papiNet enabling Industry 4.0 for the Forest and Paper Industry

Brussels
19 November 2015
Outline

• Industry 4.0 Overview
• Why standards?
• About papiNet?
• Use case Forest
• Use case Pulp
• Use case Paper
Third Industrial Revolution

Mechanization of production using water and steam power

1780-1810
Second Industrial Revolution

Mass production with the help of electric power

1880-1890
Digital communication technologies to automate production

1950-1990
Fourth Industrial Revolution

Interconnected systems for smart production

Industry 4.0
Mass customization
Smart factory
Cloud
Flexible production
Self-optimization
Intelligent networks
Connection
POWERLINK
The goal of Industry 4.0 is the **smart and connected factory** with Internet of Things and Cyber Physical Systems as technology basis.

**Internet of Things (IoT)** is the interconnection of uniquely identifiable embedded computer devices (smart objects) within the internet infrastructure.

**Cyber Physical Systems (CPS)** are systems using computations and communications deeply embedded in and interacting with physical processes.
1. Context-sensitive Component Behaviour
2. Dynamic Adaptation Based on Individual Role of the Component

Networked Manufacturing
Concept of Industry 4.0 is to interconnect machines, sensors and control systems together via intelligent networks to achieve:

- **Dynamic response to product demands**, enable rapid manufacturing of new products
- **Real time optimization** of manufacturing production and supply chain networks
- **Strong customization of products**, mass customization
- **Self optimization**, self configuration, and self diagnosis
- **Active support of the manufacturing process by smart products** themself
Standardization as a prerequisite for Industry 4.0

Industry 4.0 will involve networking and integration of several different companies through value networks.

This collaborative partnership will only be possible if a single set of common standards is developed.

Open communication standards
Key to success for Industry 4.0

http://www.forschungsunion.de/pdf/industrie_4_0_final_report.pdf
Why Standards?
The Approach

- XML definition
  - by W3C

- Business process definition
  - Data dictionary
  - by papiNet

- Gaining intrinsic value
  - by companies
About papiNet
papiNet is...

- An enabler for collaboration, information sharing, process improvement and shared decision making
- The opportunity to improve processes across the entire supply chain network

Not an electronic marketplace!

Not a software!
Standards are **fundamental** to an efficient supply chain:
- Enable timely, efficient and effective communications
- Avoid costly non-value added translation activities
- Enable fast and widespread connectivity
- Avoid “one-off” custom connections
papiNet Assets

- Complete Set of XML Designs for the Forest and paper industry
- Extensive Documentation
- eDocuments

Open communication standards
Key to success for Industry 4.0
Gaining Value by Analyzing Big Data

Perceived Value

Intrinsic Value

Critical Data to improve:

- Transactional Efficiency
- Multiple handling
- Waste
- End-to-end cycle-time
- Damage
- Process Delays
- Excess freight
- Waiting times
- Inventory turns
- Warehouse fees
- Load fill rate
- Late Deliveries
- End-to-end cycle-time
- Inventory turns
- Load fill rate
- Warehouse fees
- Late Deliveries
- Transactional Efficiency
Use Case Forest QR codes

SKOG-DATA AS
Use Case Forest QR codes

- Standard on all way bills for FWS
- QR-code presented on paper and smartphones / pads
- Speeds up measuring process and reduces error rate
- New project for automatic measuring of chips by scale
  - Scan QR-code, weigh and produce Measuring Ticket
  - Web-cam photo for control
Use Case Pulp RFID

Metsä Fibre RFID identification of pulp units
Metsä Fibre RFID solution overview

- Metsä Fibre mills apply RFID tags to pulp units on packing line
  - [https://www.youtube.com/watch?v=hQ6F_FQoGsI](https://www.youtube.com/watch?v=hQ6F_FQoGsI)

- RFID Identification is used to identify pulp units at (earlier units where tallied manually)
  - Metsä Fibre mills when moving units from packing line to mill warehouse
  - Metsä Fibre mills when loading outbound deliveries to loading port or customer
  - Loading ports when loading break bulk shipments or stuffing containers
  - Customer before pulp is used in production of product requiring pulp

- papiNet xml is used for integrating process against logistics partners and customers
### Use Case Pulp RFID

#### Metsä Fibre RFID solution overview

<table>
<thead>
<tr>
<th>Type of RFID tag</th>
<th>Image of RFID tag</th>
</tr>
</thead>
</table>
| - GS1 UHF EPC Gen2 standard with minimum 96bit EPC memory ([http://www.gs1.org/gsmp/kc/epcglobal/uhfc1q2](http://www.gs1.org/gsmp/kc/epcglobal/uhfc1q2))<br>- RFID passive tag with a read range of appr. 2 meters<br>- Benefits compared to barcode  
  - No line of sight needed for identification
  - Several units can be identified simultaneously
  - Not as vulnerable to dirt & physical damage as barcode | **RFID tag**

<table>
<thead>
<tr>
<th>RFID tag on pulp bales</th>
<th>Image of RFID tag applicator&lt;br&gt;<strong>RFID tag placement on pulp unit</strong></th>
</tr>
</thead>
</table>
| - GS1 EPC Tag Data Standard (TDS), SGTIN-96 encoding, is used for RFID data contents [http://www.gs1.org/gsmp/kc/epcglobal/tds/](http://www.gs1.org/gsmp/kc/epcglobal/tds/)  
- RFID tag is applied to pulp unit on packing line, inserting it between bales, close to edge for reading optimization and to ensure tag isn’t damaged during handling by forklifts or during transportation  
- RFID tag is destroyed completely in pulping process, no need to remove before pulp is used | **RFID tag applicator**<br>**RFID tag placement on pulp unit**

<table>
<thead>
<tr>
<th>RFID reading equipment</th>
<th>Image of reading equipment</th>
</tr>
</thead>
</table>
| - RFID reading can be done using several types of equipment, i.e. using  
  - Gate readers  
  - Fixed readers on needed locations  
  - Reader & antennas fixed to fork lifts  
  - Handheld readers | **Gate readers**<br>**Fixed reader on conveyor**<br>**Clamp truck reader**<br>**Handheld scanner**

Metsä Fibre RFID solution technical infrastructure

**Metsä Group ICT services**
- MF SAP
- papiNet XML

**Metsä Fibre pulp mills**
- MF mill packing line RFID applicators and gate readers
- MF mill fork lifts with RFID reader

**Partner IT system**
- Fork lifts with RFID reader
  - papiNet XML

**Logistics partners**
- Handheld RFID reader

**Customers**
- Customer RFID gate readers

**Metsä Group**
1. Use scorecard and feedback metrics to measure paper performance on press

2. Paper supplier used data to change how paper was produced

3. Resulting paper ran better on press, reducing waste, delays and web break penalty charges
15 years ago....
Today....
Mobile changed the world
Future Winners
The intelligent choice.....papiNet

Efficiency throughout the entire supply chain

papiNet enables your organization to take cost out of the supply chain by using standardized e-documents. Learn more about how papiNet can help you.