

Best practises in utilizing Industry 4.0 principles

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- **The SmartFactory^{KL}**
- Introduction
- Industrie 4.0 paradigms showcased
- Conclusion

The SmartFactory^{KL}



Application



Industry

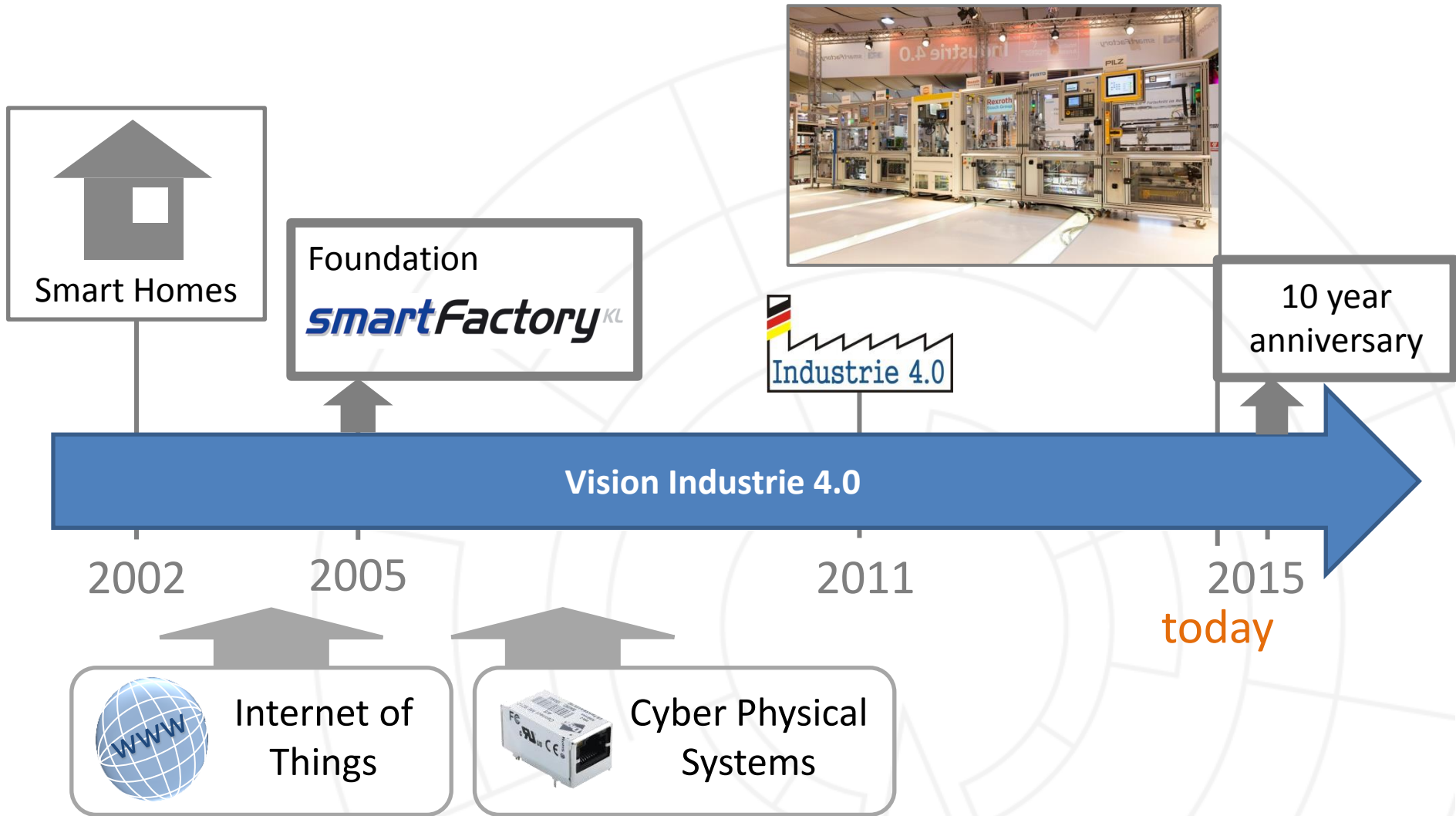


Manufacturer

Academia



The SmartFactory^{KL}



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Industrie 4.0

Means linking all factory objects into a network based on Internet technologies

In consequence all objects like machines, products but also humans are smart elements in a production process.

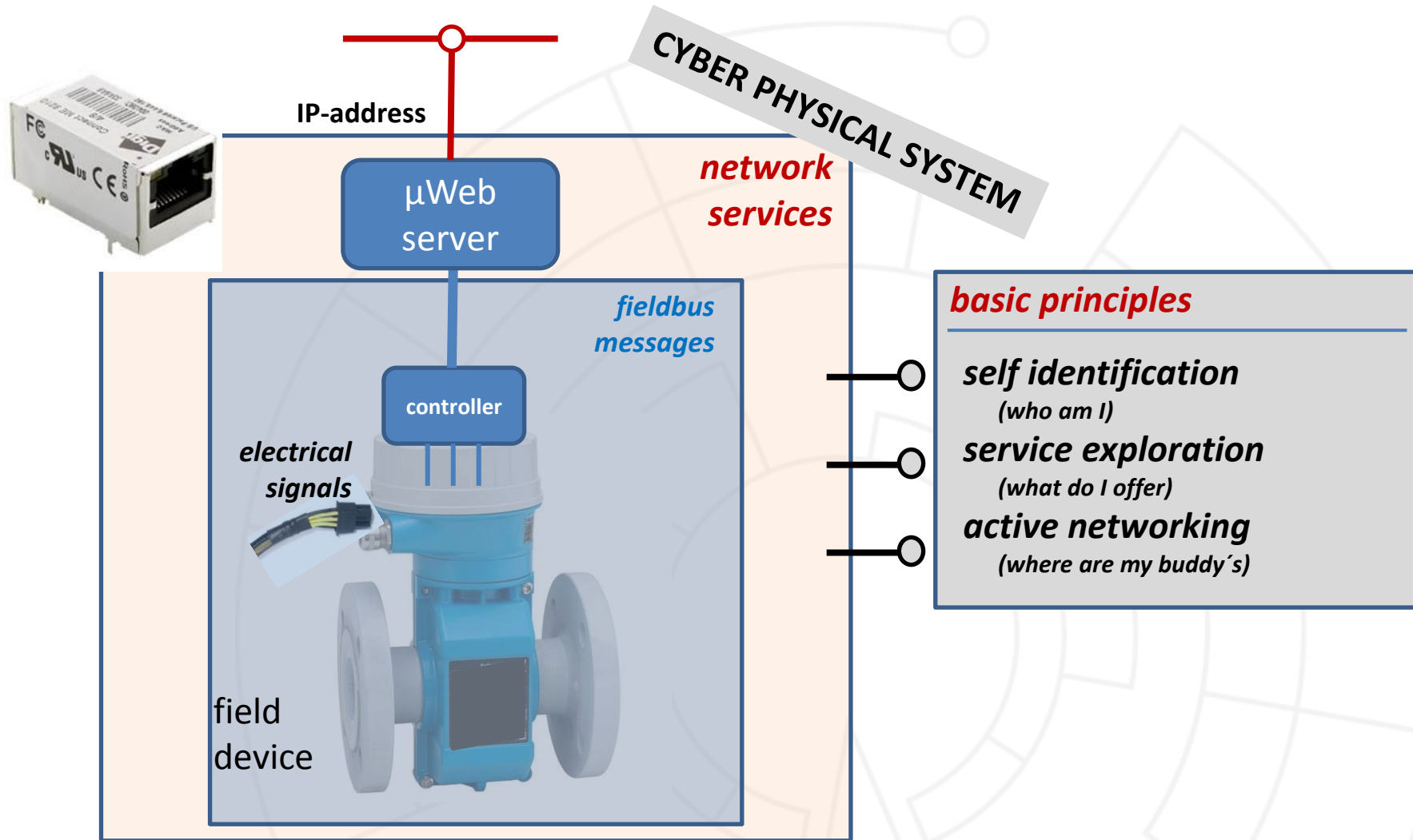
the smart planner

the smart workpiece

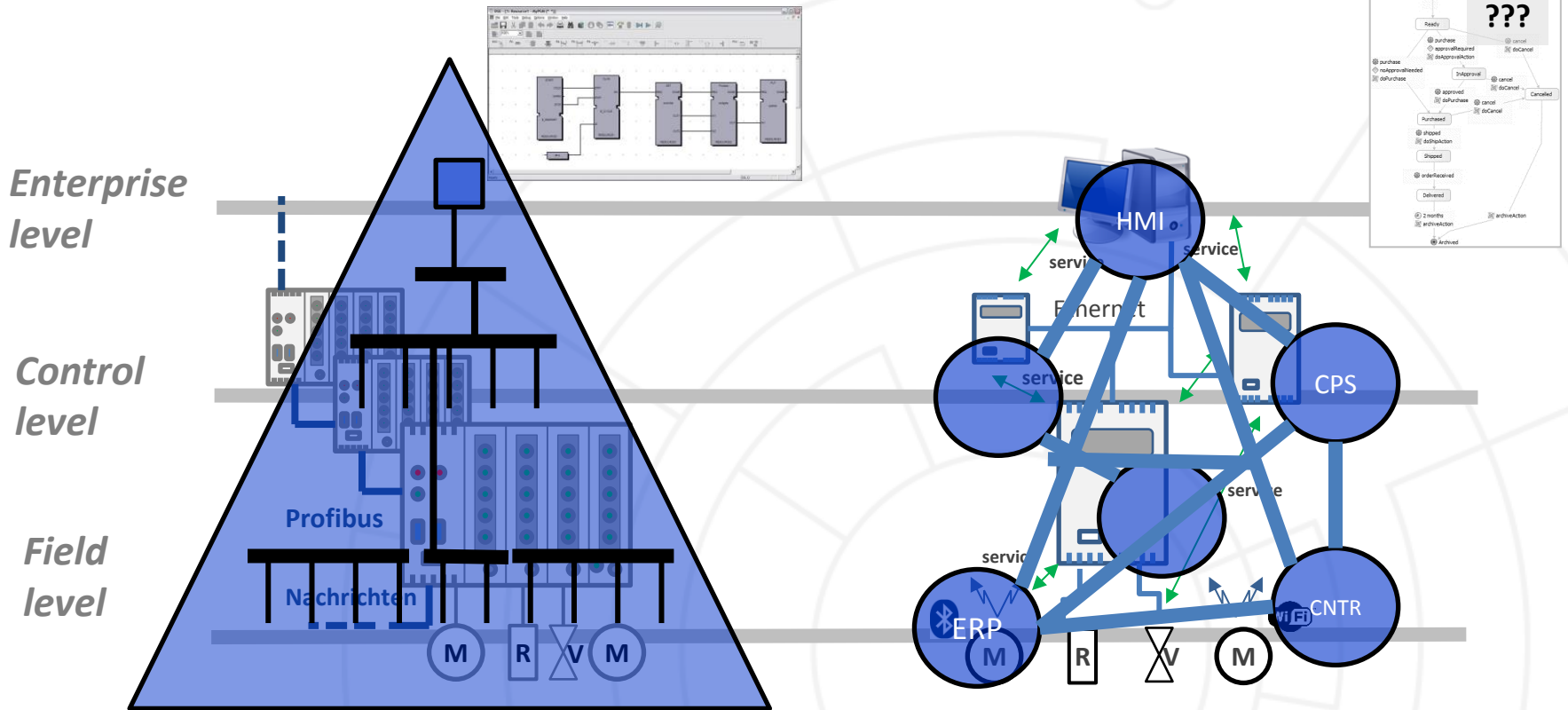
the smart machine

the smart operator

The Smart Machine



The Smart Machine



Today
Tomorrow

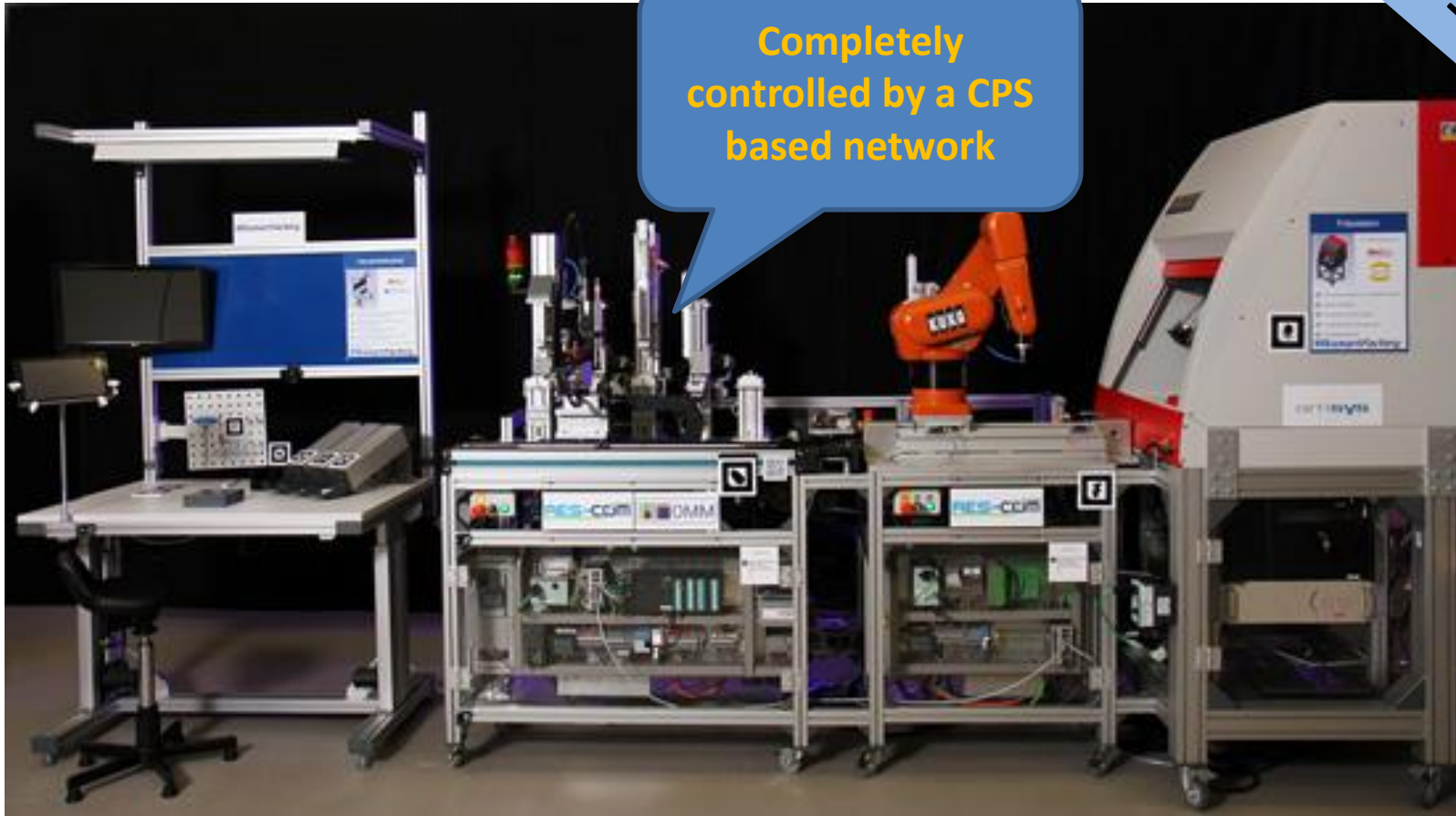
Hierarchical Automation
Smart CPS Network

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Demonstrator ResCom

2011

Completely controlled by a CPS based network



Manual Workstation

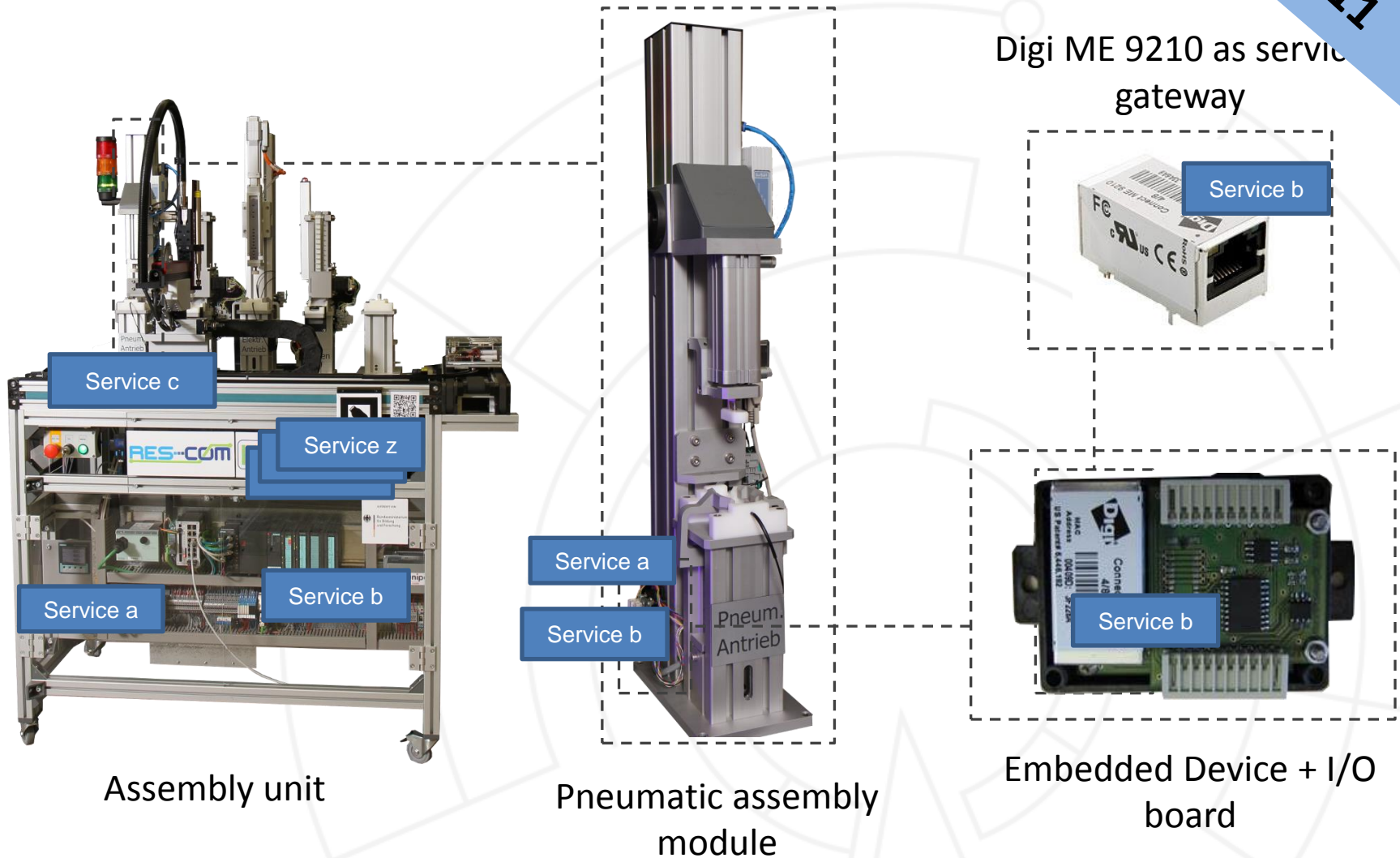
Product Assembly

Product Handling

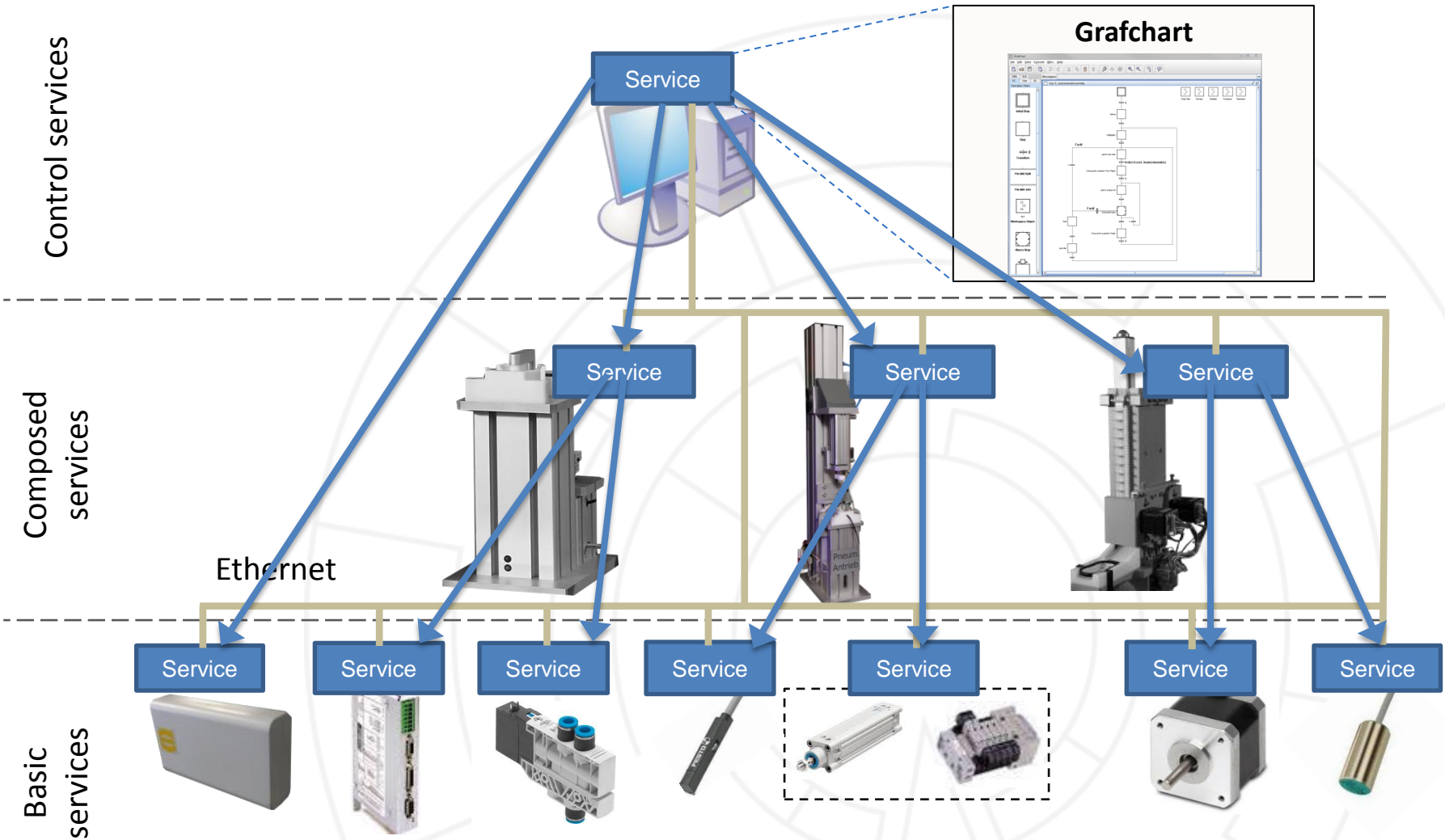
Engraving

CPS Production Demonstrator

2011



Service-orientated Control Architecture



Worlds' first Industrie 4.0 Demonstrator

2014 & 2015



Security



Monitoring



ERP



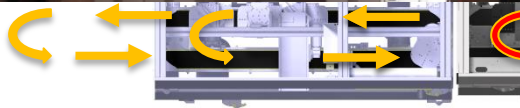
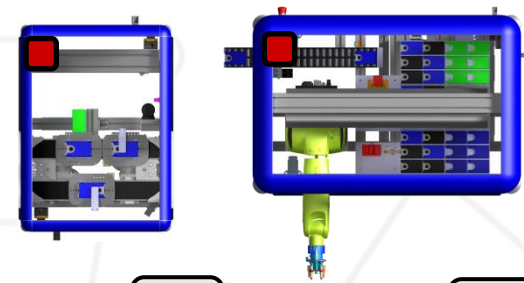
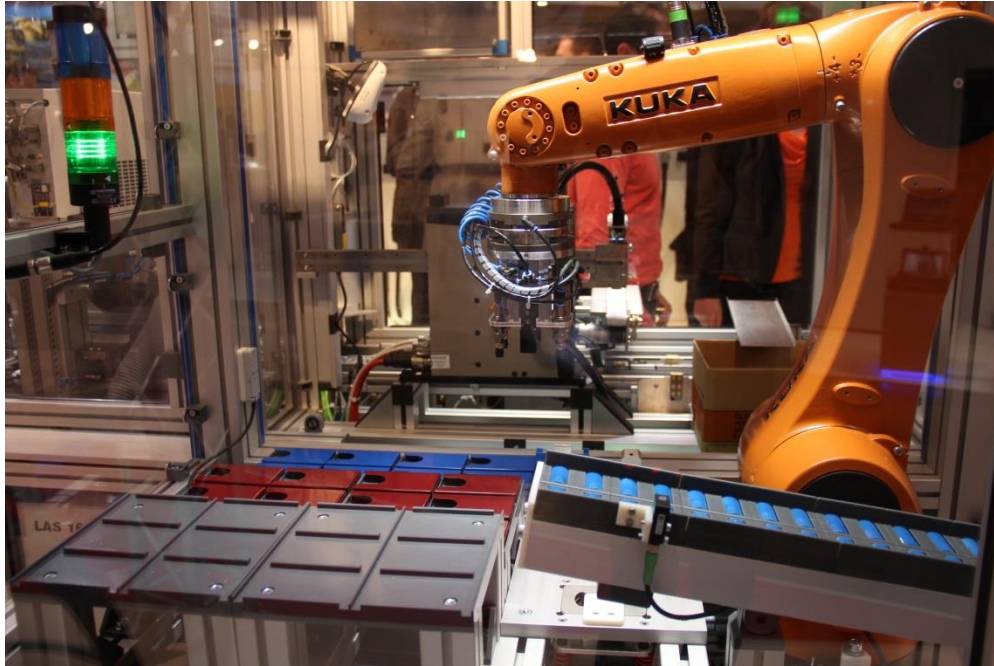
PLM



Worlds' first *Industrie 4.0* Demonstrator



Plug 'n Produce scenario

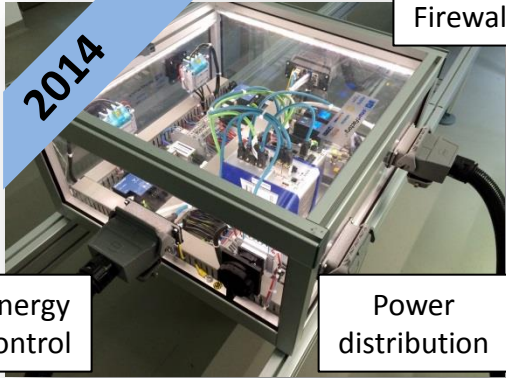


quality control scale laser

Product:



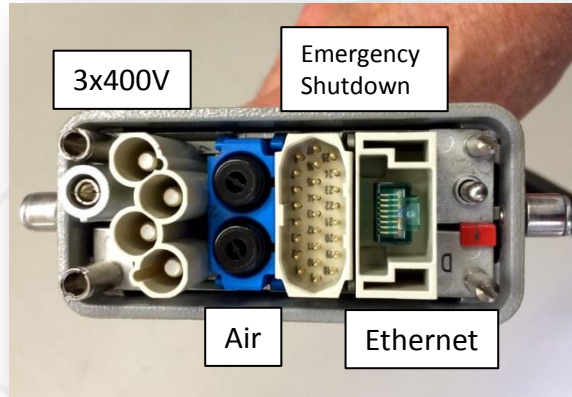
Enabling Technologies



Energy control

Power distribution

Firewall



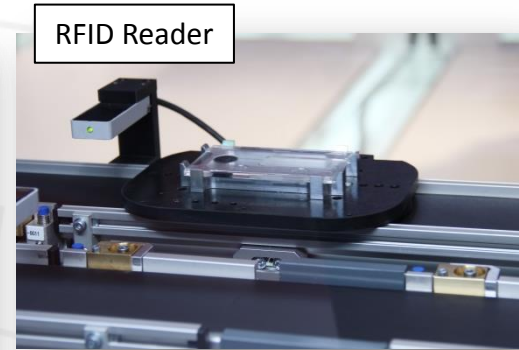
3x400V

Emergency Shutdown

Air

Ethernet

Our „USB connector“



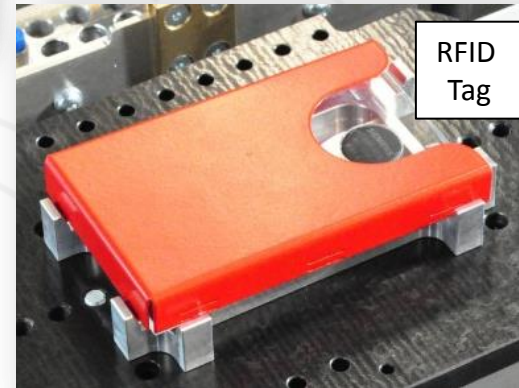
RFID Reader



Infrastructure Boxes



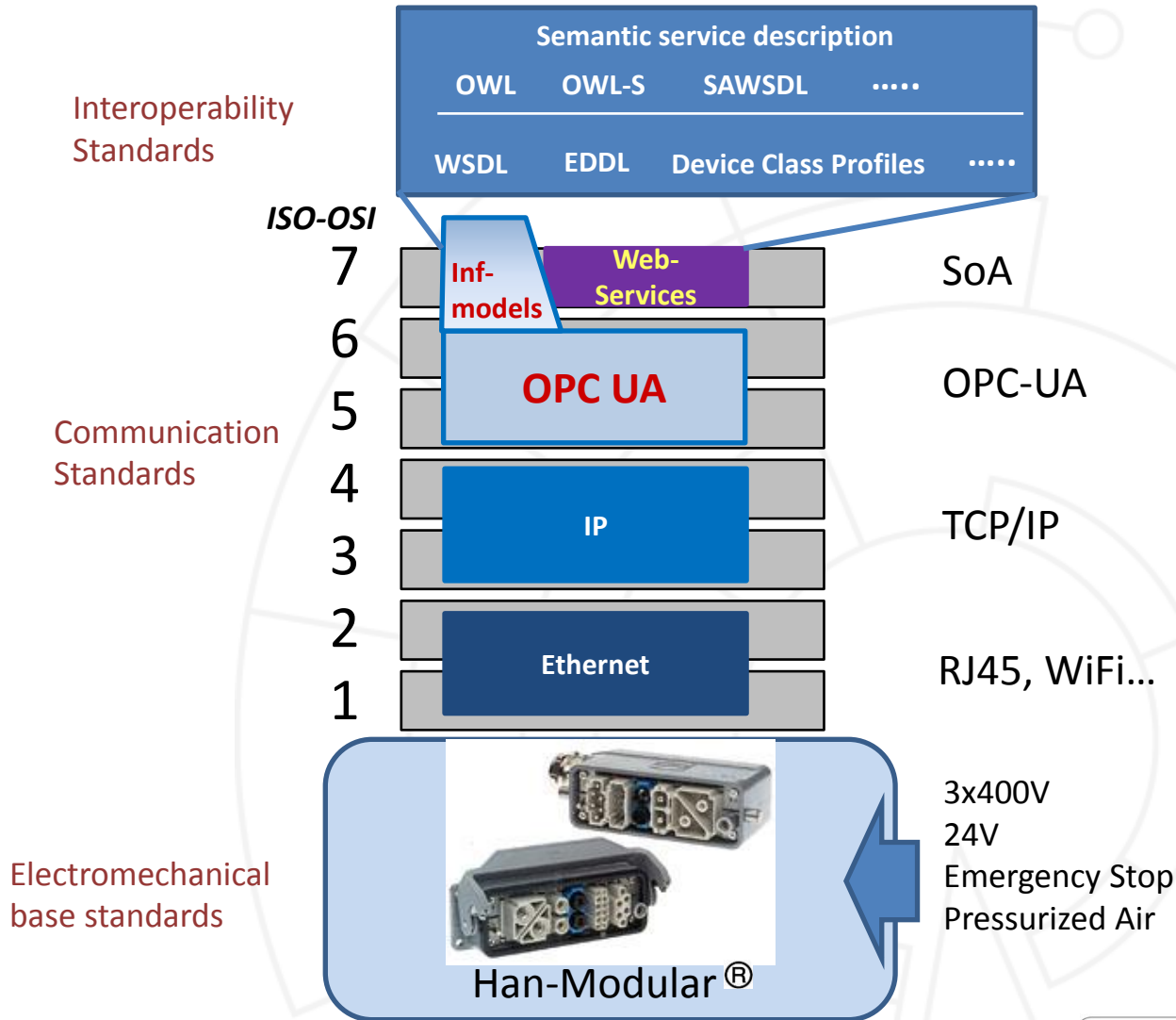
Neighbor Detection



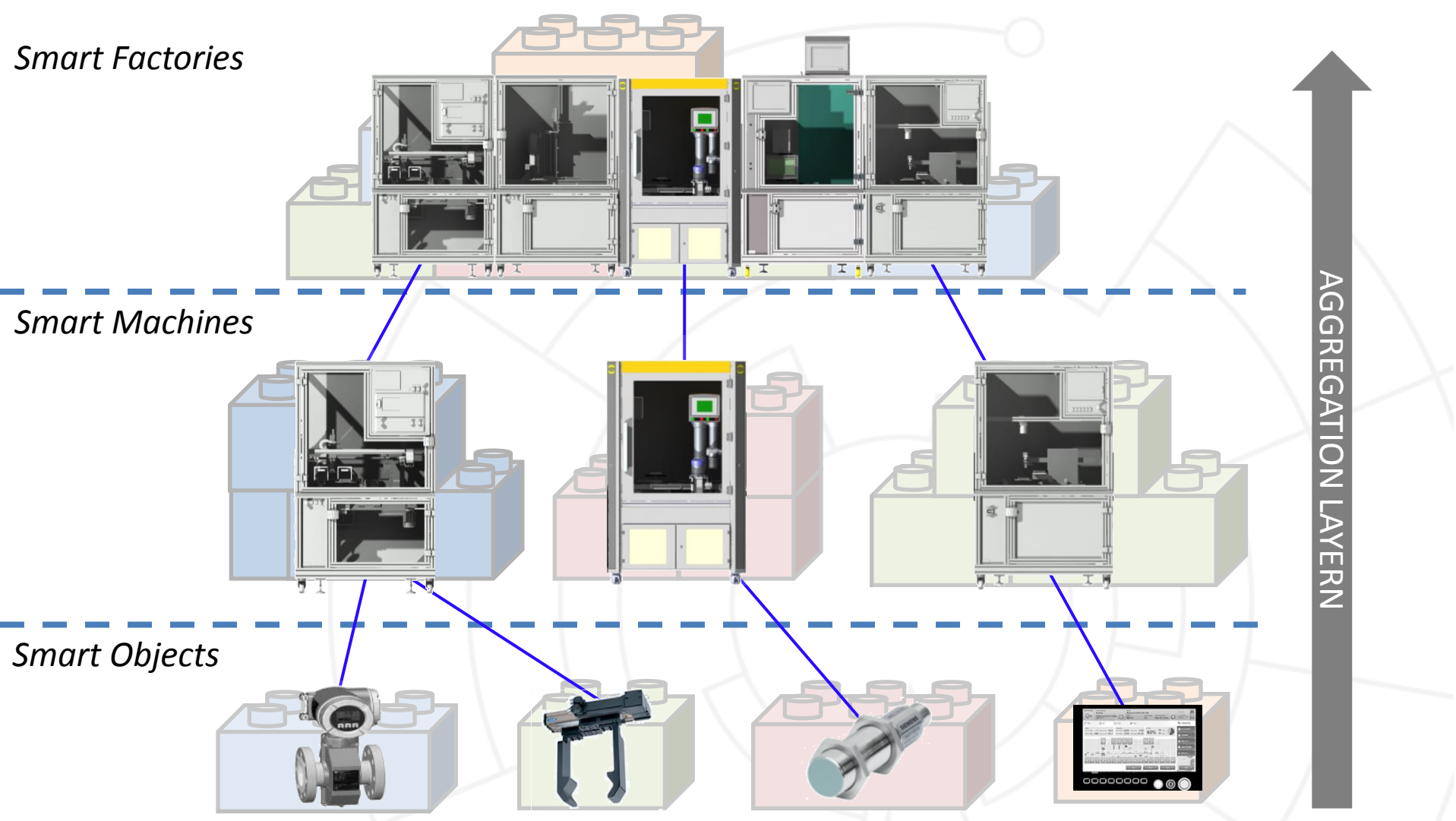
RFID Tag

Digital Product Memory

Standards are Available



From Smart Objects to Smart Factories

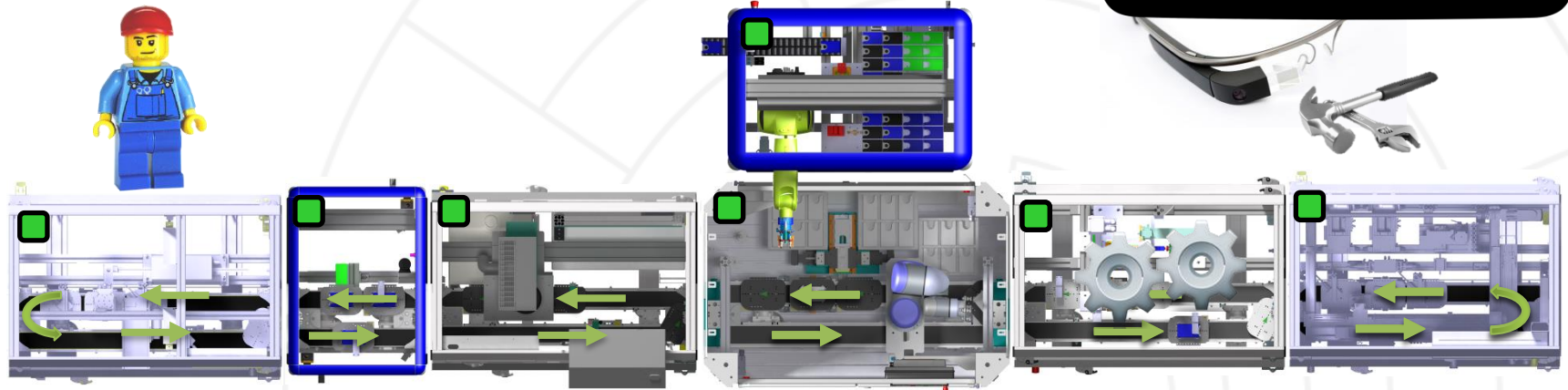
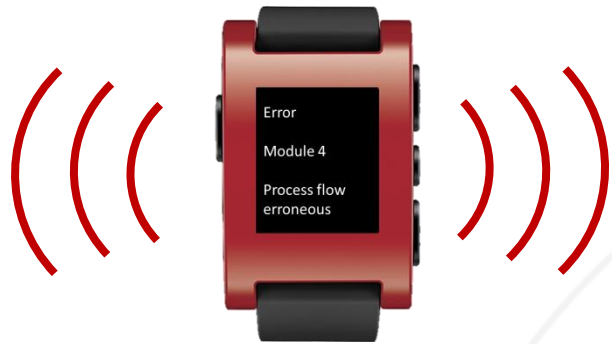


Smart Operator

How can consumer interaction technologies be used to serve the future worker in an efficient way?



Smart Operator



Error: Process flow erroneous

Caused by RFID reader malfunction

Smart Operator



Augmented.smartFactory SmartModule Information

Engraving Module - Festo

FESTO

- Summary
- Components
- Troubleshooting

- ✓ Festo Gabellichtschranke
- ✓ Rotating device for the engraved casing bottom
- ✓ CoDeSys-Controller (Effectuator)
- ✓ Workpiece magazines with controller

Festo Gabellichtschranke Troubleshooting ▶ Start Steps

Light barrier detects the presence of glass base in the module

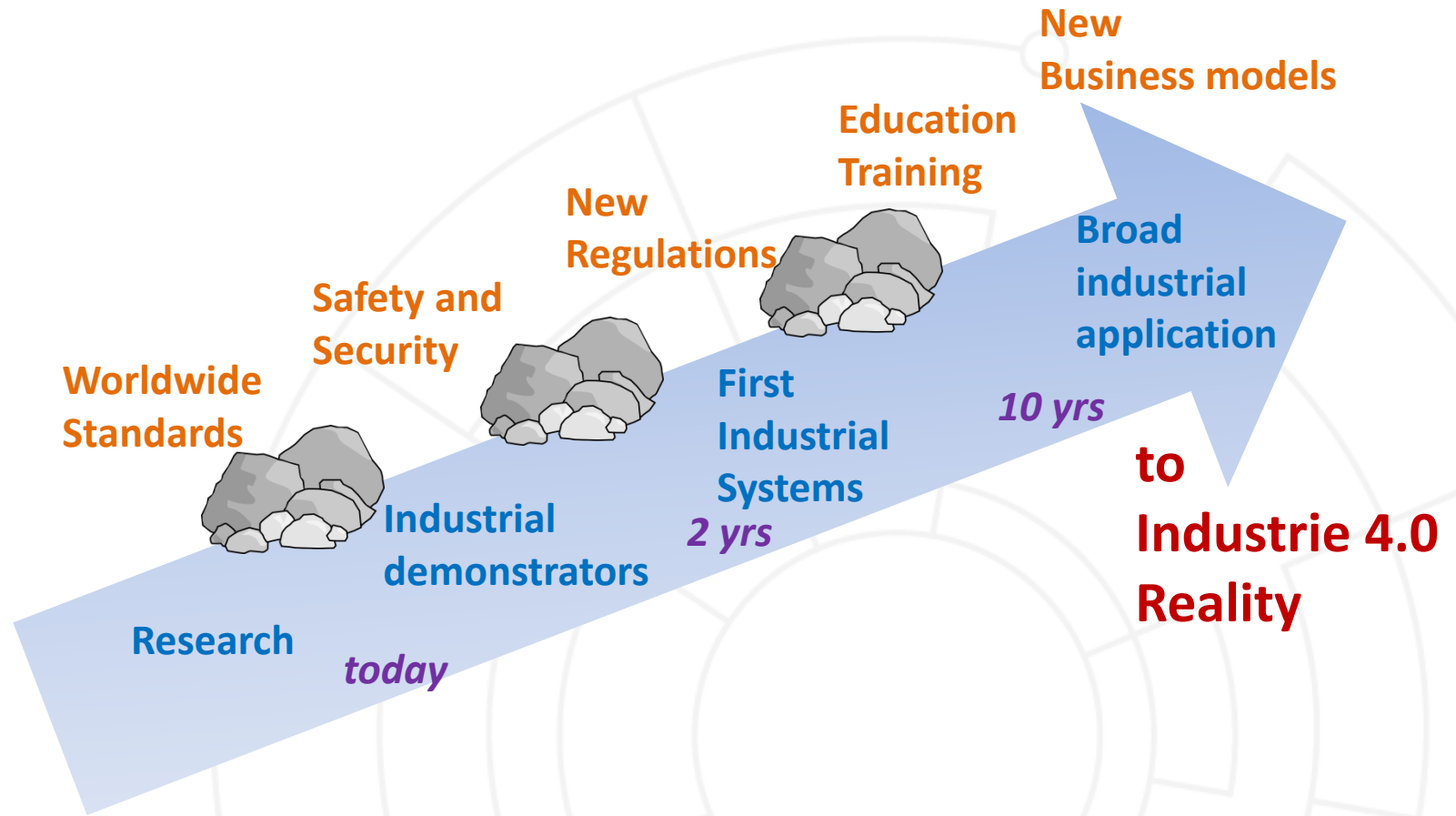
1. Check for correct placement of glass base
2. Check if the orange LED illuminates to indicate detection of glass base. If the problem persists proceed to next step.
3. Unscrew the screws as shown.
4. Remove connector as shown.
5. Place connector as shown.
6. Screw the screws as shown.

Manual Workstation



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The Rocky Road to Industrie 4.0



from
Industrie 4.0
Vision

THANK YOU FOR YOUR ATTENTION!

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