized and exchanged between partners in the supply chain based on clearly defined roles and rights
- The (human) planner has to be supported by smart IT-solutions for a scenario based planning to draw the right conclusions intuitively
Industry 4.0 – Support system services as one module within a decentralized management

How can IT-systems help to control the decentralized management of the supply chain?

- **Perception and evaluation** of the supply chain and processes to create transparency
  - Comparison of planning results and events
- **Decision** support for an active, target driven and secured action and reaction in real time
  - Integration of optimization and simulation models for a scenario based planning
- **Execution of plans** with tailor made planning and control functions
Logistical Support Systems in Supply Chain Management and their potentials

Logistical Support Systems (LSS)

Real time ability
- Identification
- RFID
- Sensor networks
- Self control
- Actuality
- Transparency

Fast decision
- Simulation
- Optimization
- Order management
- Process times
- Material flow
- Delivery times

convertible
- Evaluation of actual situation
- Measures
- Consequences
- Collaboration

Having always the necessary information

Decide 100 times faster

Shortest time for decision making

Be able to evaluate effects of different measures

Secured, Quantified collaborative realization
Example: Support system for the Supply Chain Execution

Branch: Furniture industry/ SME
Task:
- Development of IT-modules for a decentralized control in the order management
- Implementation on mobile devices
- Development of infrastructural services for the support system

Proceeding:
- Documentation of business processes (use cases)
- Development of methods for order management
- Technology development, integration and validation

Benefits:
- Control services for individual control tasks and as an addendum for the existing ERP-IT
- Autonomy from local IT resources by using Cloud-technology
- Cross department and cross company use of the support system (Webservices)
Short presentation of the project Supply Chain Execution

1. Identification of control points in supply chains
   Development of reference processes for the control of supply chains

2. Development of Premium Services
   Gathering of actual status by connecting of sensors and RFID

3. Logistical Support system (LSS)-Control services
   Connecting the evaluation of actual status and new approaches for control support, implementation of logistical software modules

4. LSS-Framework
   Development of a Service-Infrastructure to combine Services for the control of logistical functions

Plug & Control Center

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Proceeding and results
Technology development & -integration

Logistical support system (LSS) – Control services
Integration of sensor and identification data (Premium Service) with supply chain data (ERP-, SCM-, WMS-Systems) for a real time control of physical material flow processes based on configurable control services:
Industry 4.0 and Supply Chain Management – conclusions

- For the supply chain management there is high potential using information technology for **increasing transparency and quality of information** in the supply chain.

- For the management of supply chains the 4th industrial revolution raises new requirements regarding its organization:
  - Todays centralized structures have to be changed in order to be able to decide locally and fast and flexible
  - All the **organizational implications** of industry 4.0 have currently not been analyzed sufficiently.
Communication connects...

...so does logistics!

Thank you very much for your attention!

Dr. Sevket Akinlar

phone: +49 231 9743 133
email: Sevket.Akinlar@iml-extern.fraunhofer.de
Fraunhofer IML
Department Supply Chain Engineering