WORKSHOP 4.3: PI READINESS OF WAREHOUSE TECHNOLOGY

IPIC 2017

DR. MAX WINKLER / JULY, 2017

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WHAT ARE WE TALKING ABOUT?

PI:= Physical Packet +
Information Packet

Communication between PI objects
and warehouse equipment

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IS TODAY‘S WAREHOUSE PI READY?

PI Readiness

IT Integration from ERP to the machine / equipment

Communication and Co-ordination of Controls

Internet-Technologies and PI / Internet-of-Things

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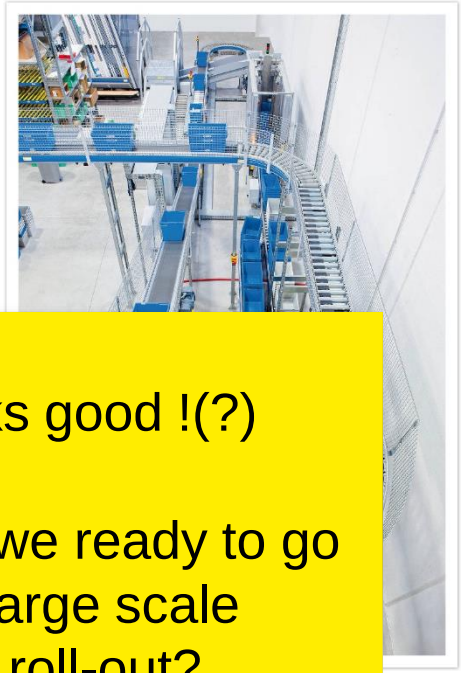

Looks good !(?)

So, are we ready to go for large scale PI roll-out?

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THE CHALLENGE

Well, there is this small challenge left…

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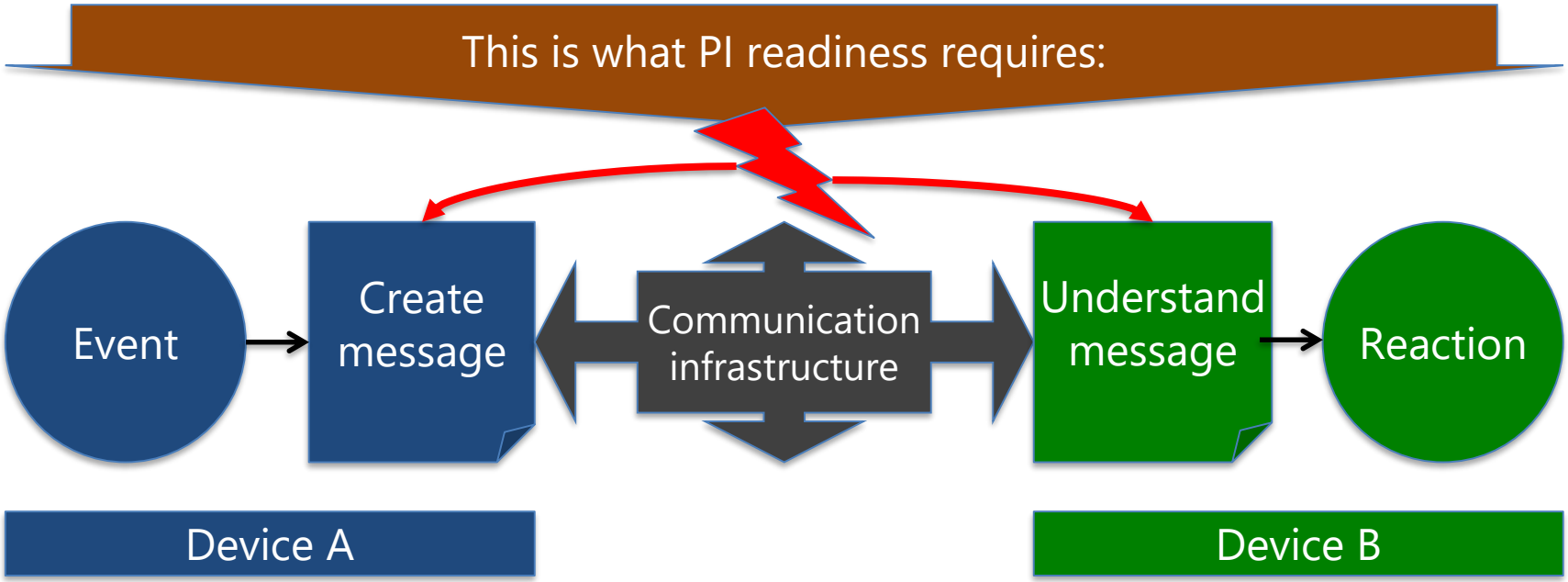
WHAT IT MEANS TO COMMUNICATE



PI := COMMON LANGUAGE

- Shared communication technology (e.g. Internet Technology)
- Common language (vocabulary, grammar)
- Common understand of expected reaction (Example: „Do you know the time?“)

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THANK YOU !

IPIC 2017

Dr. Max Winkler

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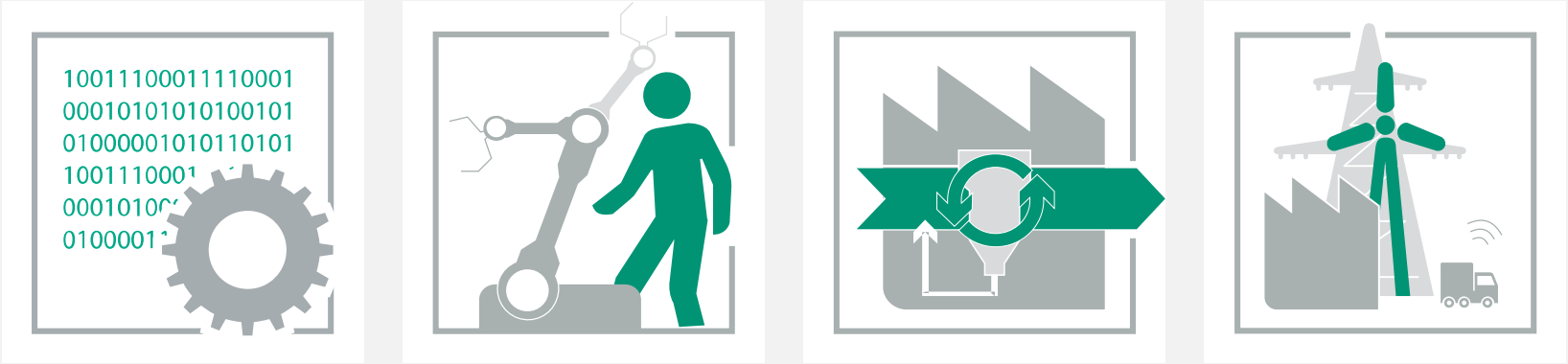
WEARABLE SOLUTIONS FOR EFFICIENT MANUAL LOGISTICS PROCESSES

Olaf Poenicke

Graz, July 05, 2017



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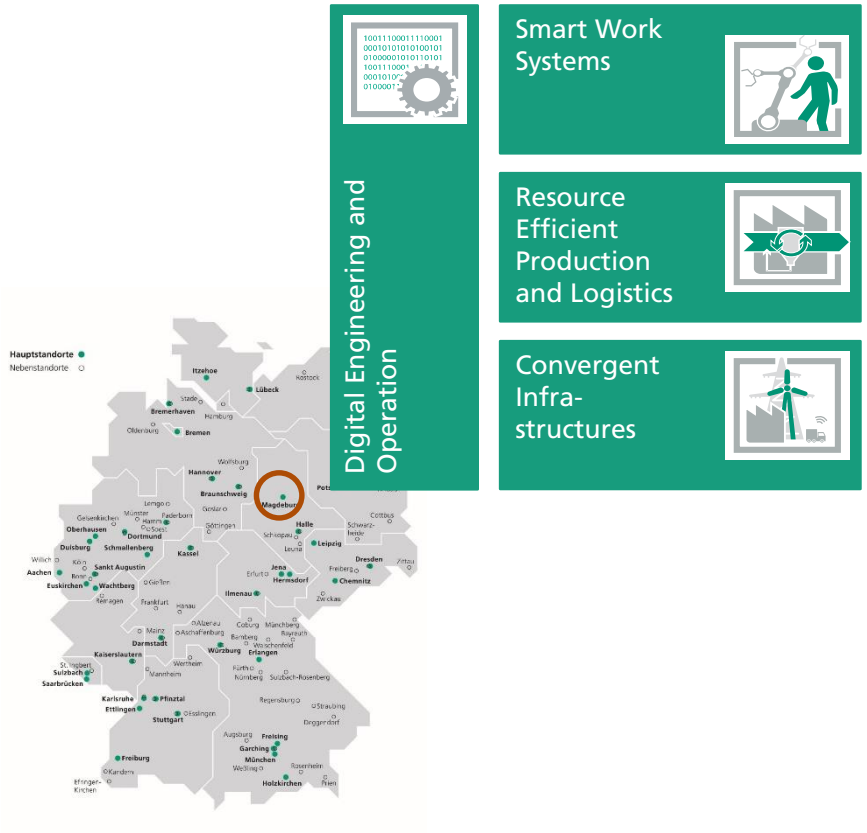
OVERVIEW

1. Fraunhofer IFF on one slide
2. Wearable Assistance using the RFID-Wristband
3. Wearable Assistance using Smart Glasses
4. Integrated Wearable Solution (Project AR-LEAN)
5. Relevance of Wearables for the Physical Internet

Fraunhofer IFF on one slide
Applied Research from Magdeburg

- The Fraunhofer Institute for Factory Operation and Automation IFF in Magdeburg was founded in 1992
- Today it is one of more than 60 Fraunhofer Institutes in Germany
  - IFF is part of the Fraunhofer Cluster Production
- At IFF more than 150 employees are researching and developing reliable technologies and solutions for efficient, sustainable and interconnected manufacturing



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Wearable Assistance in Logistics and Manufacturing
Motivation

- The practice in many manufacturing and logistics companies:
  - A **multitude of individual manufacturing steps** are performed for a product per workstation.
  - Since there is demand for a variety of products and models, **different products** are manufactured at one workstation. In logistics processes the variety of these products needs to be handled without picking and putting errors.
  - The demands on workers' **flexibility** are increasing steadily and demands for **accuracy and productivity** are rising at the same time.
- **Wearable Assistance Solutions provide high potential for efficient and accurate processes!**
  - Context visualization
  - Work step verification

From what area / location do I pick a product / part?

What products / parts should I pick? Did I pick the correct part?

Have I chosen the right storage location?

Wearable Assistance using the RFID Wristband
Overview

The **RFID-Wristband**, a mobile RFID reader worn directly on the wrist, makes it possible to:

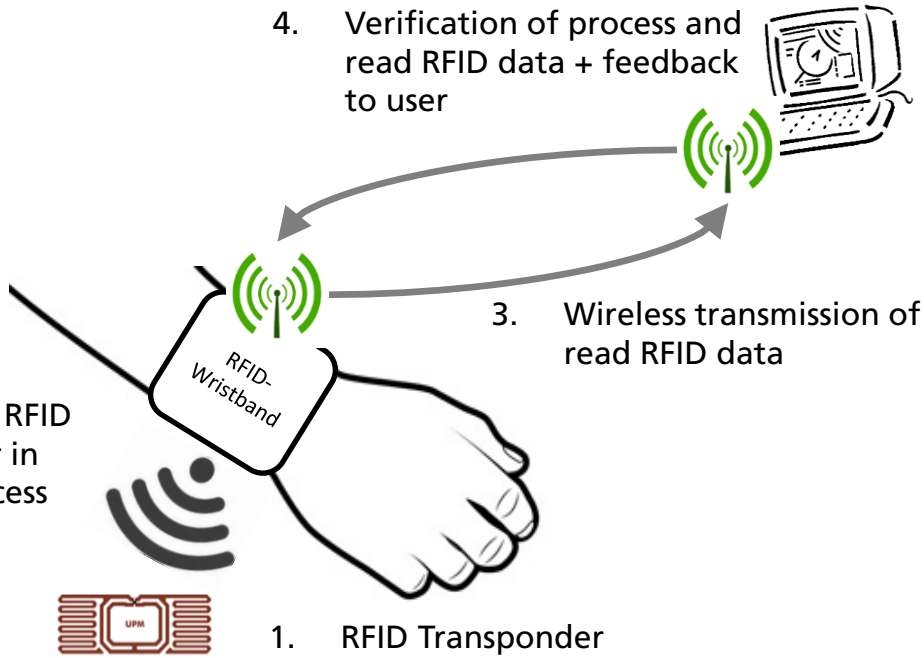
- identify objects tagged with UHF-RFID automatically in process with “free hands”
- exchange read data and job data through wireless interfaces (e.g. ZIGBee)
- give user feedback via LED and acoustic signals
- build assistance solutions (e.g. in combination with pick-by-vision etc.)

✓ **With its low weight and individual straps for single users the RFID-Wristband is highly ergonomic.**

Specification	
Frequency (ETSI)	865,6 bis 867,6 MHz
RFID Standards	ISO 18000-6C EPCClass1Gen2
Power Output	0-15 dBm
Read Range	up to 40 cm
Battery Capacity	up to 2200 reads
Weight	116 g

Wearable Assistance using the RFID Wristband

Overview



4. Verification of process and read RFID data + feedback to user

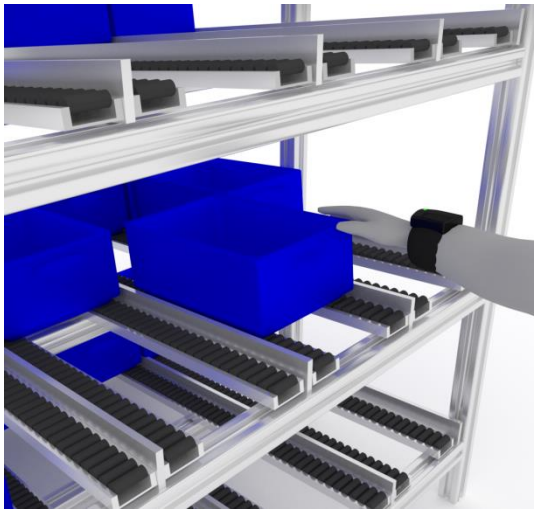
3. Wireless transmission of read RFID data

2. Scanning of RFID transponder in manual process

1. RFID Transponder
   - in a picking area
   - on a box
   - on a part
   - on a tool
   - ...

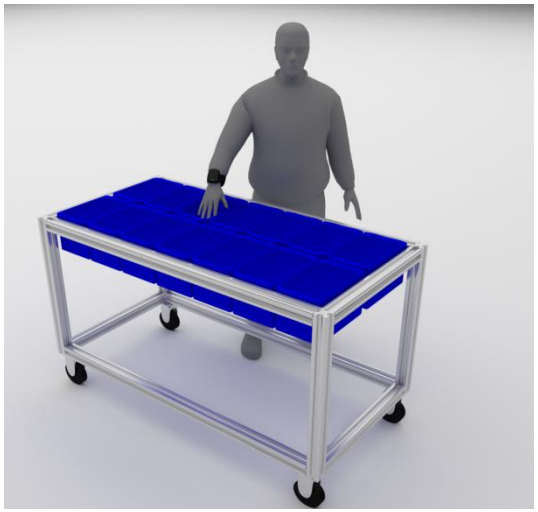
Wearable Assistance using the RFID Wristband

Typical Use Cases



- **Verification of material supply deliveries**
- ✓ Application for C-Parts-Management (verification of container and storage position)
- ✓ Verification and feedback within handling process

- **Automated confirmation of pickings**
- ✓ Applications for KANBAN racks, order picking and assembly workplaces
- ✓ More efficient and more reliable compared to classic barcode verification



- **Verification of sorting processes**
- ✓ Application for order picking trolleys
- ✓ Verification and feedback within handling process

Wearable Assistance using Smart Glasses
Overview

- Smart Glasses are used to enrich the process context with **Augmented Reality** information
- Smart Glasses like Google Glass or Vuzix provide **Assisted Reality** contents
  - Concepts for Assisted Reality are ergonomically feasible
- Ubimax is project partner of Fraunhofer IFF for the development of integrated Wearable Solutions
  - Ubimax is the European market leader for Smart Glass based solution development

Wearable Assistance using Smart Glasses
Overview

UBiMAX

- Smart Glasses can be used in various manual operations providing assistance along the value chain

- The Assisted Reality application provide online or offline context information and are synchronized with IT systems like ERP
- The Smart Glasses operate as integrating device with other wearables or sensing devices connected via Bluetooth or Wifi

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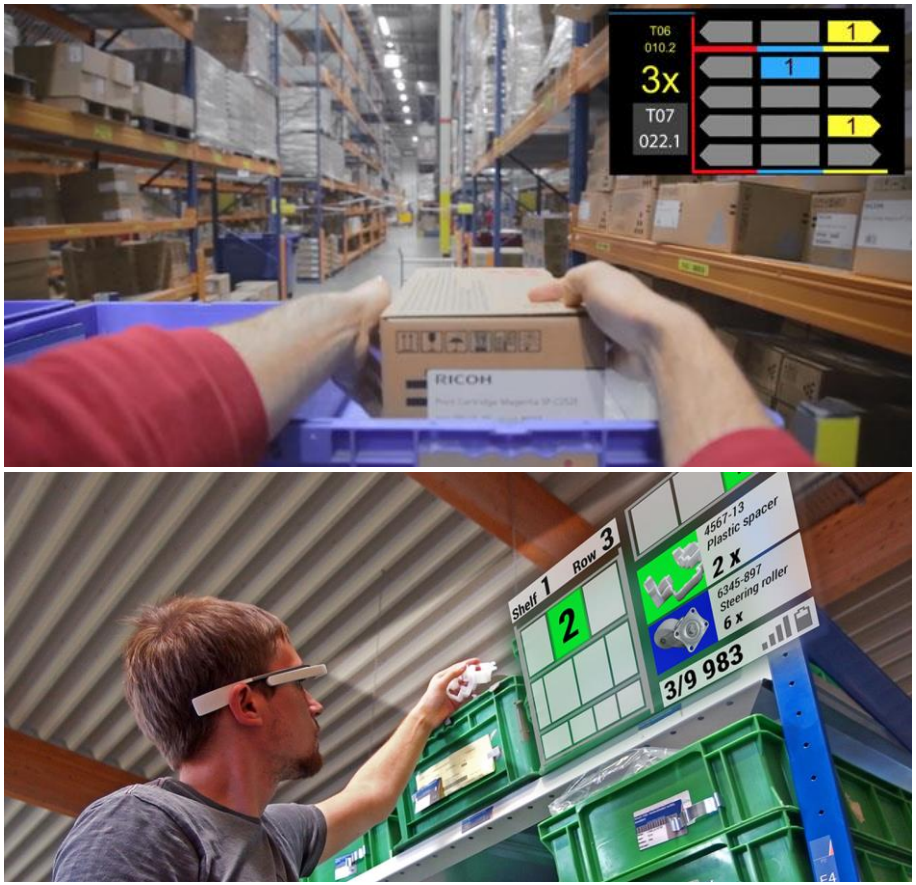
Wearable Assistance using Smart Glasses
Applications

- The Warehousing solution XPick of Ubimax proved the efficiency potential of Head-Mounted-Displays as it was scientifically evaluated (Guo et al., 2015; Baumann, 2013)
  - +25% Speed at DHL
  - +22% Speed and +10% Accuracy at Samsung
  - +20% Speed at Daimler
  - +29% Speed at Intel (using Smart Glasses together with barcode ring scanner)



Wearable Assistance in Logistics and Manufacturing
Benefits

- The use of Wearables like Smart Glasses or the RFID-Wristband offers various benefits for industrial applications in logistics and manufacturing processes

Higher Speed

Both hands free for main task

Seamless Integration of digital and real world

Data and interaction always available

Fewer Errors

Innovative graphical User Interfaces

Step-by-Step Workflow Confirmations

Context Awareness and Integrated Sensors

Greater Flexibility

No fixed installations required

User and task specific user interface

Integrated Wearable Solution
Project AR-LEAN

Smart Glasses

- ✓ Compute job orders and information of RFID Wristband
- ✓ Visualize current job orders (e.g. picking) and feedback information
- ✓ Trigger RFID reading

RFID-Wristband

- ✓ Automatically identifies picked objects or picking locations
- ✓ Gives verification feedback at Wrist
- ✓ Can be used as input trigger for Smart Glass operation

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Integrated Wearable Solution
Project AR-LEAN

- Within the project AR-LEAN following main goals are focused
  - Development of RFID-Wristband with BLE interface for direct communication with Smart Glasses
  - Development of an integrated application for logistics operation like picking + placing
  - Evaluation of the integrated solution in productive logistics use cases
  - Evaluation of interaction of wearables with smart containers
- The project is funded by the BMWi on German national level (reference 16KN045445)
- On international level AR-LEAN is ranked as EUREKA project

EUREKA innovation across borders

ZIM Zentrales Innovationsprogramm Mittelstand

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Relevance of Wearables for the Physical Internet
Interacting with Smart PI Containers

Even with the Physical Internet in place manual handling of containers will remain crucial!

Wearable assistance solutions can be helpful in various scenarios:

- **RFID-based identification of PI containers** – Standardized PI containers can be identified by the RFID Wristband in manual handling processes where automation is not feasible but process reliability needs to be secured
- **AR context information about PI containers** – PI containers with a higher smartness level can directly communicate with HMD applications via wireless communication to provide process related context information
- **Interaction of other wearables with PI containers** – as PI containers will provide wireless interfaces, also other wearables like smart watches can come into focus for process control interaction. Wearables can be used as control and decision support devices – e.g. to assign single PI containers to follow-up processes.

Thank you for your attention!

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