

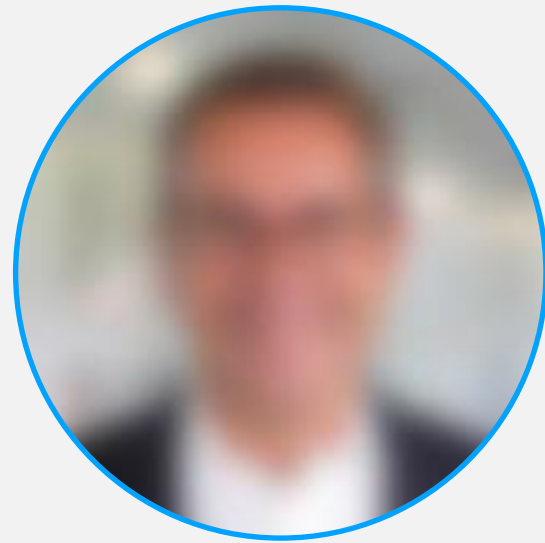


Session 5B: Sustainable Planning of Industrial Parks



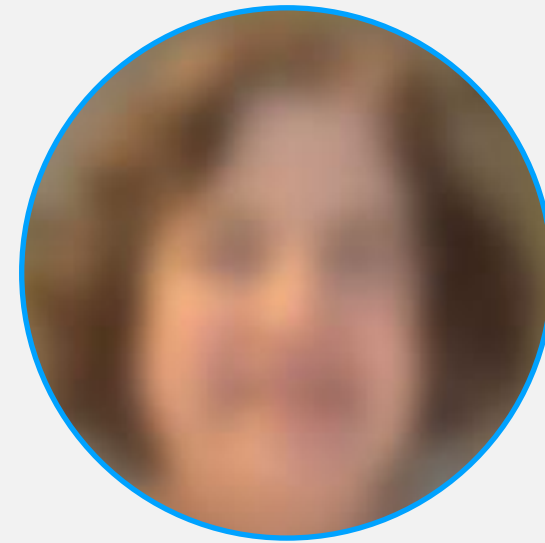
Mohamed Mazen

GIZ Egypt, Session Moderator



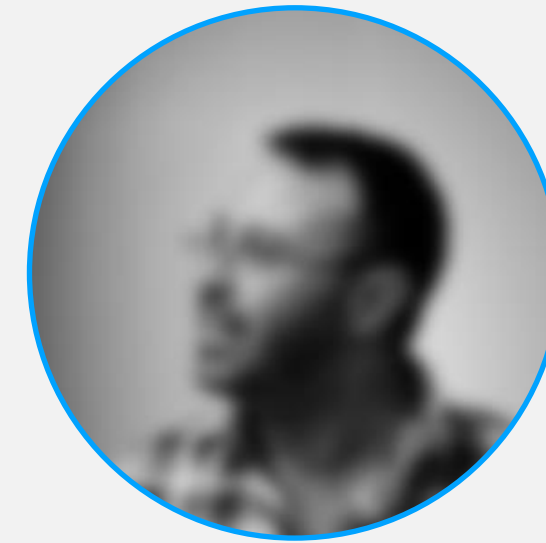
Hannes Utikal

Provadis University of Applied Sciences Frankfurt



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Yale University Center of Industrial Ecology



Ahmed Huzayyin

Chemonics Egypt Consultants



Peter Lindlau

Tomorrow Labs GmbH



Implemented by:



TOMORROW LABS

your industrial IoT-platform



Industry 4.0 / Industrial IoT

We help you to...

digitize your shop-floor...



digitize & manage your buildings...



A yellow toy robot with a camera-like head and a small antenna, standing on a wooden surface against a sunset background. The robot is positioned on the left side of the frame, looking towards the right. The background is a warm, golden sunset with a bright sun visible on the right side. The text "Digitalization – How do YOU benefit?" is overlaid on the right side of the image in white, with "YOU" in yellow.

Digitalization –
How do **YOU** benefit?

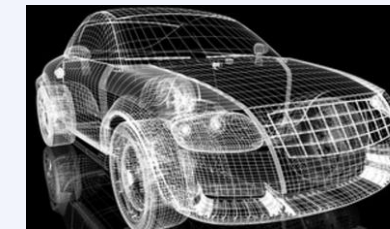
Just to be clear on...

Digitalization



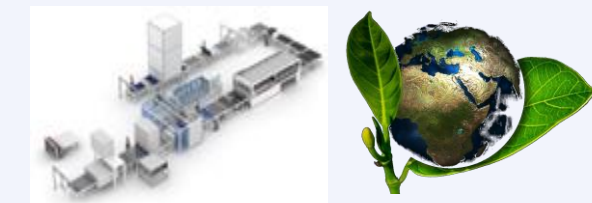
- From “no information” to information driven
- From analog to digital
- From “guessing” to “fact based”
- From manual to automated
- Mandatory for:
 - Digital Twin
 - Twin Transformation
 - Many, many others...

Digital Twin



- Simulation
 - Reduce costs (no prototypes, higher test speed, many test scenarios)
 - Integrated Testing / “Unit-Testing”
- Audit (Tracing/Tracking)

Twin Transformation



- Resources usage - Environmental footprint
 - reduced resources == reduced costs
- Race for human talents
 - talents are seeking for innovative, digital, and more and more importantly: sustainable companies.
- Environmental footprint already is, in will be much more in future: Enforced by law

Digitalization – Industry 4.0

What is your benefit?

Implement new Business Models

- Subscription vs purchase
 - Compressed air instead of compressor
 - Produced meters/kg of cotton sliver instead of machine purchase
 - Remote maintenance / auto-fill inventories

Digitally connected production resources boost effectiveness

- Boost production effectiveness (OEE)
- Smart resource purchase /consumption (e.g. avoid energy peaks)
- Create work aids (Robots...)
- Enabler for artificial intelligence
 - Predictive maintenance
 - Self adjusting processes
 - Smart Factory
- Take advantage of a digital twin

Enabler for Sustainability

- Reduce / Track resource consumption
 - Enforced by law
 - Reduce your bills for resource consumption
- Raise credibility
 - Raise company ranking
 - Be attractive for human talents
 - Your customers DO CARE! (no “green washing”)

Sustainability – no longer just „nice to take care“

- Laws will enforce it

Form the year 2025 on, companies > 250 employees MUST report

- Your customers will demand it

- “Race for Talents” will demand it

Greenhouse gases:

- CO2: Carbon dioxide
- CH4: methane
- N2O: dinitrogen monoxide
- HFCs: hydrofluorocarbons
- PFCs: perfluorinated hydrocarbons
- SF6: sulfur hexafluoride
- NF3: nitrogen trifluoride

- Digitalization is on its way...

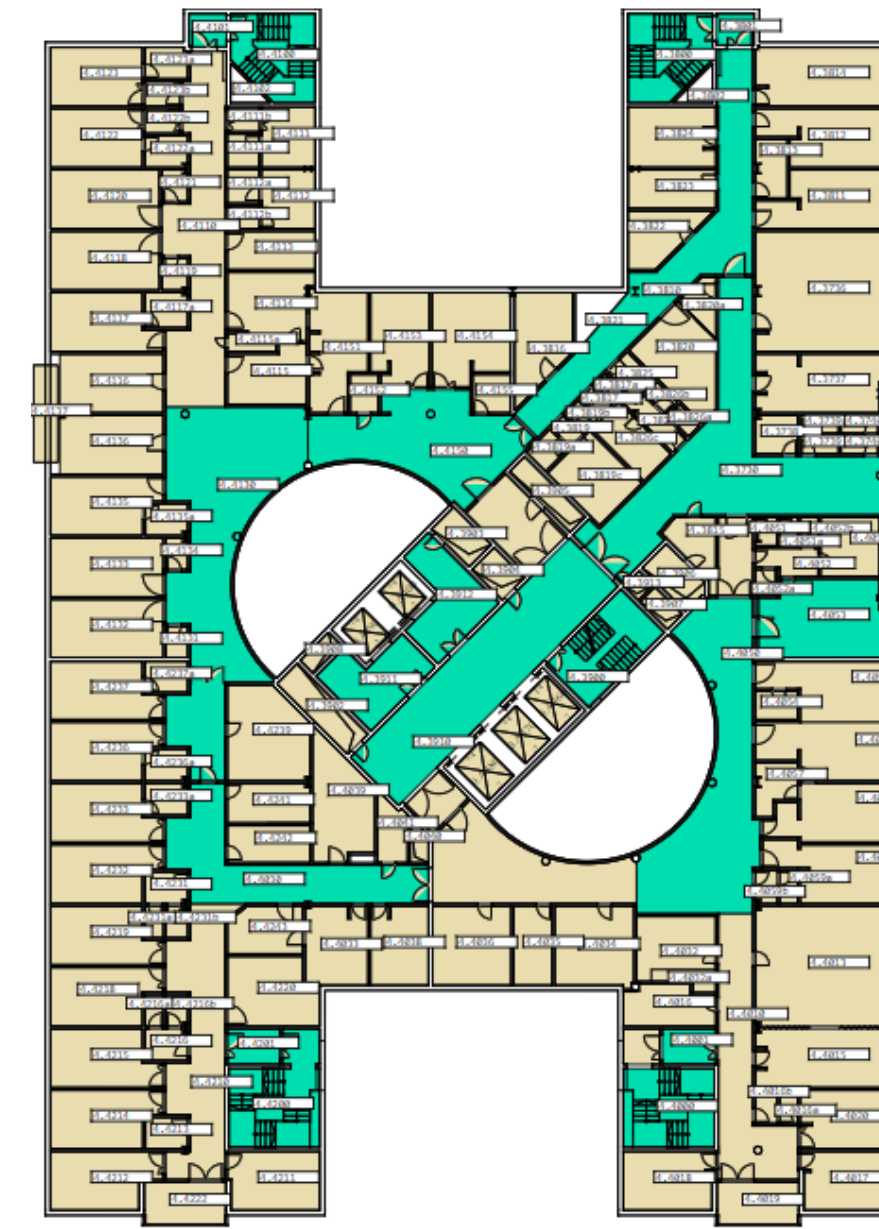
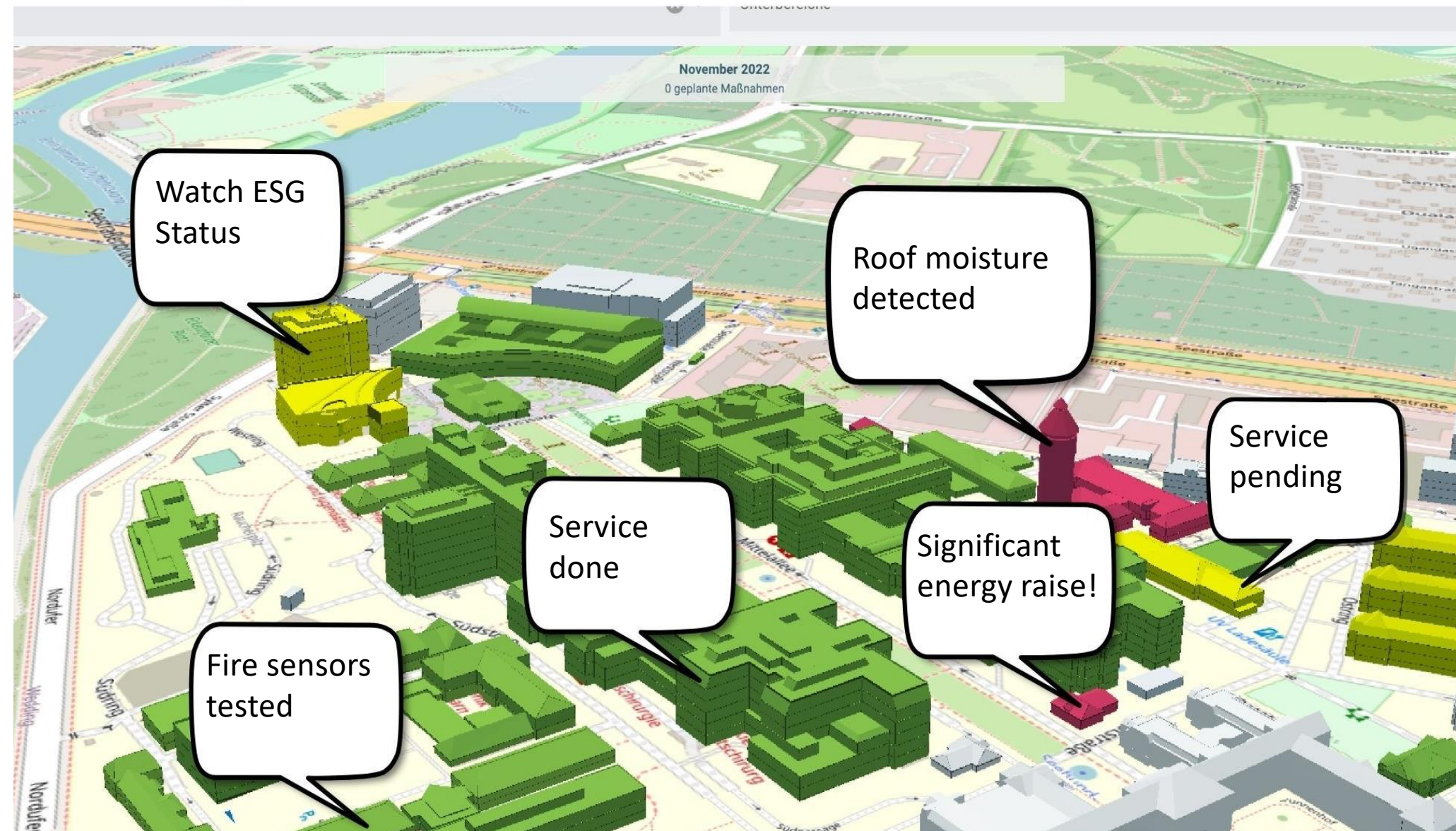
- Reporting metadata/structures are defined
- Digital data exchange format(s), e.g:
XBRL = eXtensible Business Reporting Language
- automate report generation

The screenshot displays the 'AiFO Facility Operations' interface for 'Charité CFM Facility Management GmbH'. The top navigation bar includes 'GLOBUS', 'MELDUNGEN', and 'SENSORIK' icons. A sidebar on the left lists categories: ESRS-1, ESRS-2, ESRS-E1, and GHG. The main content area is titled 'E1-1 Transition plan for climate change mitigation' and includes a 'SPEICHERN' button. The form is divided into sections: 'General Disclosure Requirement' (a large empty text box), 'Description' (a yellow box containing text about transition plans), 'Files' (an empty area), and 'Remarks/Help' (a blue box with instructions on referencing GHG targets).

Sustainability – automate knowledge generation



Let your buildings talk to you




Sustainability – no longer just „nice to take care“

ecovadis [Enterprise Solutions](#) Sustainability Assessments Resources About Blog EN

Sustainability Ratings For Global Supply Chains

Our flagship solution, EcoVadis Ratings, is the cornerstone of over 1000+ sustainable procurement programs within global value chains and has been tested on over 100,000+ companies across 200+ industries and 175+ countries.



EcoVadis: Global, Reliable Assessments

Solving a complex challenge, making it easier for buyers and better for suppliers.

| Buyers | Suppliers |
|--------------------------|-------------------------|
| Reliable Ratings ✓ | Benchmark performance ✓ |
| Low admin costs ✓ | Save time and effort ✓ |
| Drive improvements ✓ | Differentiate brand ✓ |
| Identify opportunities ✓ | Win more business ✓ |

•ESRS (Environmental Social Reporting Guideline)

About the draft ESRS

In April 2021, the European Commission adopted a [legislative proposal for a Corporate Sustainability Reporting Directive \(CSRD\)](#) that requires companies within its scope to report using a double materiality perspective in compliance with European Sustainability Reporting Standards (ESRS) adopted by the European Commission as delegated acts. Under the

•GRI (Global Sustainability Standards Board)



The GSSB has sole responsibility for setting the world's first globally accepted standards for sustainability reporting – the GRI Standards. Established as an independent operating entity under the auspices of GRI, GSSB members represent a range of expertise and multi-stakeholder perspectives on sustainability reporting.

•... and much more

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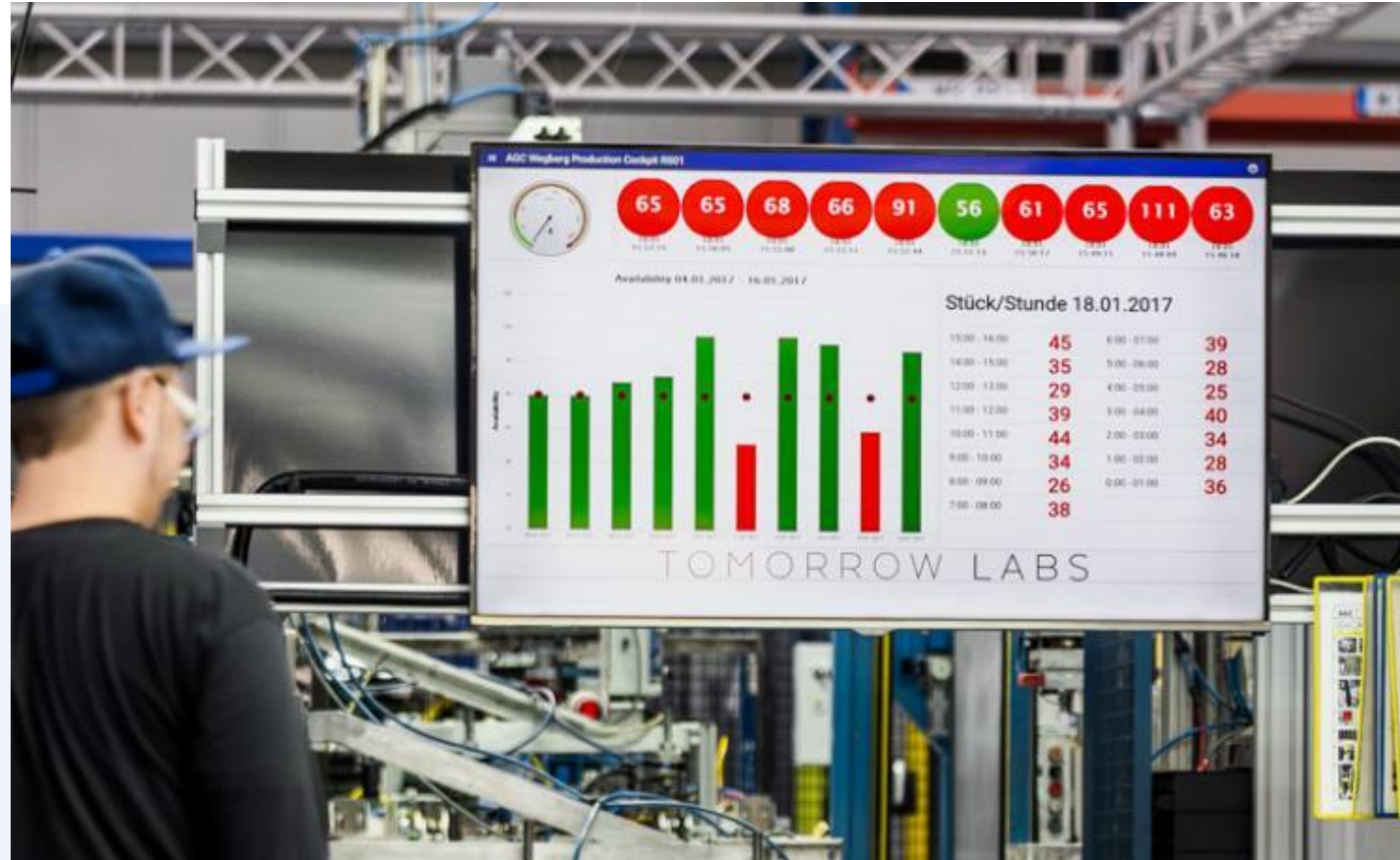
Examples and use cases

- AGC Glass Europe
- Quick Wins,
“low hanging fruits”
- Supplier Independence



<https://www.youtube.com/watch?v=KcrWPGwuW00>

Industry 4.0 – AGC Europe



Video – Tomorrow Connect at AGC Glass Europe
<https://www.youtube.com/watch?v=KcrWPGwuw00>

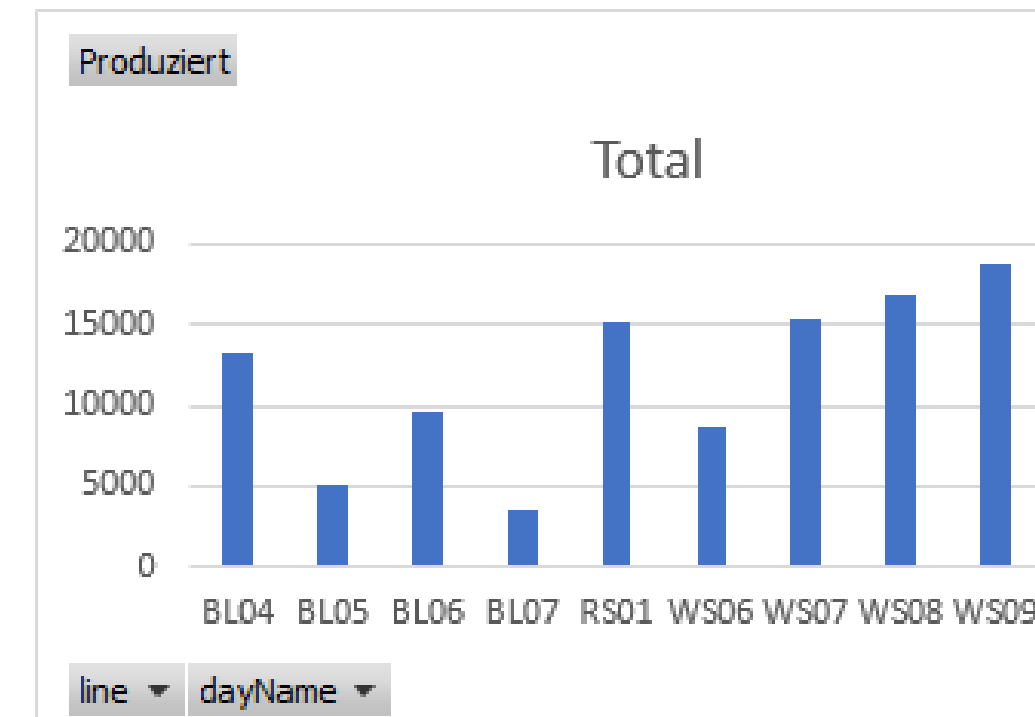
Industry 4.0 – AGC Europe

Findings, business impact

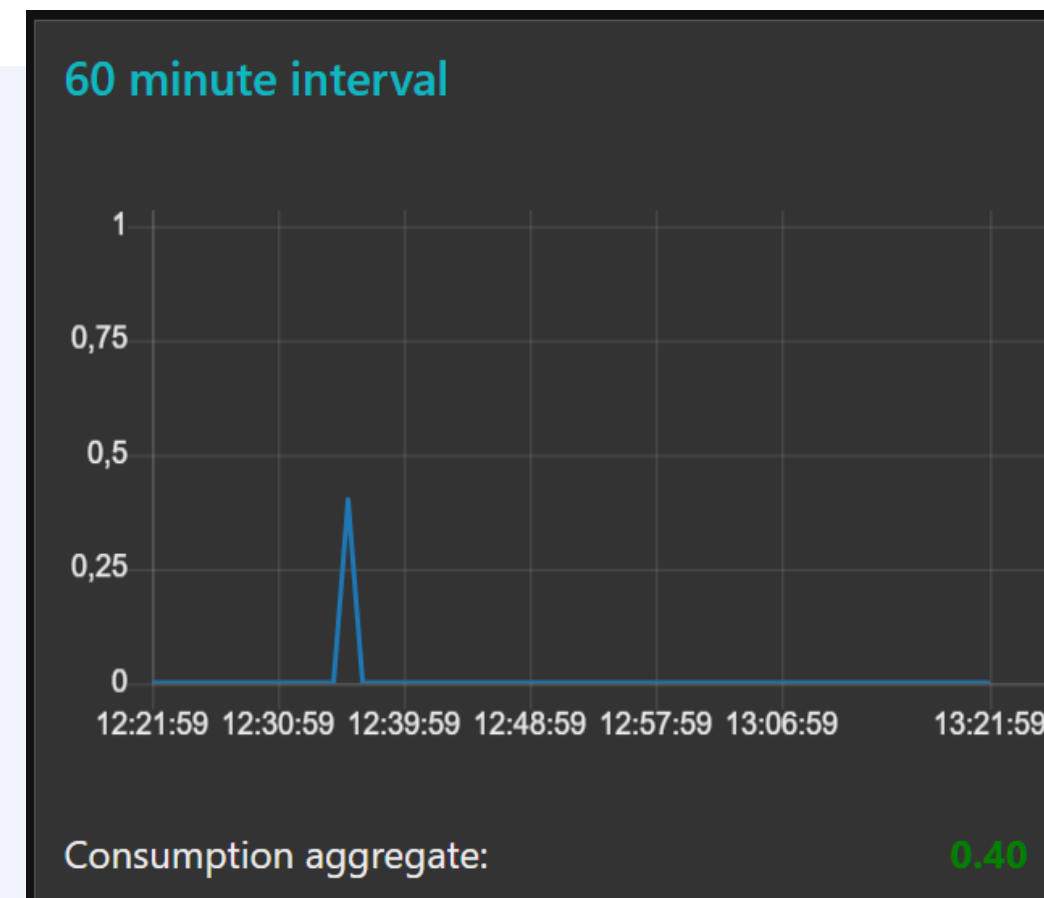
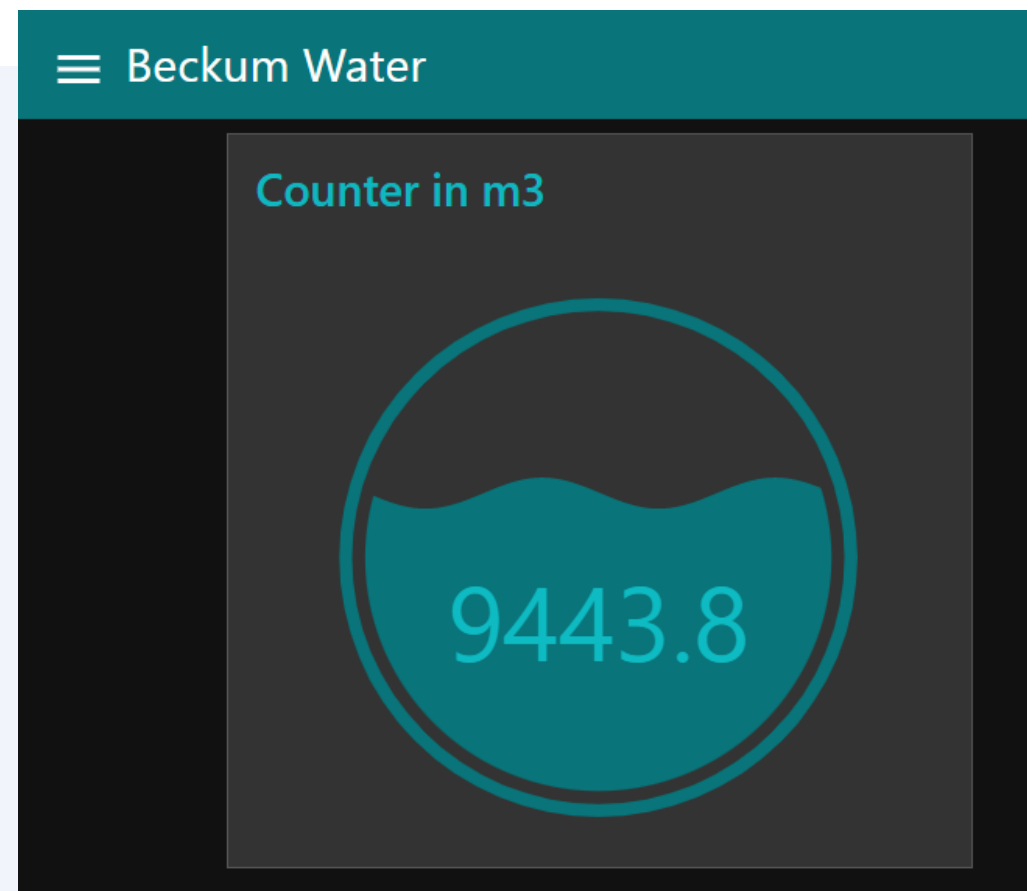
Example: Wind Shields and Backlights

- Analyse production efficiency
- Result: output is at ~ 70% (!)
- Consequence: Process change, reduced part cycle time from > 60 seconds to less than 50 seconds

| Produkt | Produziert |
|-------------|------------|
| ⊕ BL04 | 13280 |
| ⊕ BL05 | 5119 |
| ⊕ BL06 | 9698 |
| ⊕ BL07 | 3575 |
| ⊕ RS01 | 15219 |
| ⊕ WS06 | 8673 |
| ⊕ WS07 | 15411 |
| ⊕ WS08 | 16917 |
| ⊕ WS09 | 18802 |
| Grand Total | 106694 |




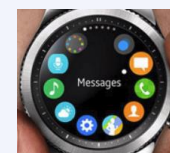
“low hanging fruits” – energy monitor



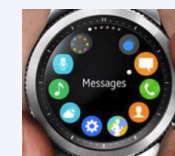
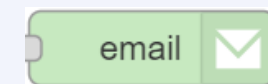
Consumption

| | |
|---------|-----------|
| Water | 9450.60 |
| Energy | 173610.30 |
| Heating | 3623.10 |

email 



“low hanging fruits” – Fill level watcher



Fill level control for Welding rod
- Apply weight sensor

The story behind this use-case:
- Company internal employee enablement, topic: “What is digitalization all about”
(Full day workshop)

supplier independence

One of the triggers: Supply chain crisis

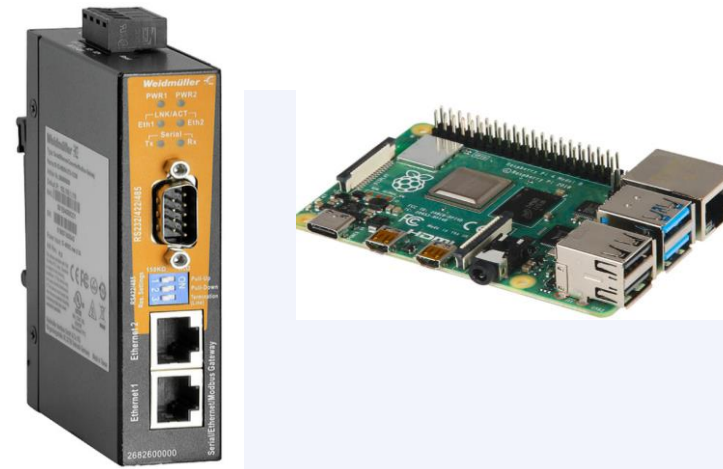
Proprietary controller (PLC)



Separation of Concerns



Industrial PC (and Peripherals)



Proprietary

- OT > Machine Control Software
- IT > User Interface, Business Logic, Analytics

Standard Development Frameworks,
Open Source Software and community

IT:



OT:



And much more...

Digitalization - Challenges

01 |

How do I get information that is relevant to my manufacturing process?

02. |

How can I derive potentials and evaluate it economically?

03. |

How do I transform my findings into process improvement?

04. |

How do I “win” my employees for the changes and new opportunities?

Industrie 4.0 - How to

01

Step 1:

Collect data generated on your shopfloor/building/...

- Physically connect machines, systems and sensors
- Where ever possible, use standards such as: OPC-UA, MTConnect

Result: Facts are created



Industrie 4.0 - How to

02. Step 2: Map raw data to manufacturing process related information

- Create rules to convert raw data, convert raw data to meaningful information
- Derive and constantly expand the process- and company-specific metadata model (which data is relevant for my company?)

Result:

Information for the specific manufacturing process is available

Industrie 4.0 - How to

03.

Step 3:

**Analyze information and put it in the
business context**

|

- What are the business effects of the findings

**Result: Clear picture where the biggest potentials
are**



Industrie 4.0 - How to

04.

Step 4:

Boost your shopfloor effectiveness by 10% to 30%

- Define and implement measures for process improvement and lift identified potentials
- Which process changes/measures will have the greatest benefit

Result: Change potentials are recognized and transferred to a permanent, fact-based change management

Industrie 4.0 - How to

01-04.

**Take along your employees,
preferably from the beginning and across processes**

- Identify positive minded employees and promote them as "beacons".

**Result: Motivated, positive-minded team is "on board",
willing to contribute**

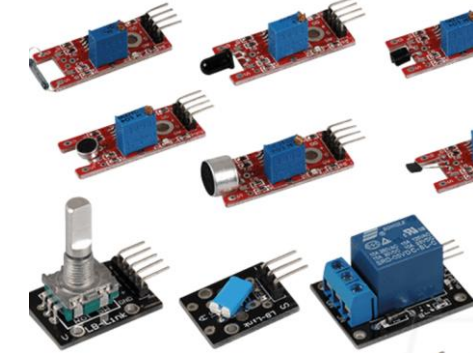
What do you need – how do you get there?

Shop floor

PLC (Programmable Logic Controller)



Sensors, Actors → Retrofit






Industrial PC → Gain Supplier Independence



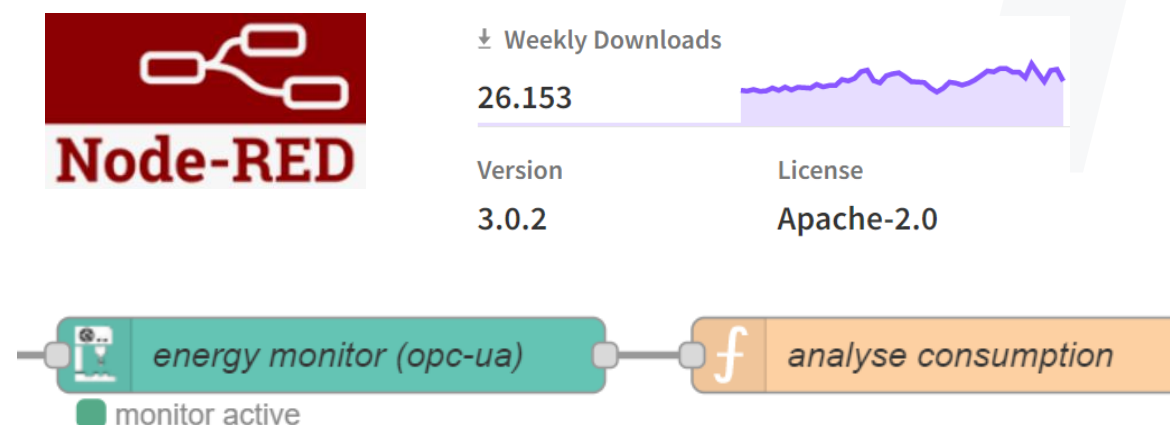
What do you need – how do you get there?

Flexible IT-Tools

- Connect your resources, sensors and actors
- Transform, Aggregate, Store, Analyze, ...
- Present (ui), Automate and Decide
- Take advantage of the “magic” of AI

- Machine, Sensor, Actor communication (Look for standard protocols such as opc-ua) 
- Security – your data is YOUR data 
- Efficient Software tools to implement your business logic, e.g. low coding platforms 

Example for low coding (open source):



Cooperations – Synergies – Industrial parks

“Coopetition”

Competition and Cooperation

- Joint R&D projects
- Joint Development / Co-development
- Subject matter communities
- Joint Services platforms / data “conformities”
- Commonly used data lakes
- AI - special interest groups
- AI - common data sets for AI based machine learning, common subject matter algorithms
- Co-Working Spaces / “Testbeds”
- Subject matter offerings / initiatives

Resources Sharing

- “Common digital spaces”
- Shared infrastructure
 - Network, Security, IT-Services
- Shared procurement
- Shared assets
 - e.g. 3D Printers
- Smart metering, “smoothen” energy peaks
 - Smart purchase via Smart Meters
- Co-Develop Sensors, Actors, Controls, “smart-devices”

Example “R&D consortium”

“eApps4Production” – Industry 4.0

- Funded by: Federal Ministry of Education and Research (Germany)
- Duration: 3 years
- Goal: Create an industrial services platform hosting manufacturing applications
- Result (among others): “Tomorrow Connect”



GEFÖRDERT VOM

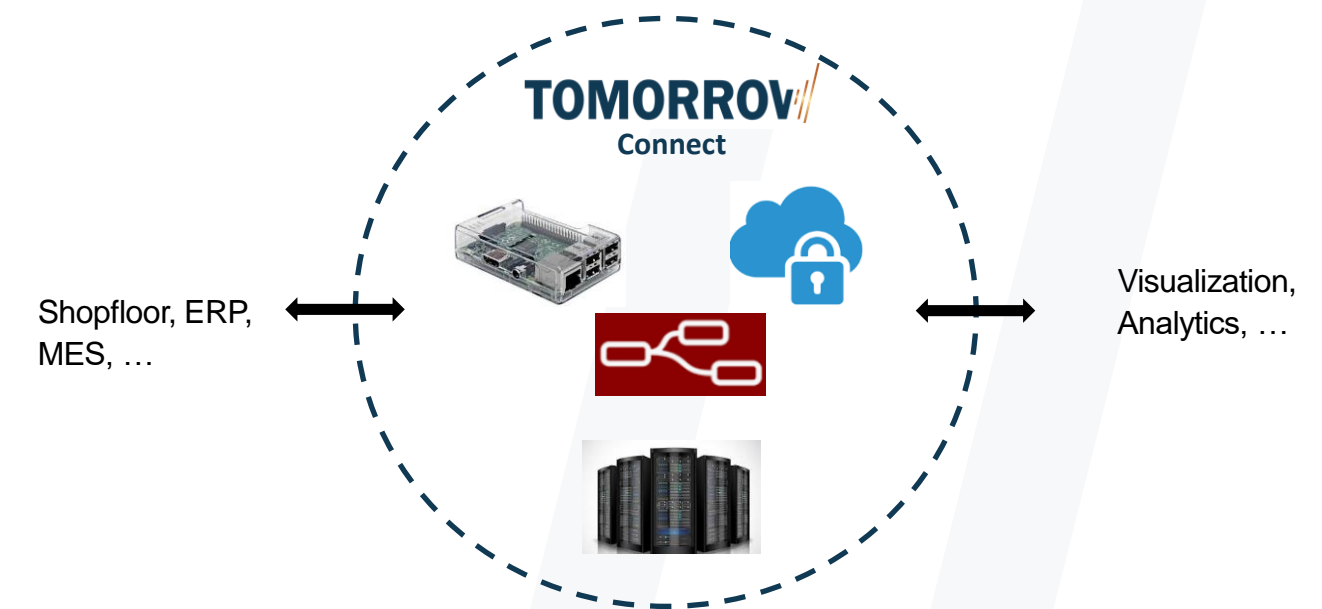


Bundesministerium
für Bildung
und Forschung

BETREUT VOM



PTKA
Projektträger Karlsruhe
im Karlsruher Institut für Technologie



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Example “Coopetition”: Production of foils



Raw granules



“subject matter value chain”



Final product

Use case:

Multiple suppliers within the plastic foils production value chain are trying to establish a common services platform:

- Uniform metadata (orientation towards ANSI/ISA-95)
- Reference implementation (open source, small footprint)



Example “Coopetition”: Production of foils

Goals/Motivation

- Securing or expanding market positions
- New business models (value-added services, data sharing)

Initial use-cases

- DRP -> "Digital Role Profile", electronic product data sheet
- Backtracking
- Production optimization: Optimized machine settings (recipe) through knowledge of material properties from previous production steps (→ previous supplier)

Discussions

- Who will provide data, what data is required?
- How do data formats look like (metadata)?
- How to handle security
- Should it be for free, or license based
- How does the “value add” mature into \$\$\$ for each party?
- Who may access the data

Critical Success Factors

- Have the **right people** on board!
- Look at the opportunities rather than on the threats
- Don't over-manage and overload with never ending requirement write-ups, structure definitions, architecture decisions and endless meetings
→ **just get started!**

Cooperations – Synergies – Industrial parks

“Coopetition”

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Example Testbed: TUM – Makerspace

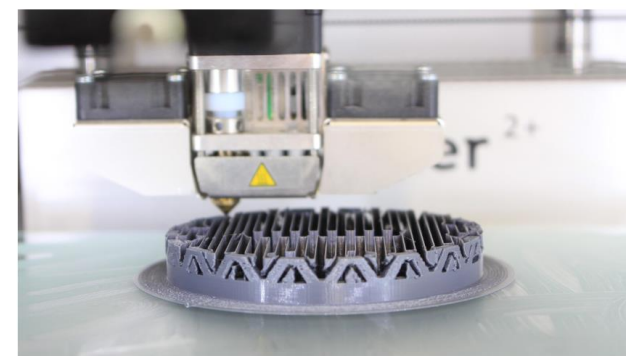
(TUM = Technical University of Munich)



ÜBERSICHT GARCHING



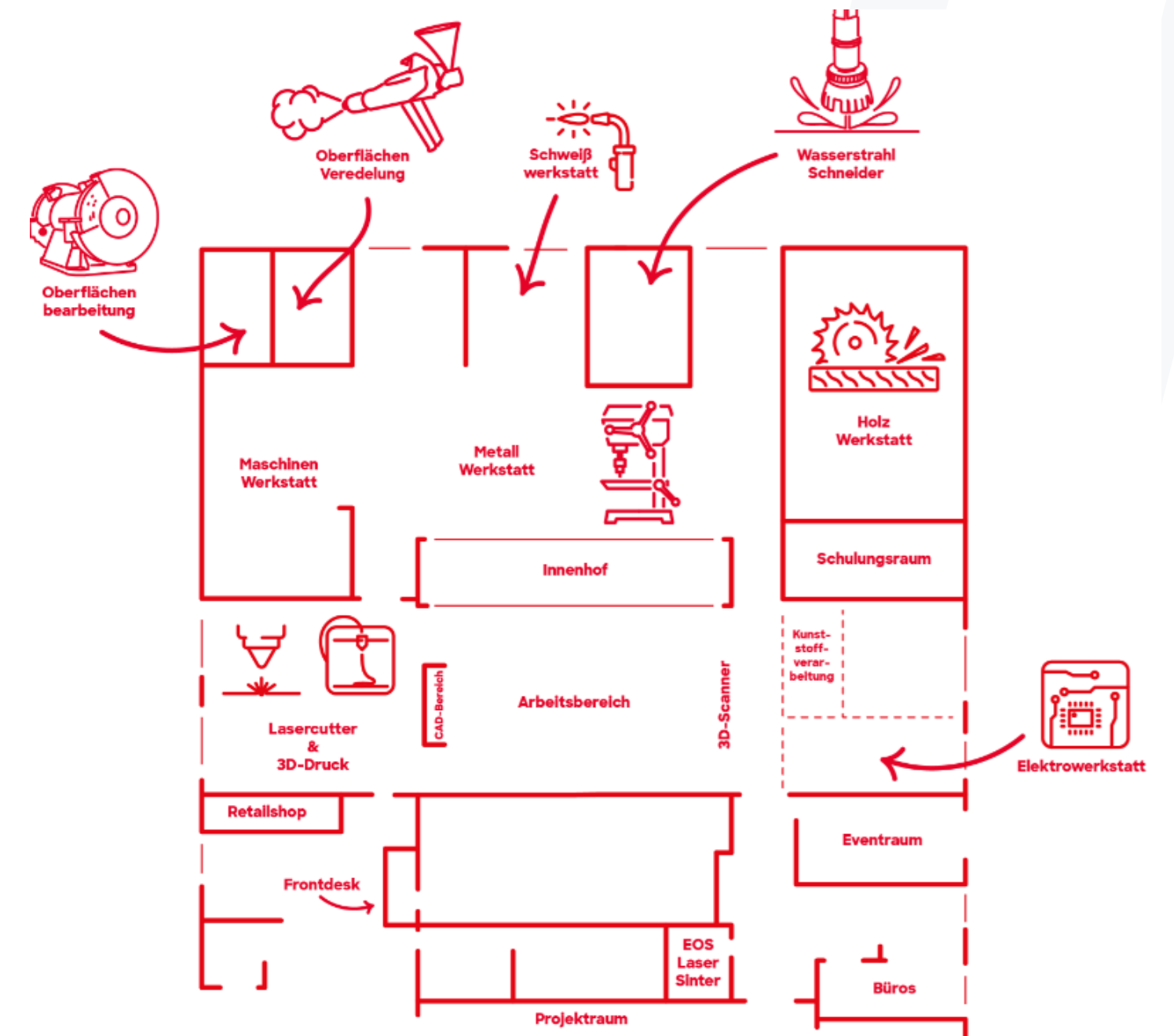
LASERCUTTER



3D-DRUCK



KUNSTSTOFF VERARBEITUNG
(Synthetic materials)



A yellow toy robot with a camera-like head and a small arm, standing on a wooden surface against a sunset background. The robot is positioned on the left side of the frame, looking towards the right. The background is a warm, golden sunset with a bright sun low on the horizon. The text "Industry 4.0 – Digitalization" and "There is no reason to wait" is overlaid in the center-right area of the image.

Industry 4.0 – Digitalization

There is no reason to wait



Thank you

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TOMORROW
LABS



Backup

TOMORROW
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Your “cookbook” for getting started

„Think big – start small“

How to get started – what is the effort?

01. Define Team and Asset

First, identify a machine or production resource that can ideally be connected via a standard protocol (OPC-UA / MTConnect). Of course, you also need motivated employees who have specialist knowledge to be able to interpret the data coming from the machine.

02. Connect Asset

In this step, internal IT staff needs to be involved. The machine data is processed, interpreted and stored on a computer. Initial evaluations can be made.

For such data analysis, "business administration" or "controlling" can already be integrated.

03. How big is the effort?

If the prerequisites are in place, the first machine can be connected within one day.

If you add a few more days to interpret the data, you can take the first step towards digitizing the factory floor within a week.



„Think big – start small“

Von den ersten Erkenntnissen zur Digitalisierung des Unternehmens

04. The first findings

We experience that the first findings are already so surprising that you can think about the "Big Picture".

Gradually you develop your own data model: Which information is important for my decisions? (e.g., cycle time, down time, good/bad parts, energy consumption, capital lock, ...)

05. „Think big“

What are the next steps, what information is still missing?

How do I motivate the team, who must be there from the very beginning?

How do I create the "momentum" from operator to management?

How do I integrate all production resources, even older machines?

06. Iterative Steps

Gradually connect the factory, depending on the importance and knowledge gained. Incorporate operational systems (ERP, MES, legacy applications).

Integrate more corporate functions, from sales to the customer.

