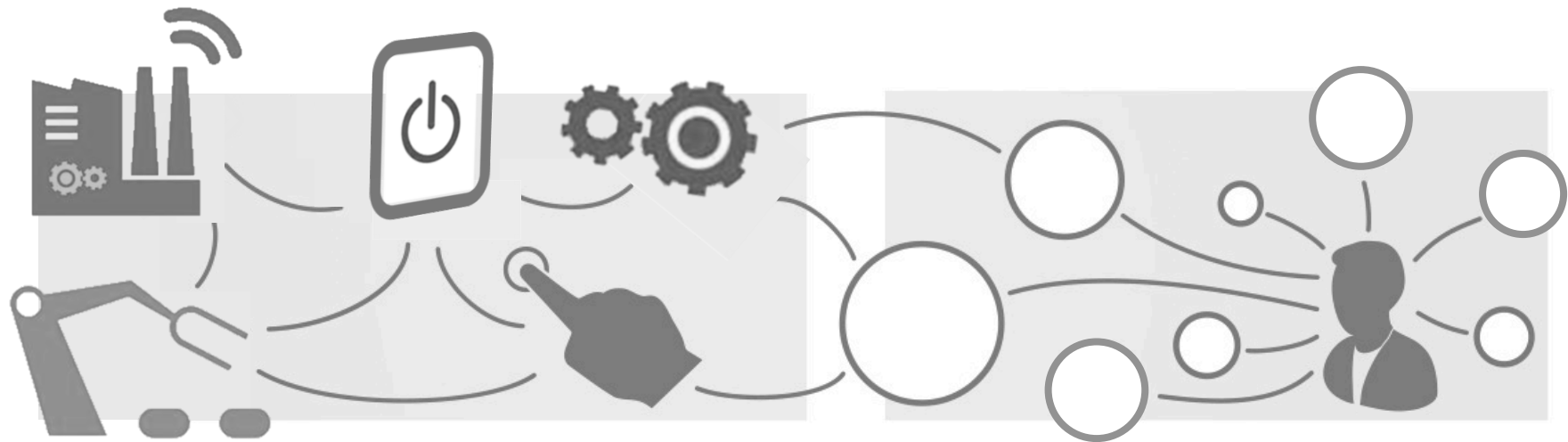




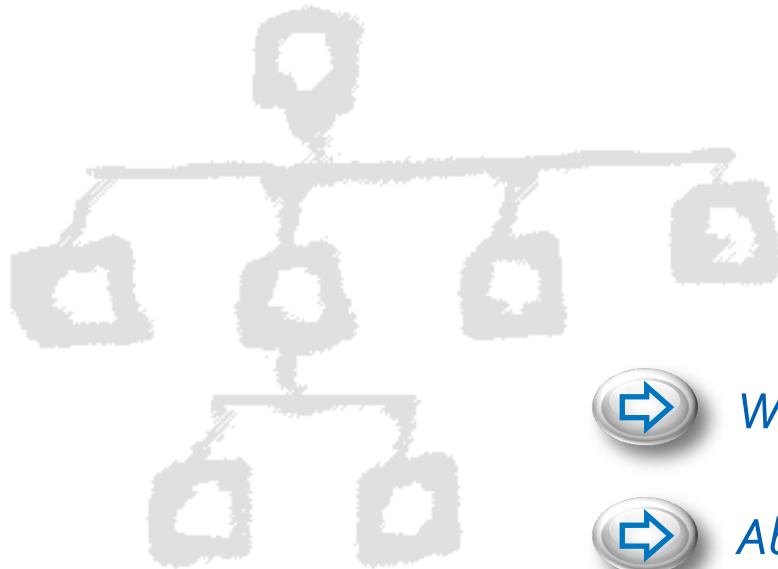
## Industrie 4.0

# Smart Services for a new Generation of co-creative Production

Andreas Dengel@

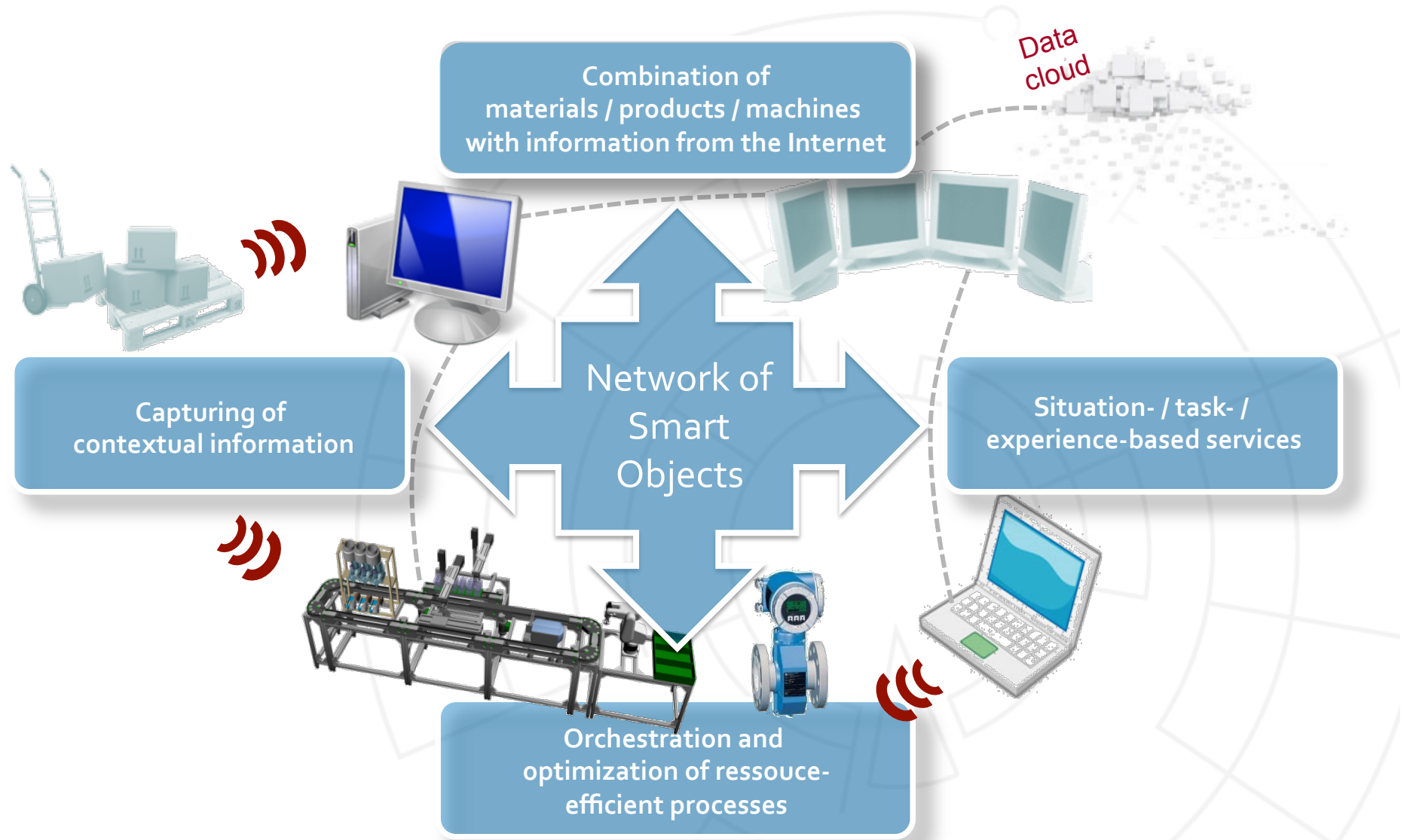


# Agenda

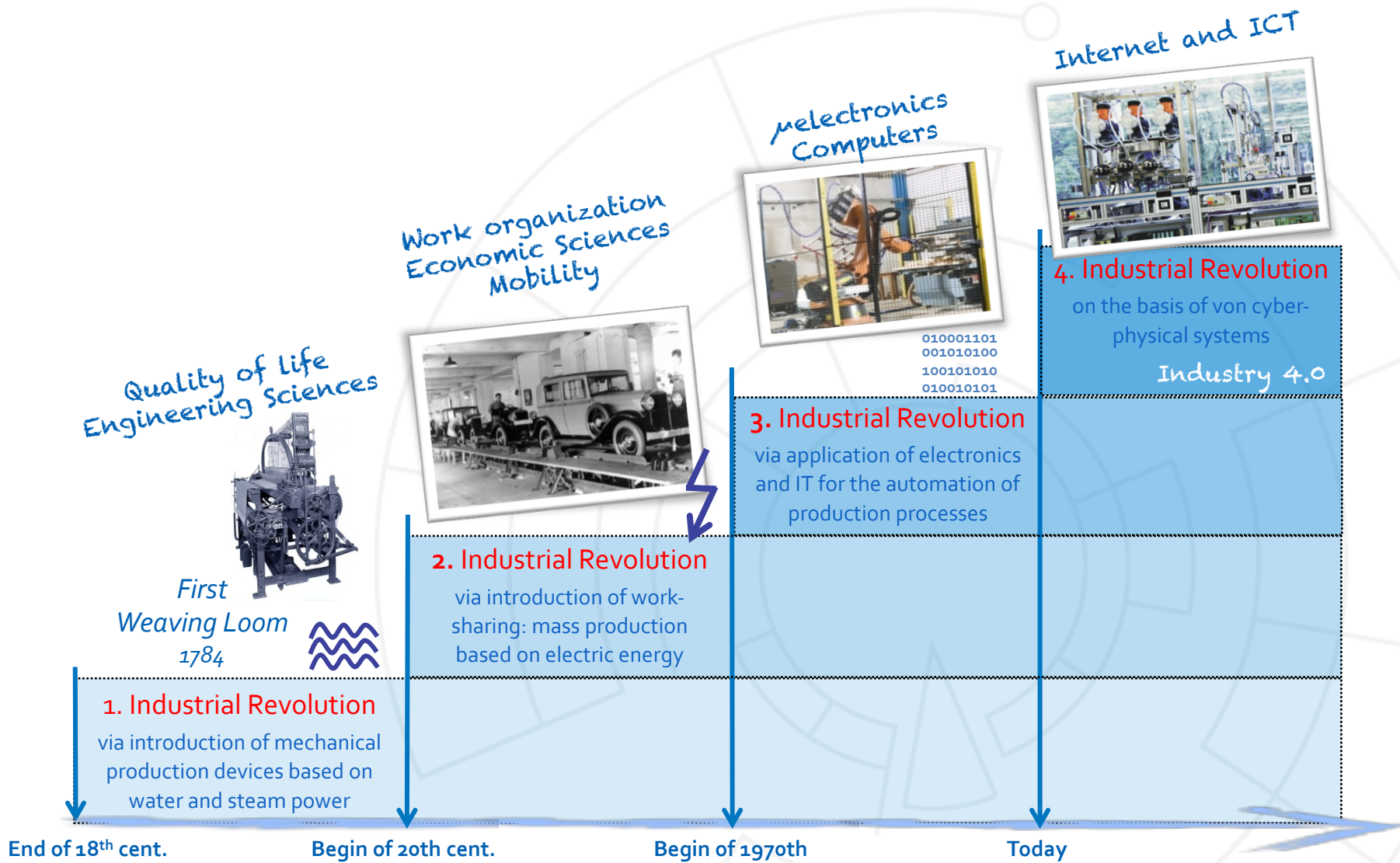


- ➡ *What is Industrie 4.0?*
- ➡ *About Smart Components and Smart Machines*
- ➡ *The Smart Factory<sup>KL</sup> @ DFKI*
- ➡ *Towards Digital Taylorism*
- ➡ *From Hindsight to Insight to Foresight*

# The „Internet of Things“ is entering the factories



# From the first industrial revolution to Industry 4.0

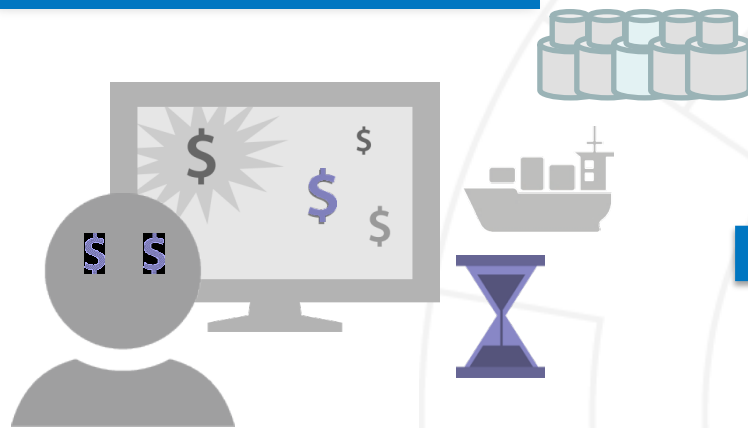




We have to rethink production because the paradigm of customers is changing!

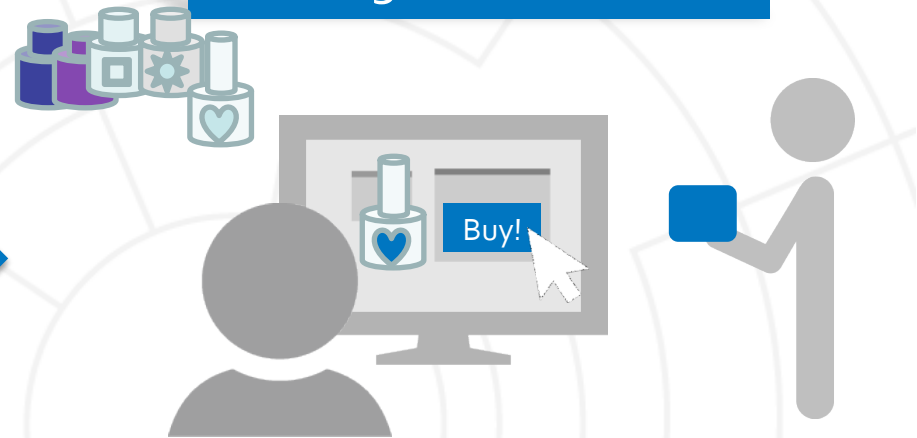


Paradigm of the past



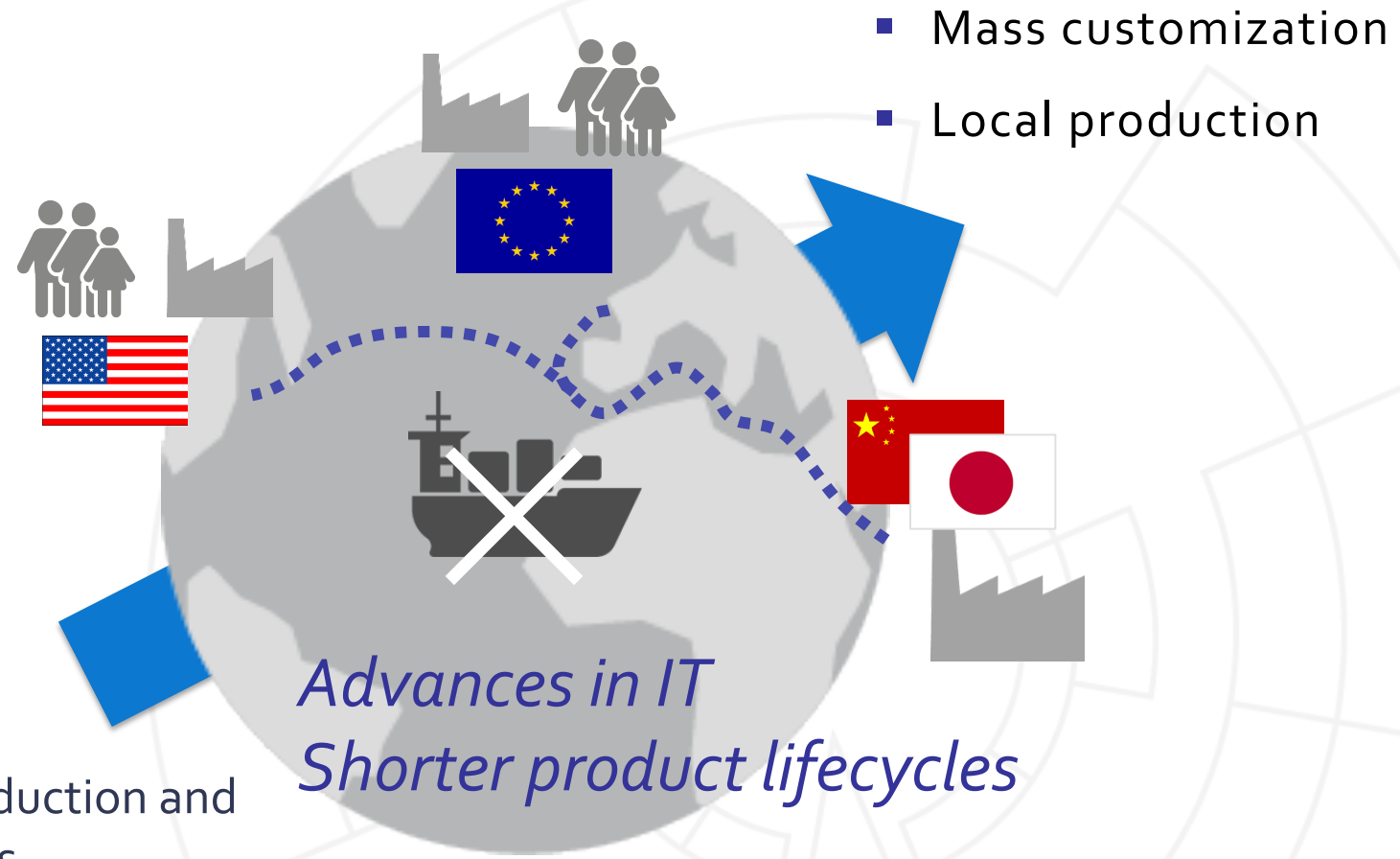
*cheap, cheaper, cheapest!*

Paradigm of the future



*Order by a mouse click  
get YOUR product tomorrow!*

# The new developments in IoT and Industrie 4.0 lead to a reshoring of production



- Mass customization
- Local production

- Mass production and low wages
- Long delivery times

*Advances in IT  
Shorter product lifecycles*

*Leading to a new world economic structure?*



Industrie 4.0 means digitalization and networking of all processes, products and resources



Pervasive Engineering



Internet of Things



It's not a standard

Big Data



INDUSTRIE 4.0

Smart Products



It's not clearly defined

Virtual & real world



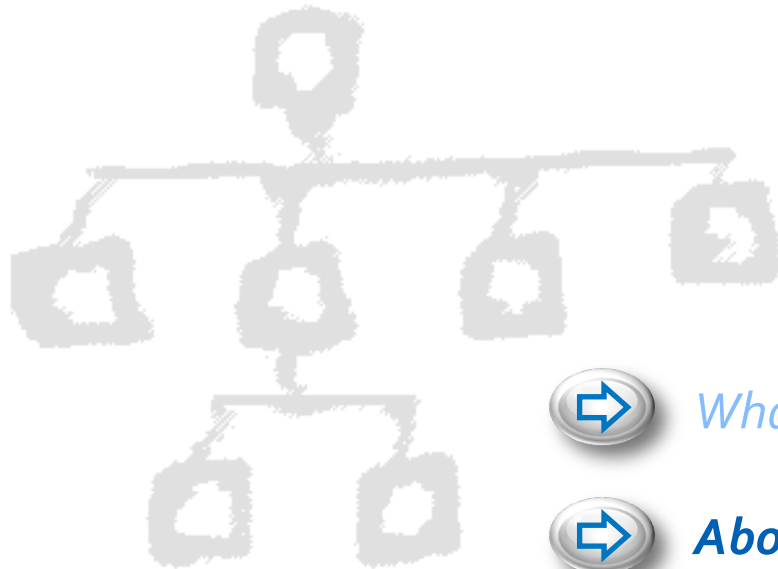
Human & work



Standardized Interfaces



# Agenda



*What is Industrie 4.0?*



***About Smart Components and Smart Machines***



*The Smart Factory<sup>KL</sup> @ DFKI*

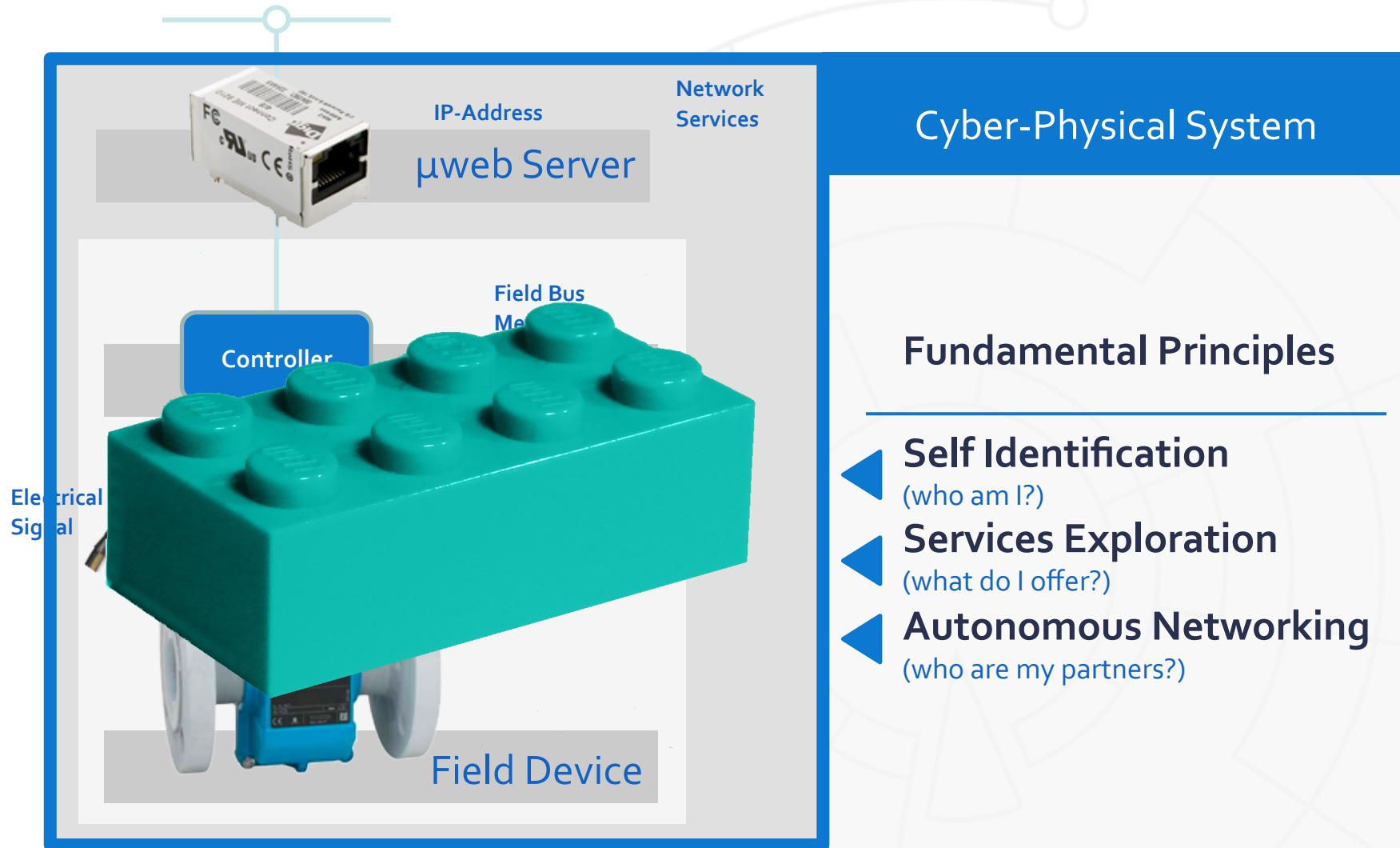


*Towards Digital Taylorism*



*From Hindsight to Insight to Foresight*

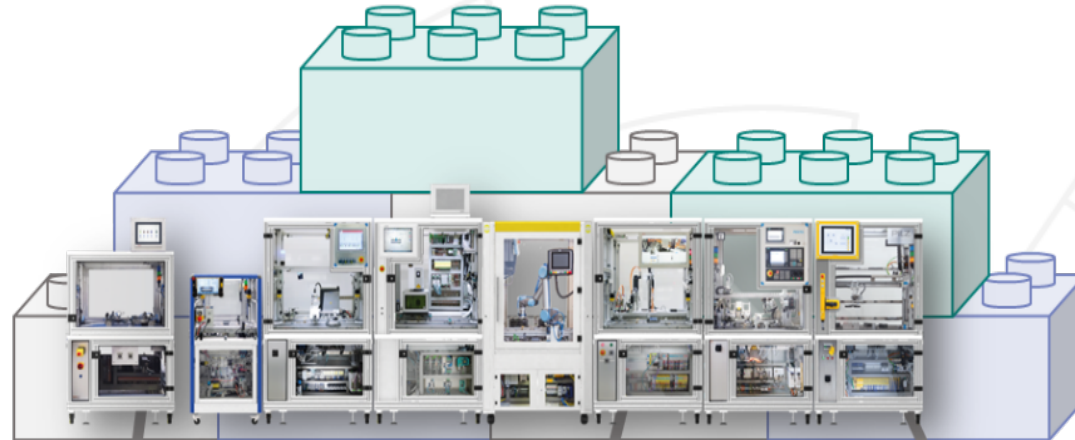
# Towards smart components ...



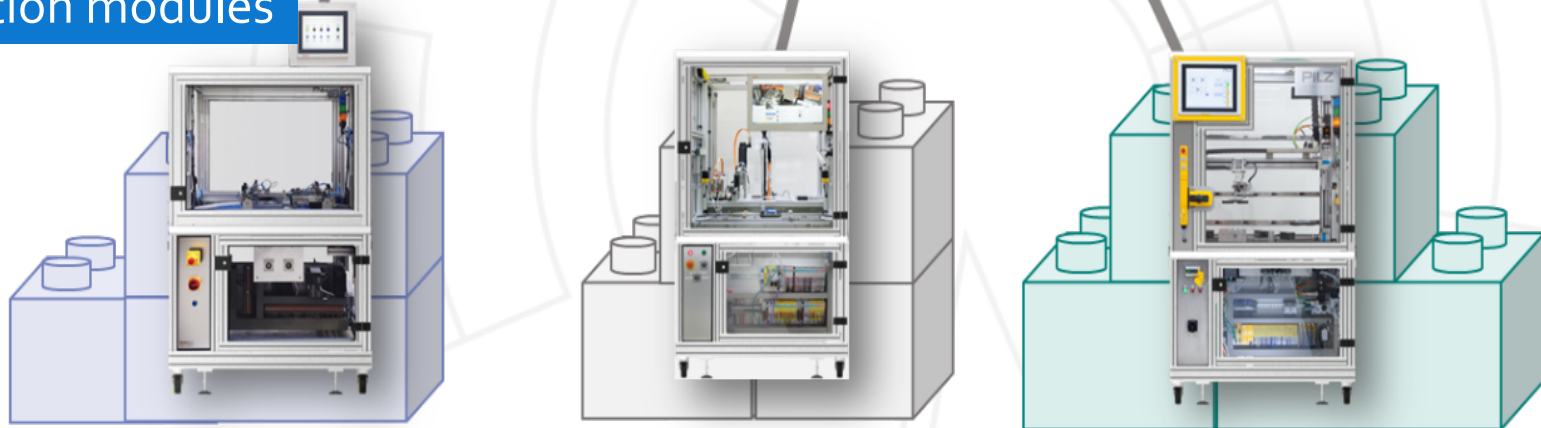
As a result we receive a modular agile factory kit



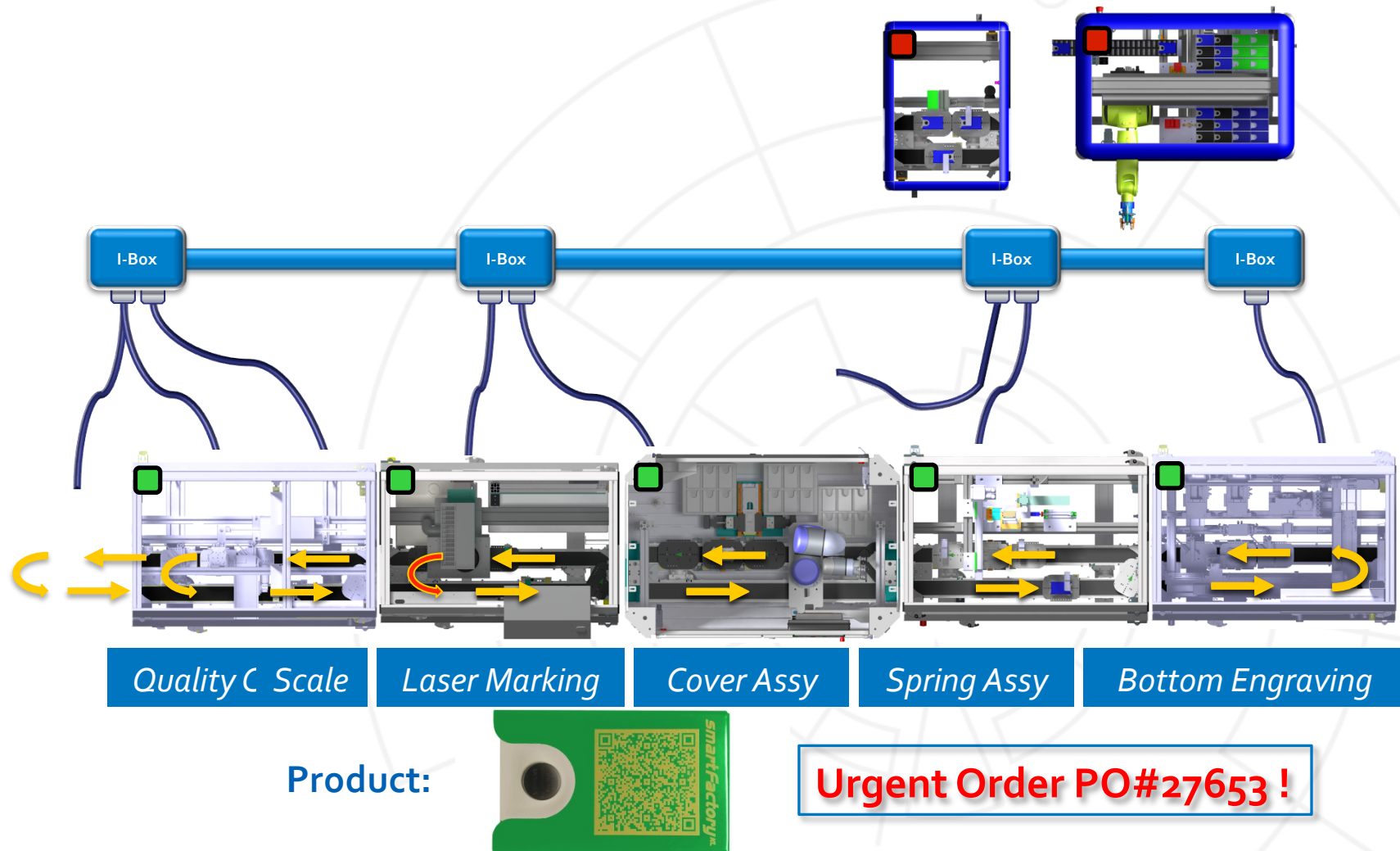
Production line



Production modules

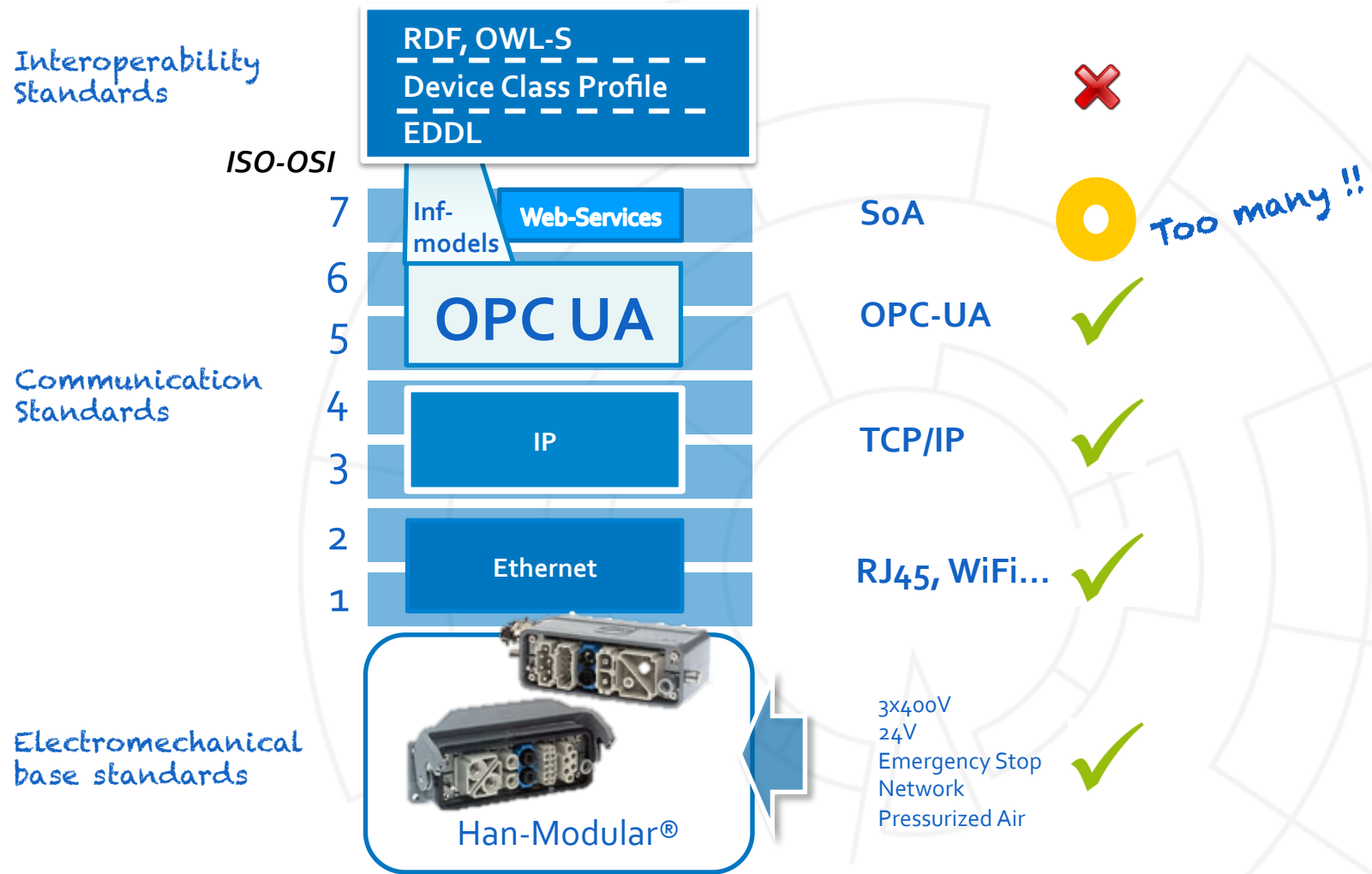


In particular, the SmartFactory<sup>KL</sup> will demonstrate an innovative „Plug & Play“ Scenario

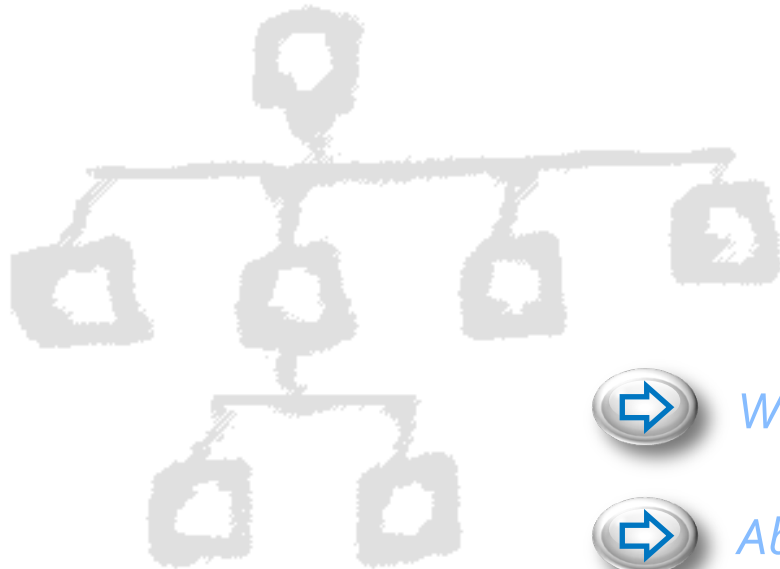




# Different state in standardization is still revealing some challenges



# Agenda



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The *smartfactory*<sup>KL</sup> is the largest and most popular independent research and demonstration center for INDUSTRIE 4.0 technologies

**smartFactory**<sup>KL</sup>

**organized as a registered non-profit association**

**we Learn Work Build Present together**



- Certification Organizations
- Security Providers
- Component Manufacturer
- Software Providers
- Network Providers
- Research Organizations
- Marketing Organizations
- Users

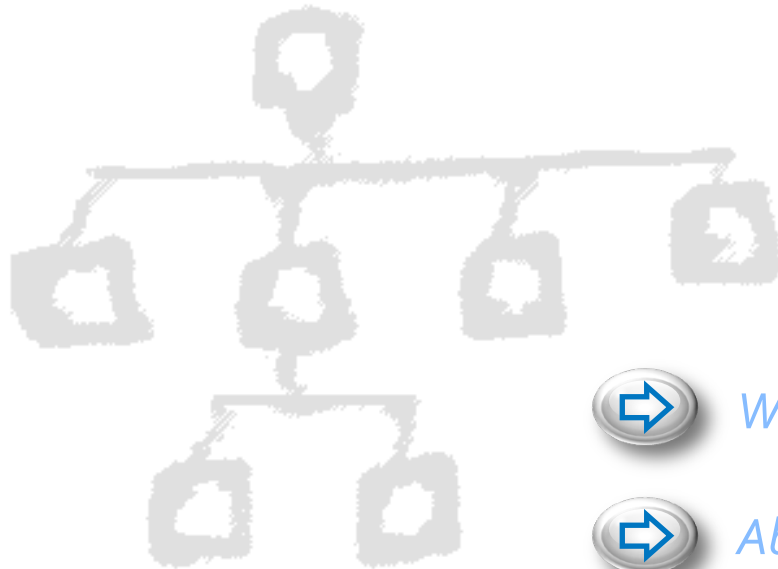
The *smartfactory*<sup>KL</sup> has 47 members some of which are international



# The new generation of the SmartFactory<sup>KL</sup>



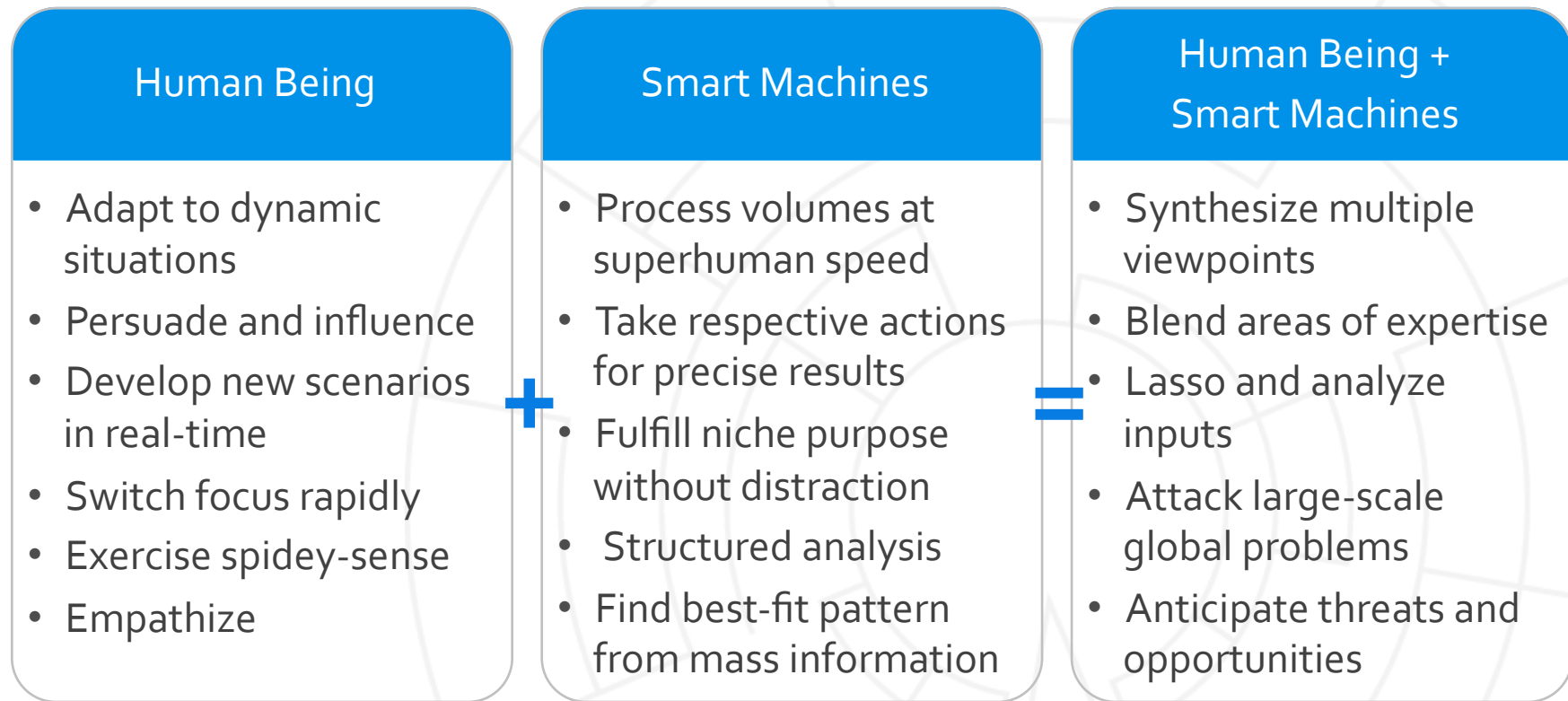
# Agenda



- ➔ *What is Industrie 4.0?*
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# Digital Taylorism addresses the shift from cooperative via co-dependent to competitive\*

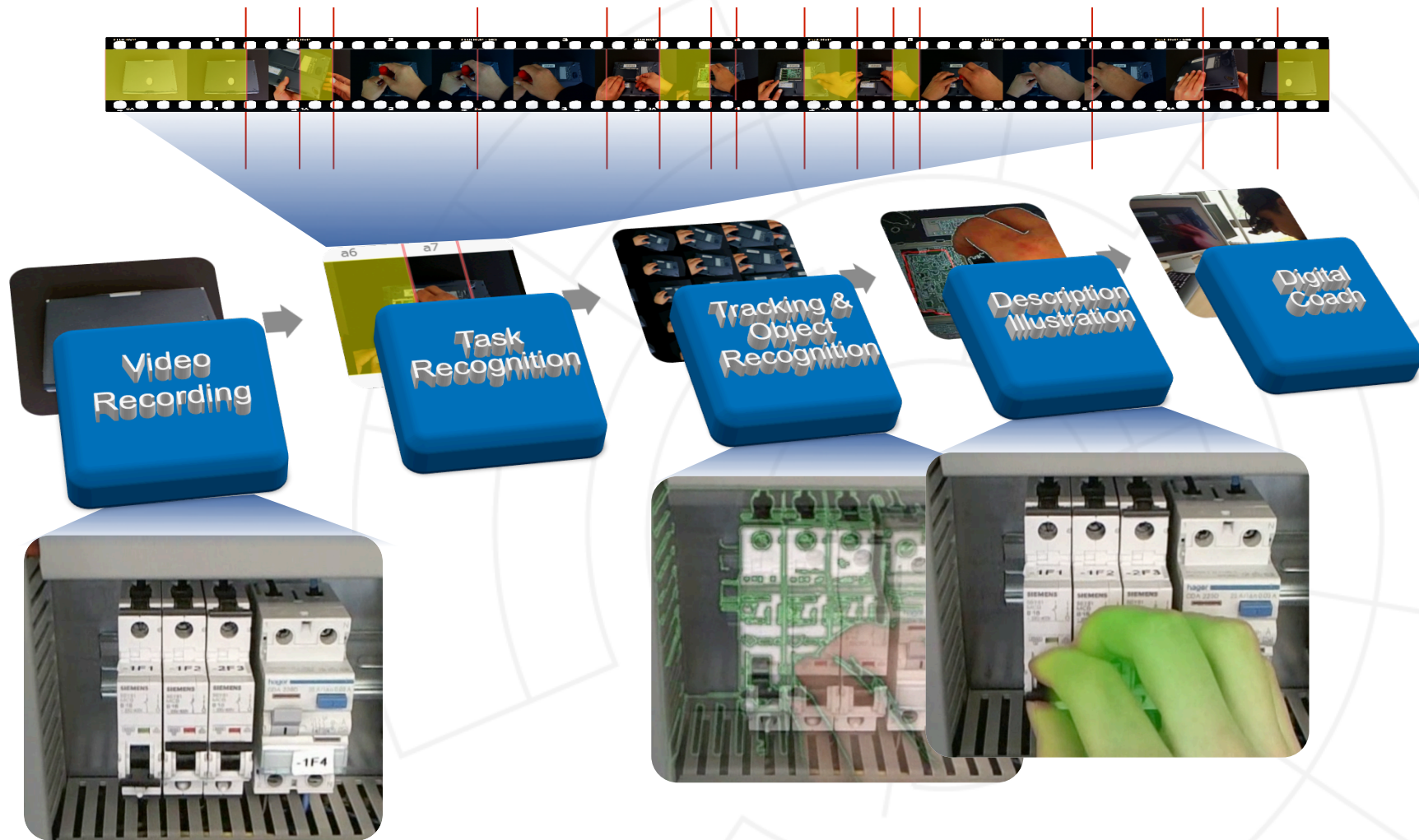




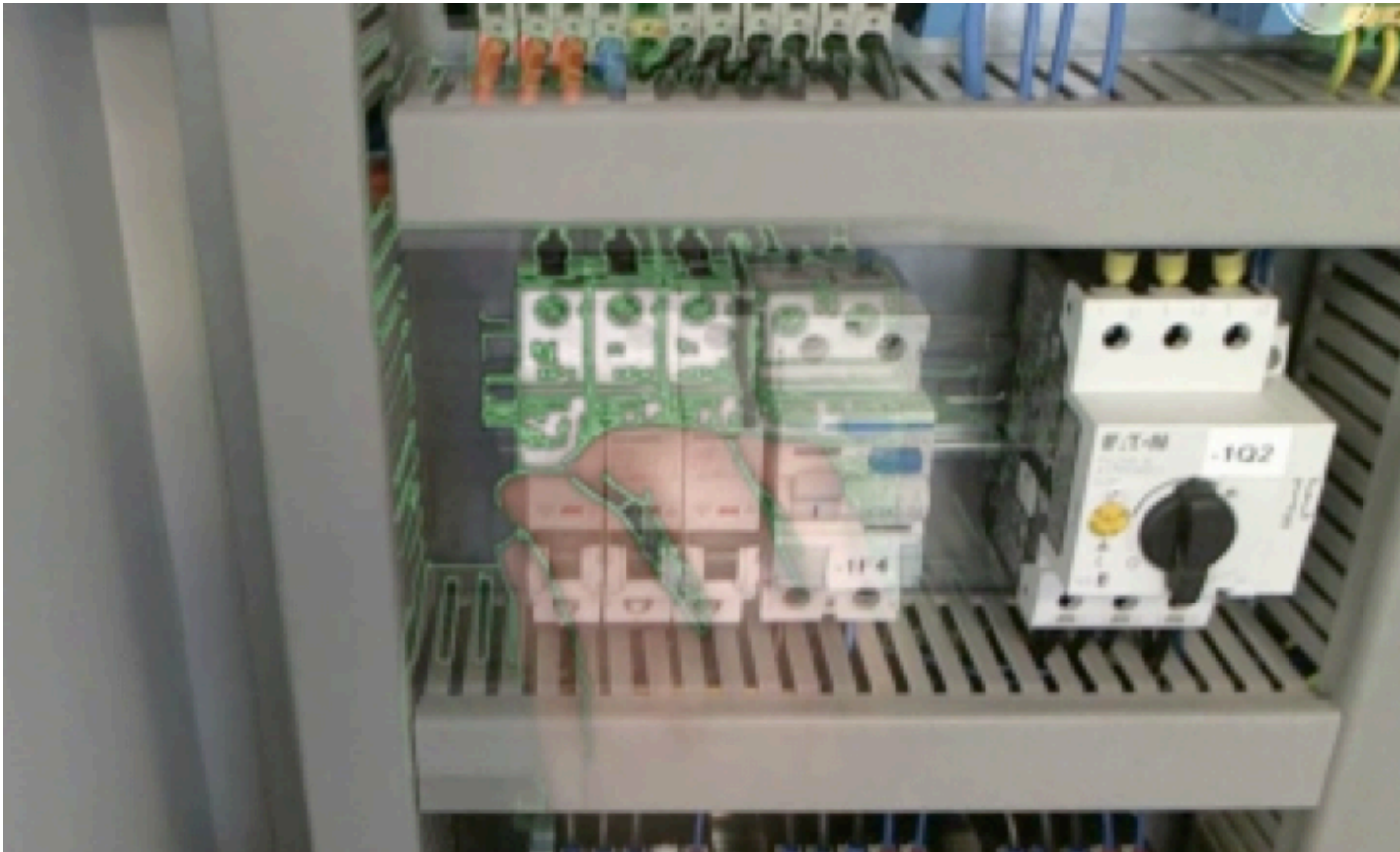
By measuring visual and embodied attention, digital companions may learn from experts but also teach how to do things



# Best Practices are recorded, analyzed and semi-automatically annotated



How does it look like in practice?



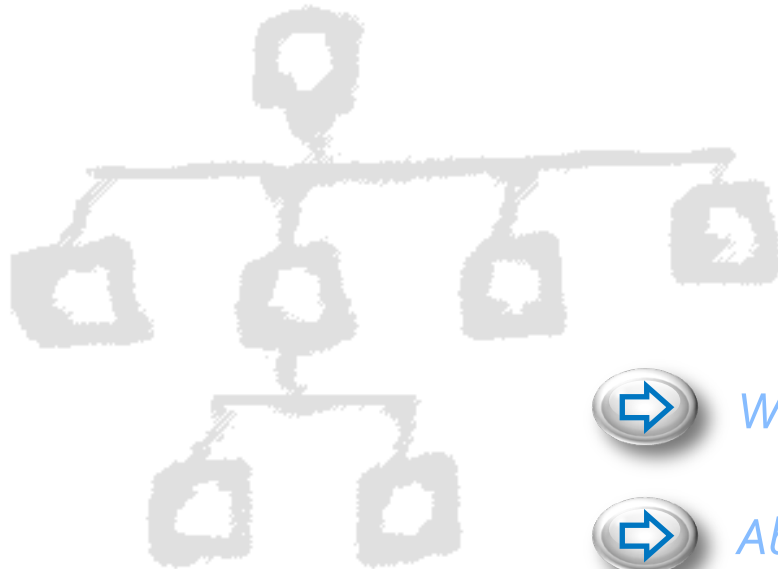
We may extend this idea to different environments (I)



*Towards Attention-Based  
Vision Systems!*



# Agenda



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The many data produced by IoT reveals new business options for smart services

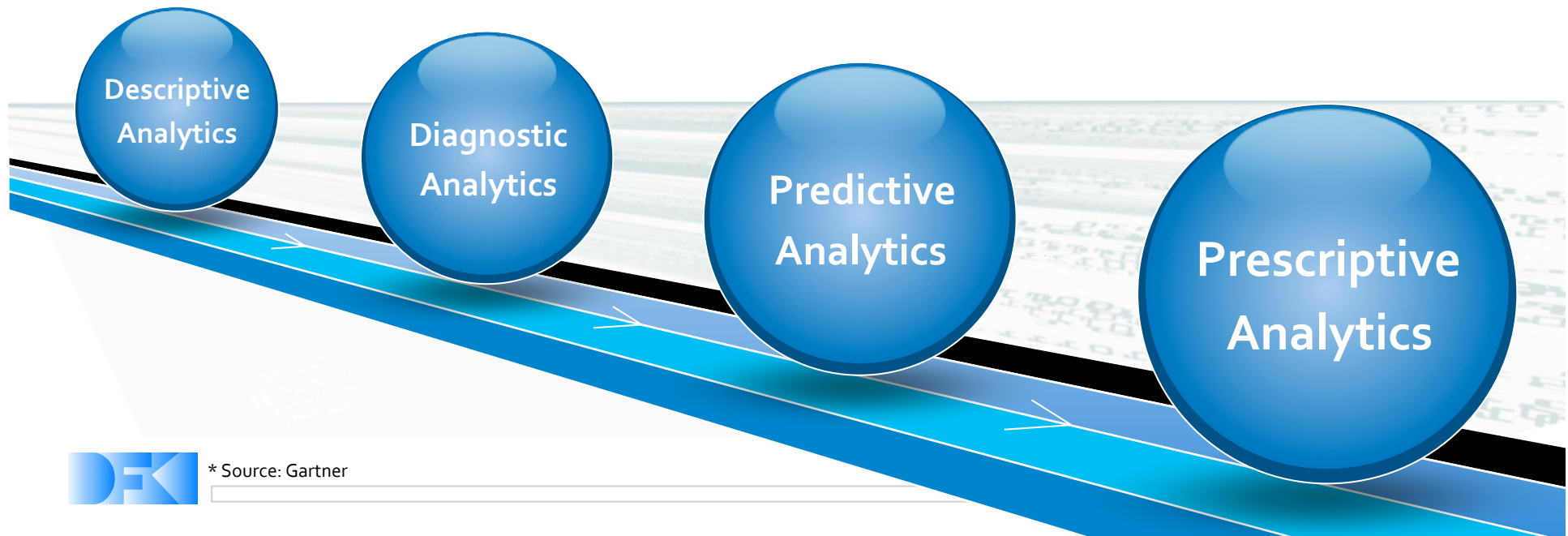
*„From hindsight to insight to foresight“*

What happened?

Why did it happen?

What will happen?

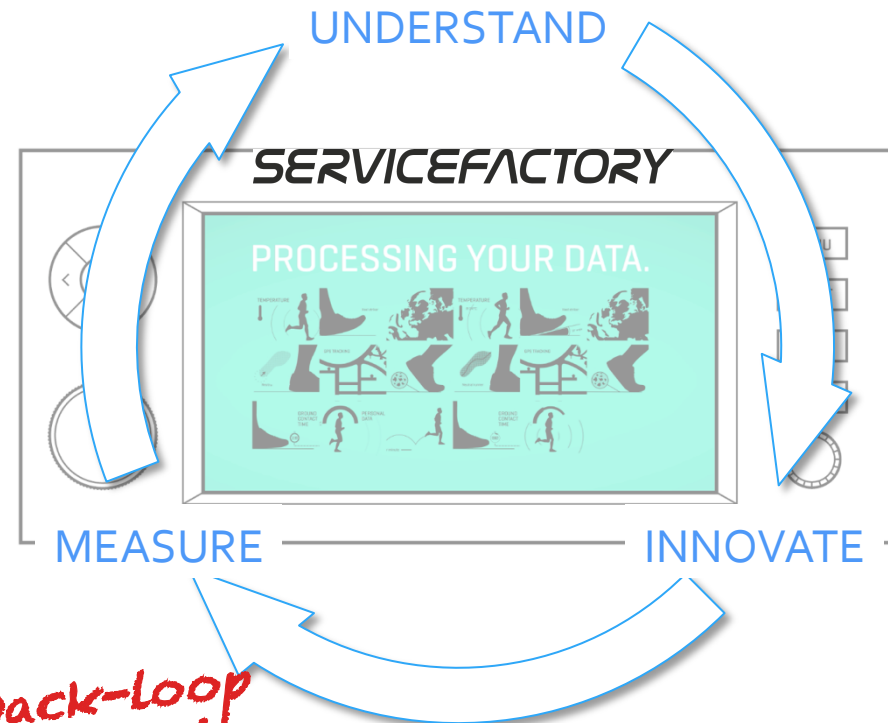
How can we make it happen?



\* Source: Gartner

# The **SERVICEFACTORY** project focuses on recommender systems for smart objects in the context of IoT and Industrie 4.0

- ⇒ Sensor-based smart textiles generate Big Data streams
- ⇒ Open Big Data platforms with appropriate modules for data analytics and smart services are not available at the market yet
- ⇒ Different interests of key players generate Lock-Ins which inhibit market participation



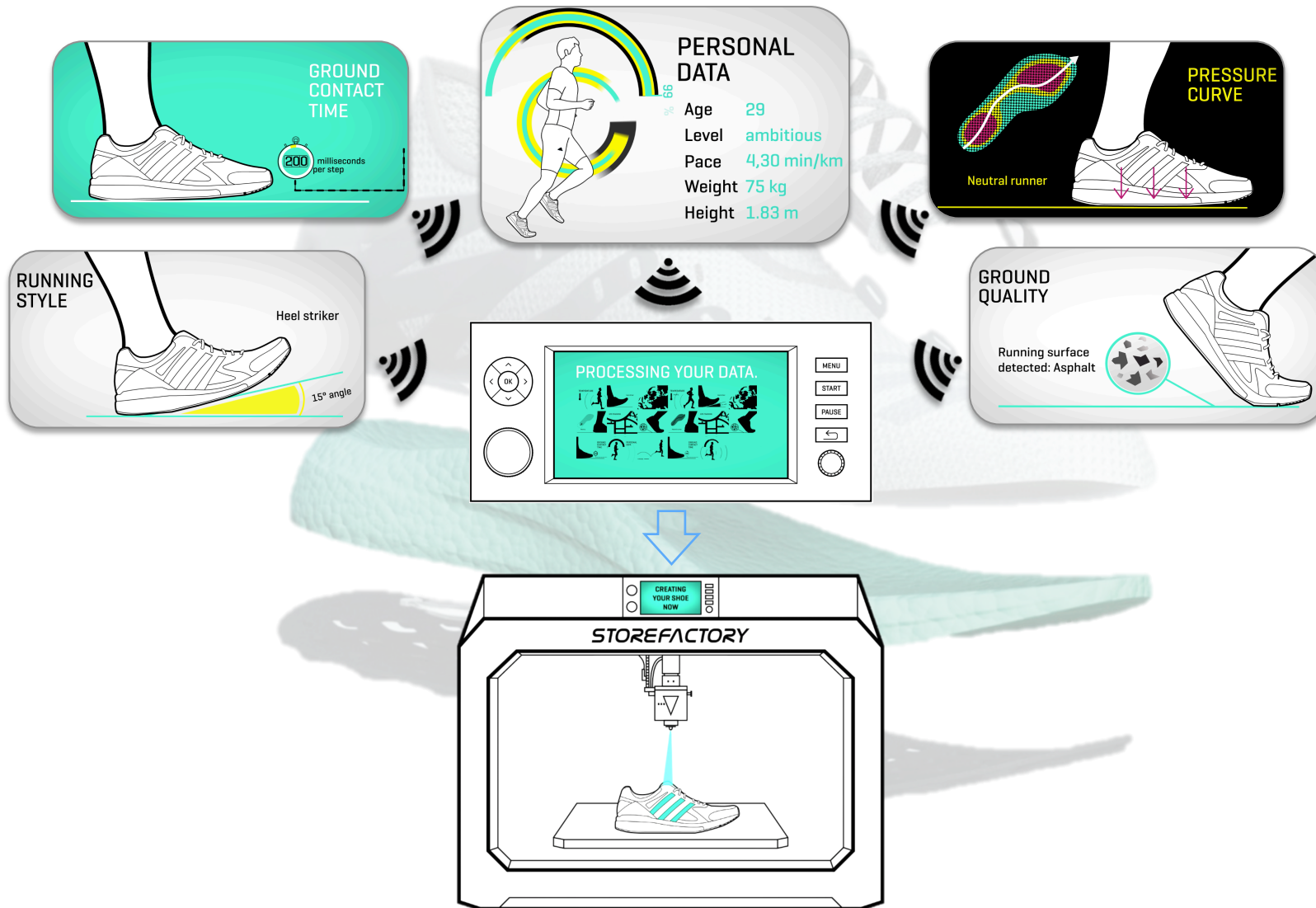
*Provide feedback-loop  
between the product,  
the environment and the action*

Funded by  
Smart Service World  
Program of BMWi

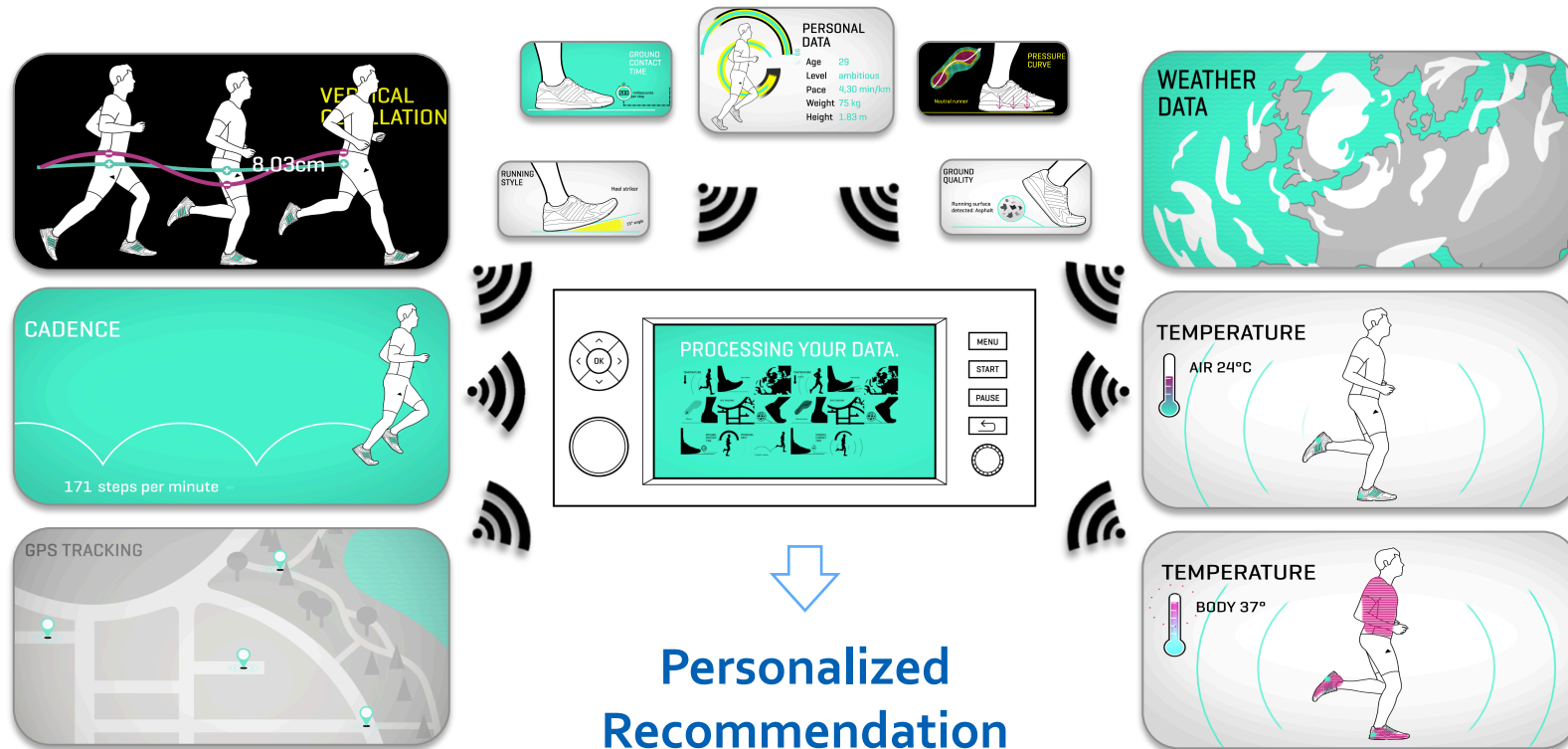




# Multiple sensors provide insights into usage as well as state of product and thus create the basis for "Batch Size One" production



This information can be complemented by behavioral and contextual data capturing in order to provide individual recommendation



Health Protection

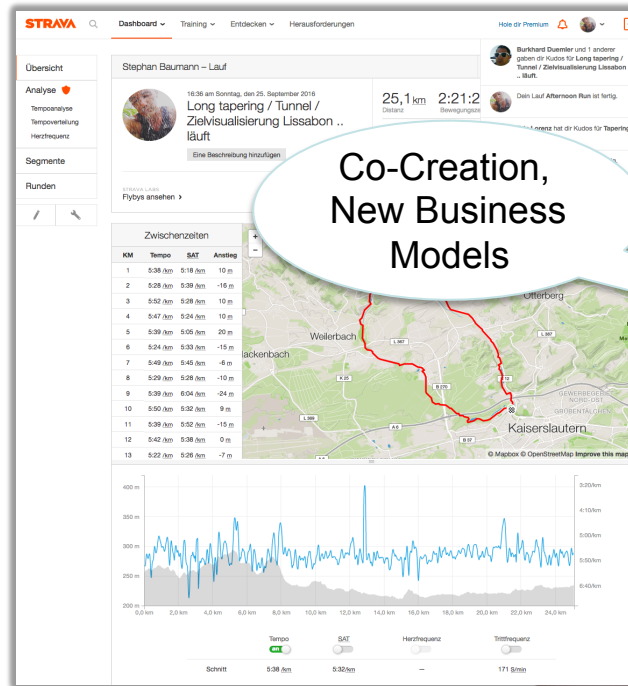
Product Recommendation

User Recommendation

Rehabilitation



Such rich applications provide a multitude of options for data analytics



Co-Creation,  
New Business  
Models

Content-Based Filtering

Social Network  
Analysis

Contextual  
recommendation

Collaborative  
Filtering

Time Series Analysis

The screenshot shows the product page for the 'ADIZERO TAKUMI REN 3 SCHUH'. It features a high-quality image of the shoe in green and white. The price is listed as €111,95 (reduced from €159,95). The page includes a star rating, a 'Größentabelle' (size chart) dropdown, and a 'Wähle deine Größe aus' (select your size) dropdown. Below the image, there is a detailed description of the shoe's features and benefits, such as 'Ein absolut durchdachter Laufschuh' and 'Ein absolutes Durchdachter Laufschuh'.



# Some final take-aways ...



|  |                           |
|--|---------------------------|
|  | Resource and Energy model |
|  | Service model             |
|  | Communication model       |
|  | Product model             |
|  | CAD model                 |

## Future Products must...

be described by abstract models

have a semantic notation

```
{ <span class="latitude">let format VEC</span> }
```



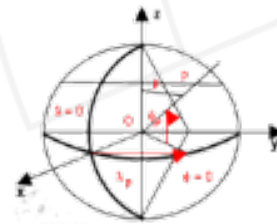
have a unique identity (by birth)

IP<sub>v6</sub> [2001:0db8:85a3:08d3:1319:8a2e:0370:7344]

be linked in worldwide networks



...be treated as abstract objects and ...



be locatable at all times

...but are co-created in cyber-social settings

# Questions?



*Adresse:  
Prof. Andreas Dengel  
DFKI GmbH  
Trippstadter Straße 122  
67608 Kaiserslautern  
email: [andreas.dengel@dfki.de](mailto:andreas.dengel@dfki.de)  
<http://www.dfki.de/~dengel>*

