Collaborative data-driven business models

Collaborative Condition Monitoring
How cross-company collaboration can generate added value
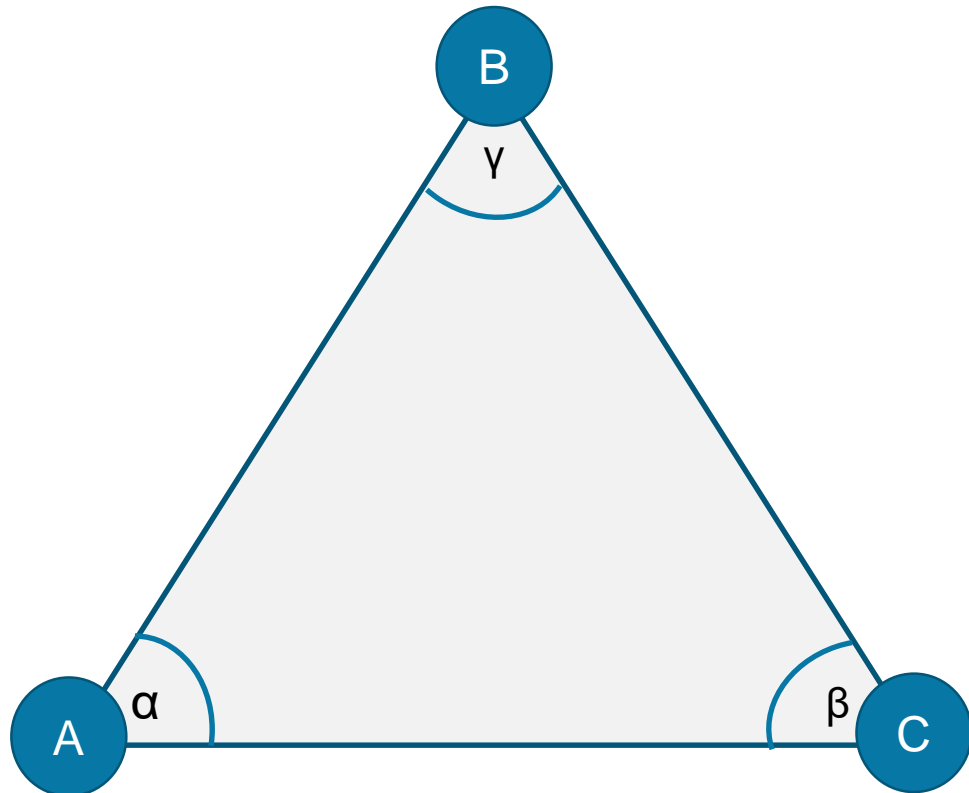
Webinar

9th Sept 2020

Collaborative data-driven business models
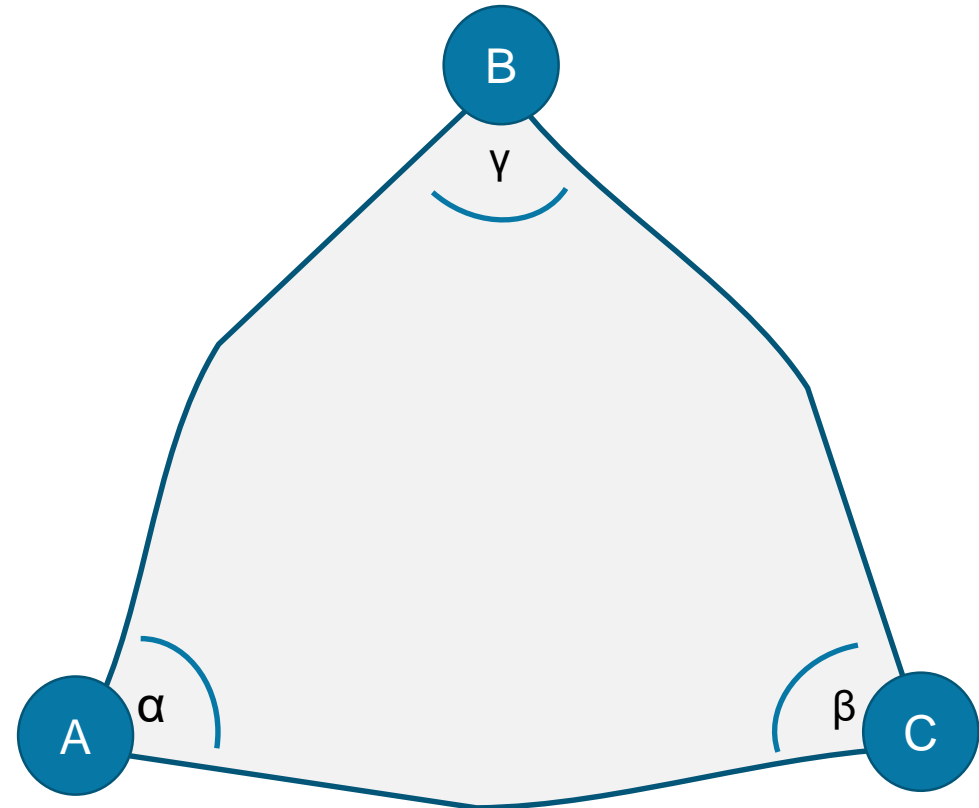## Vision of the Plattform Industrie 4.0

Collaborative data-driven business models
Hypothesis: Multilateral data sharing bends the triangle

α + β + γ = 180

α + β + γ > 180

Foli

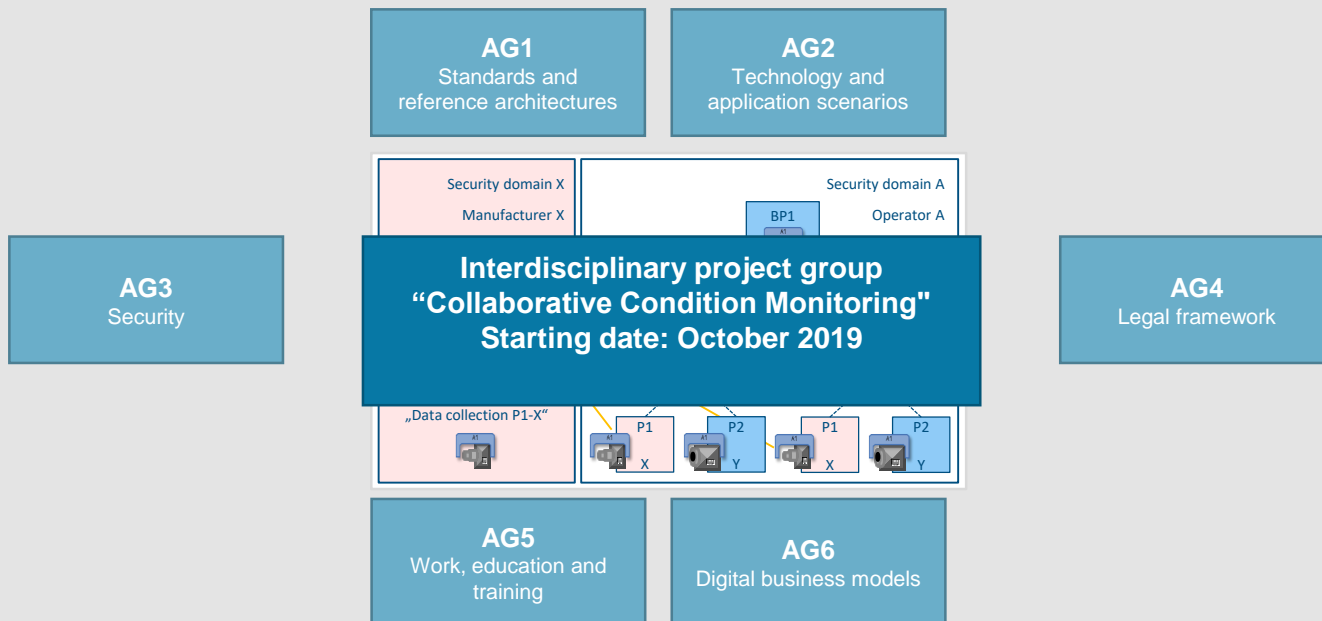# Collaborative Condition Monitoring
Use Case „Collaborative Condition Monitoring" (CCM)

- The UseCase "Collaborative Condition Monitoring" (CCM for short) deals with the collection and use of operating data to optimize the reliability and service life of machines and their components during operation

- In the real world, installed machines come from different machine suppliers that are equipped with different products from different component suppliers

  - Challenge for manufacturer X (component supplier) to access the data of his delivered product X.

- CCM supplements the classic version with the aspect of multilateral cooperation

  - Cross-company and cross-competition sharing of data

  - Classification of the data, including in data that does not differentiate between brands and products
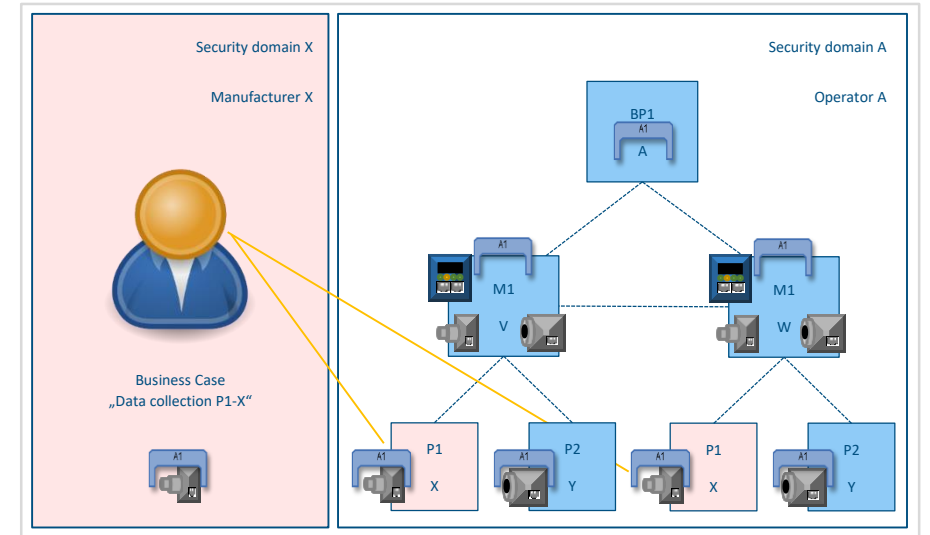
Collaborative Condition Monitoring
An interdisciplinary task for all working groups of Plattform Industrie 4.0

Initiation of a cross-workgroup **project group "Collaborative Condition Monitoring"**

- Development of a **common description** for the use case
- Merging of existing partial approaches in a **holistic, integrative implementation model** as an exemplary illustration of the mission statement of the Plattform Industrie 4.0
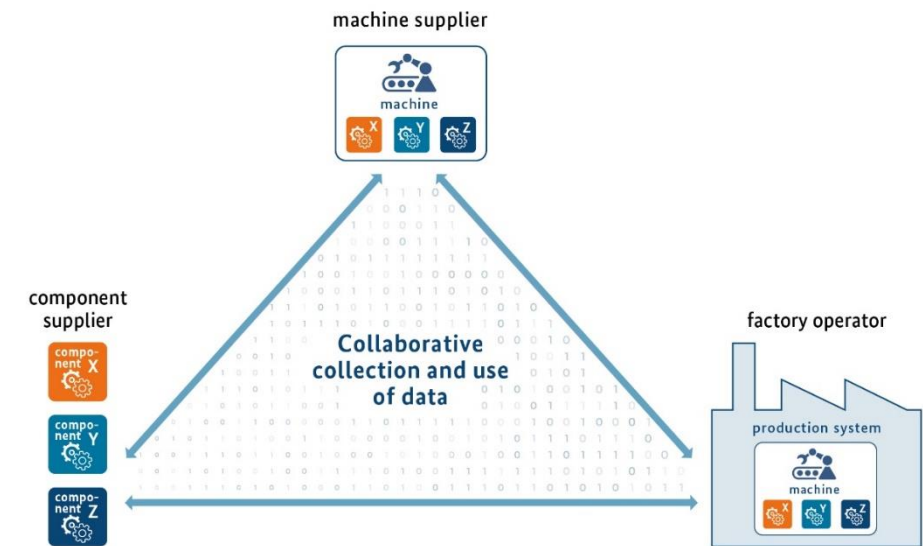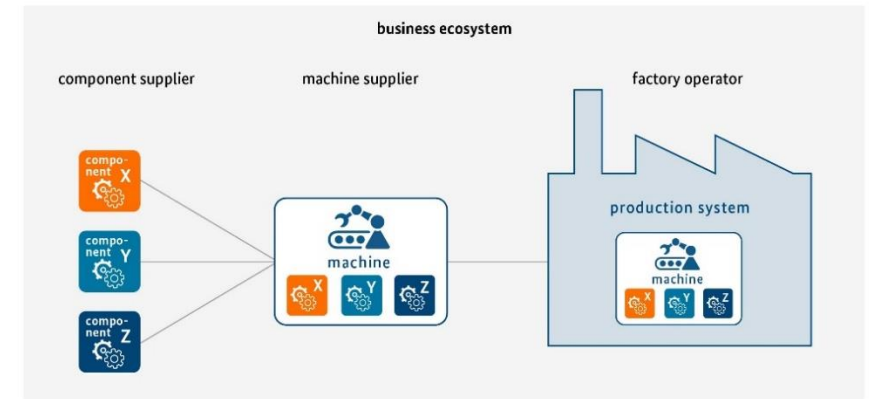
Collaborative Condition Monitoring
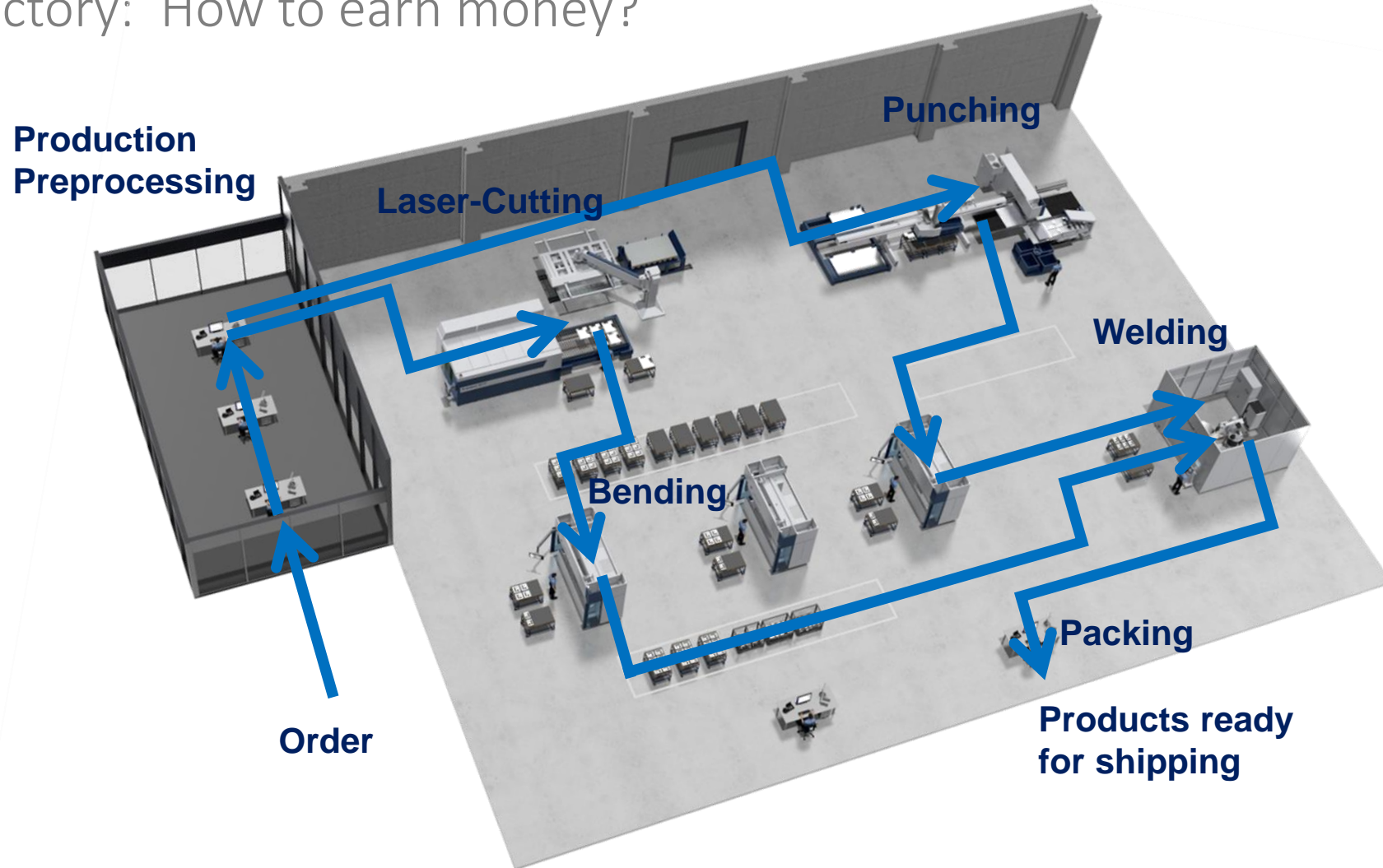## Key questions

1. How can **data be monetized** (including shared data)? Who receives what share of the benefits generated by collective data provision?

2. How does the **use of AI** expand the application options?

3. How is **flexible communication** made possible between all partners across all instances?

4. How are **security and trust** in data usage and access guaranteed?

5. How can we achieve a **legally use** of the data?

6. How do we ensure usability in the **application by people** down to the shop floor?

Collaborative Condition Monitoring
Three-point fractal

- A three-stage value chain with various actors is considered as an exemplary, simplified process of an operational ecosystem

- The smallest possible fractal of a multilateral structure is a three-point structure, shown here as a component supplier, machine supplier and factory operator

- Hypothesis:

  - An <u>economic advantage</u> can be generated within the digital ecosystem ("digital business model") by increasing the reliability and service life of components and machines.

  - **Prerequisite**: Collaboration between all those involved in the value chain

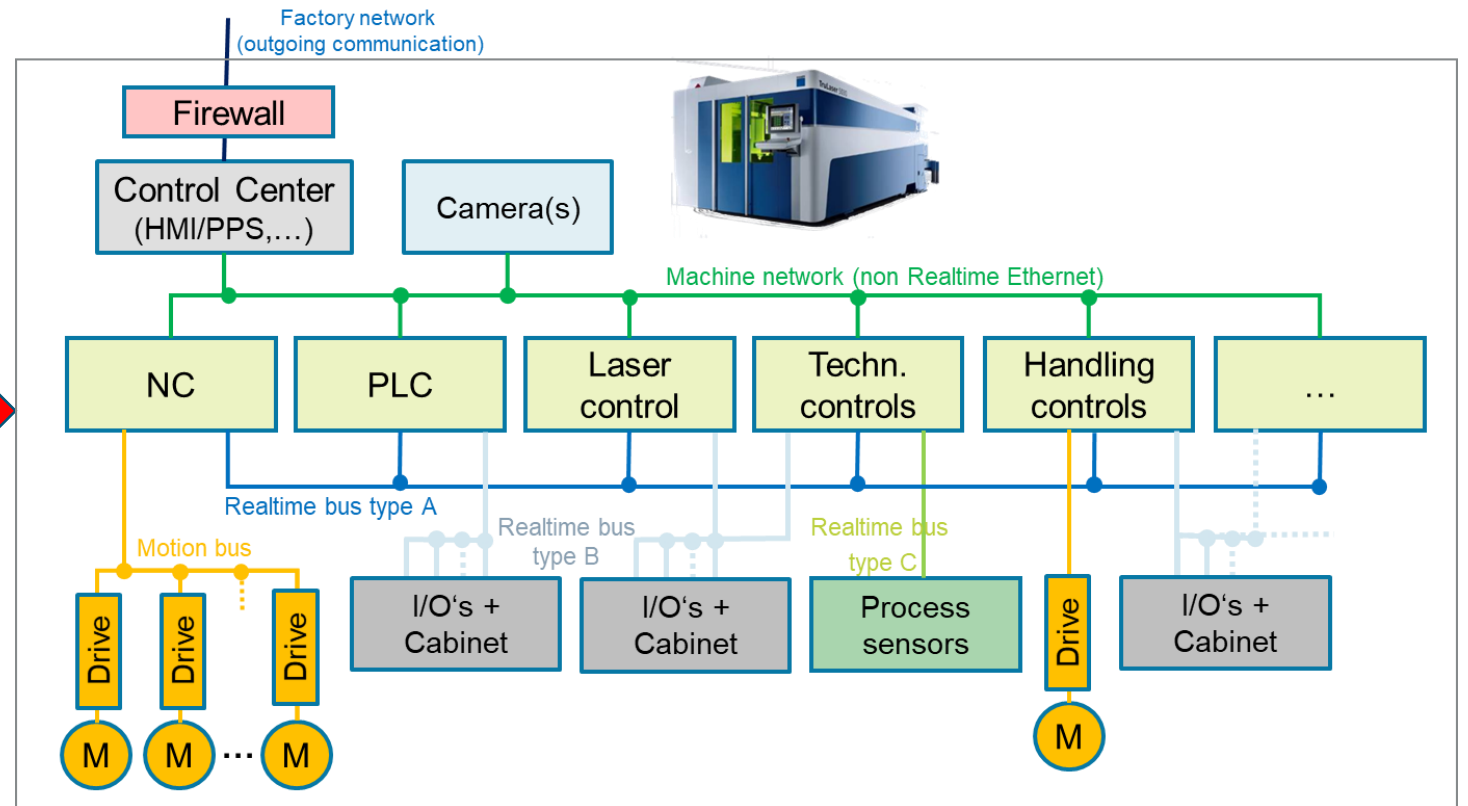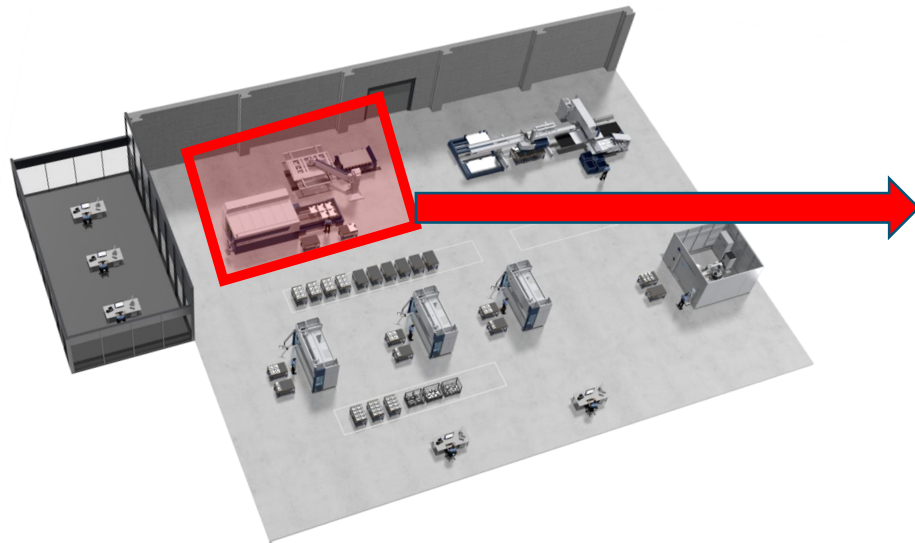 - **Main requirement**: Access to the data depending on the authorizations
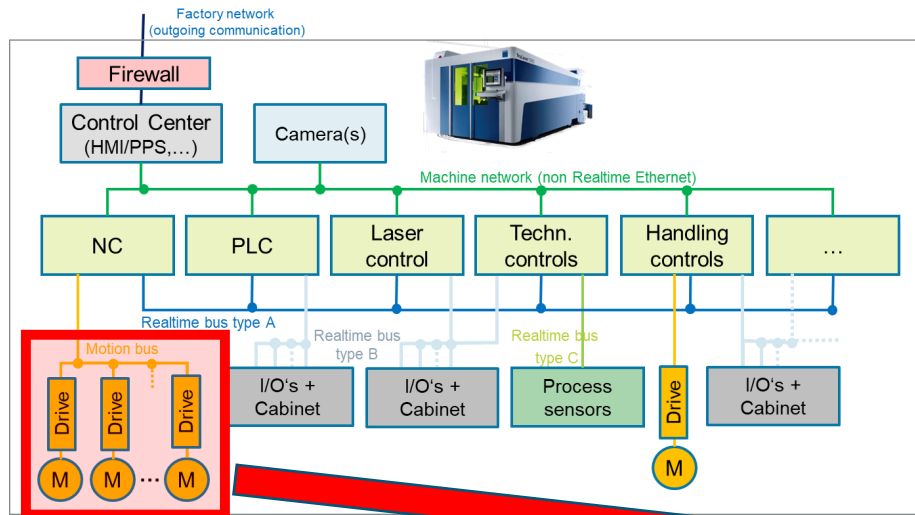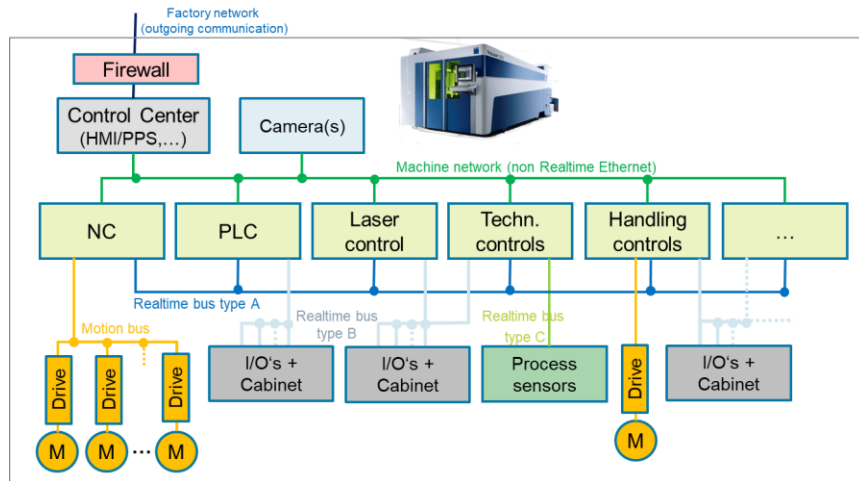
Smart Factory: How to earn money?

Production
Preprocessing

Laser-Cutting

Punching

Welding

Bending

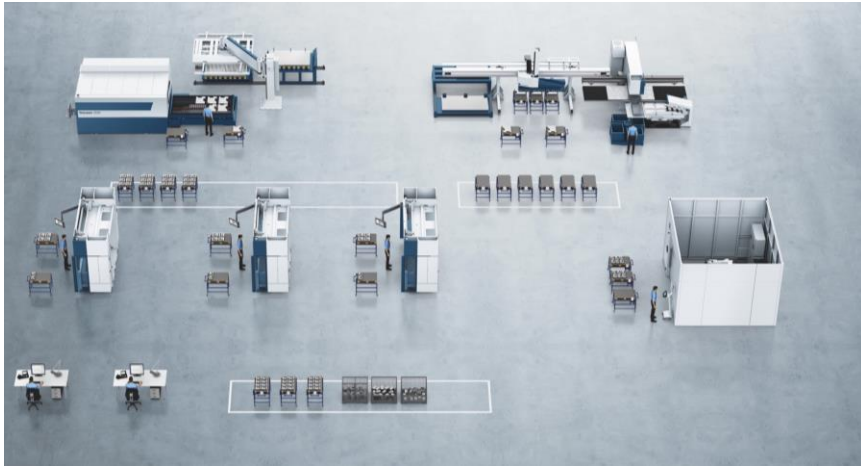Packing

Order

Products ready
for shipping

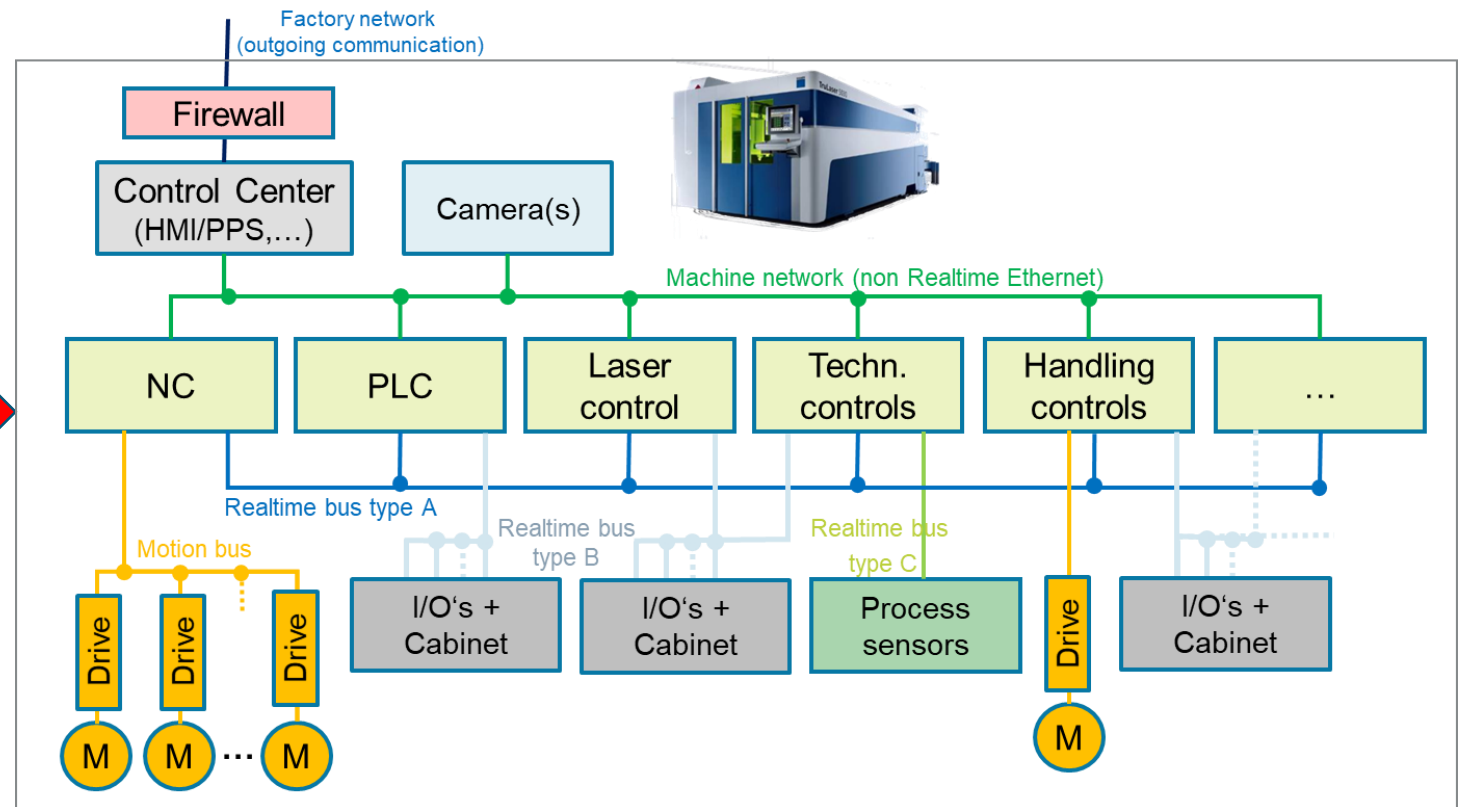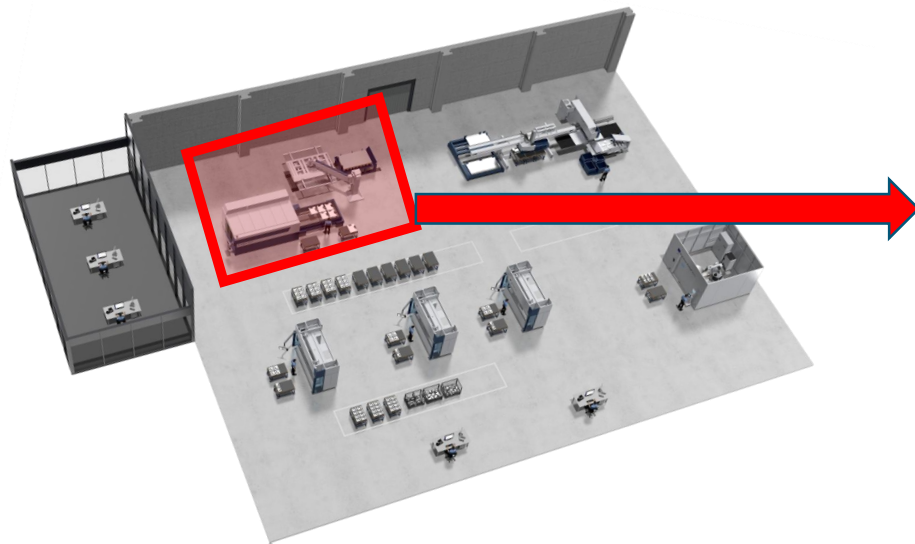# Who owns the data? Who is able to work with the data?

What about data from sensors and actors (with drives beeing actors and sensors)

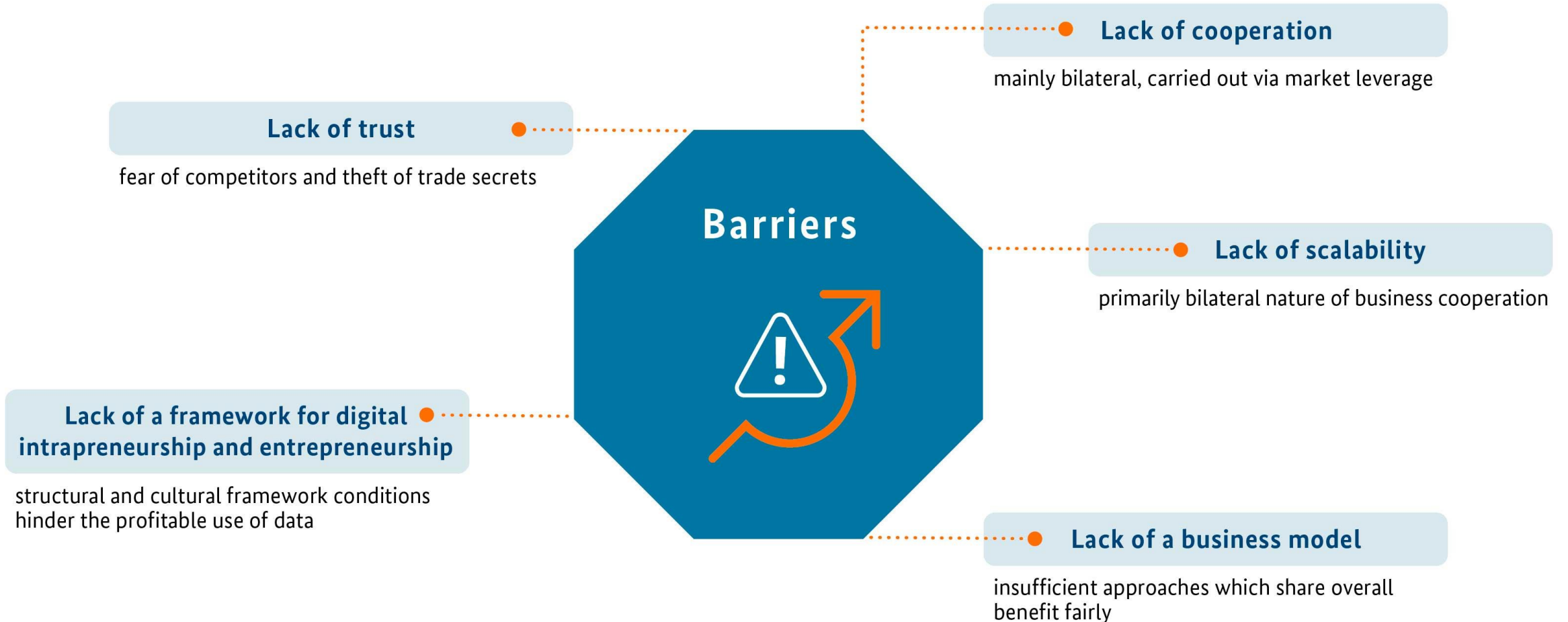# Vision: Collaborative Condition Monitoring

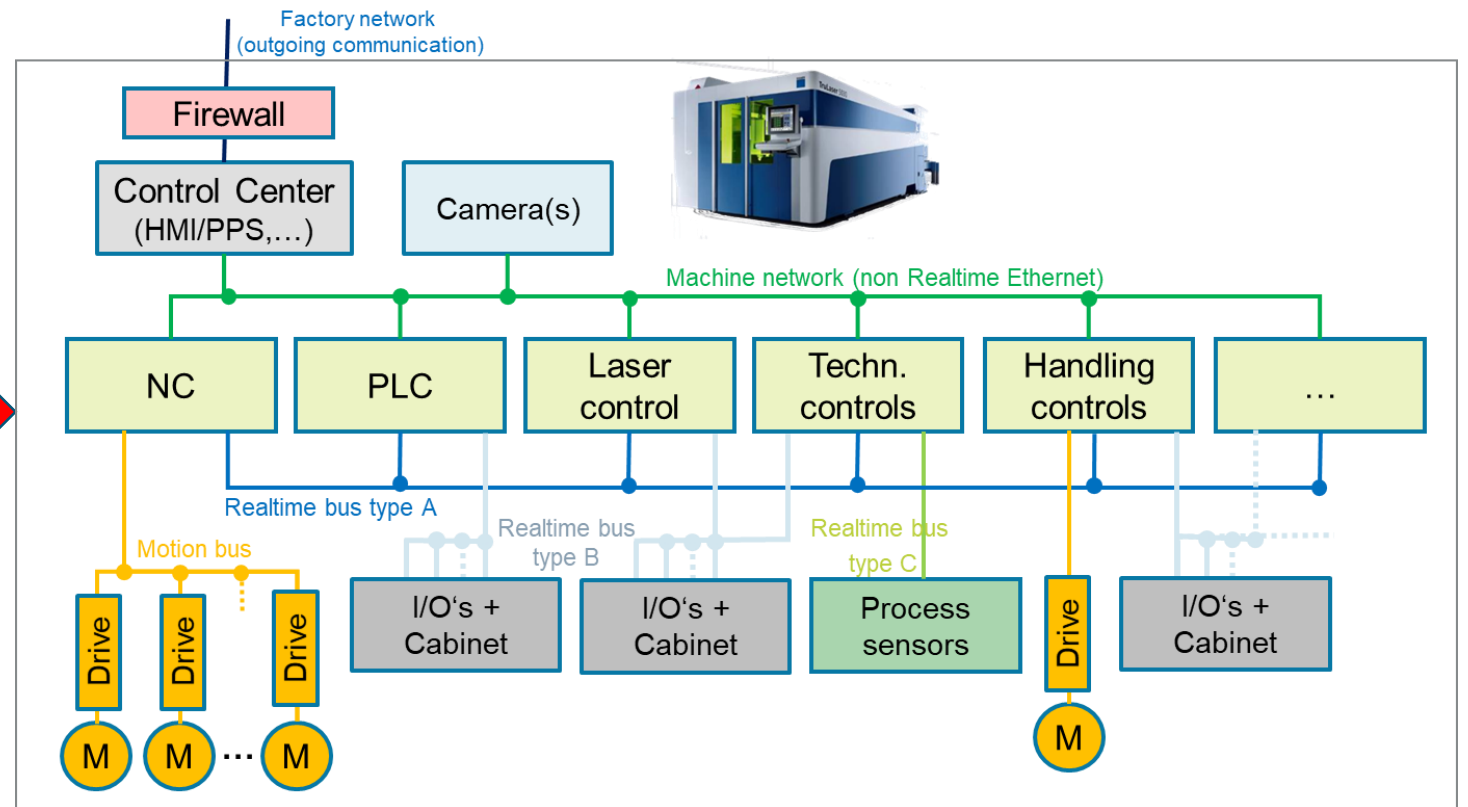# Why is this still a vision for factory owners, machine and component suppliers?
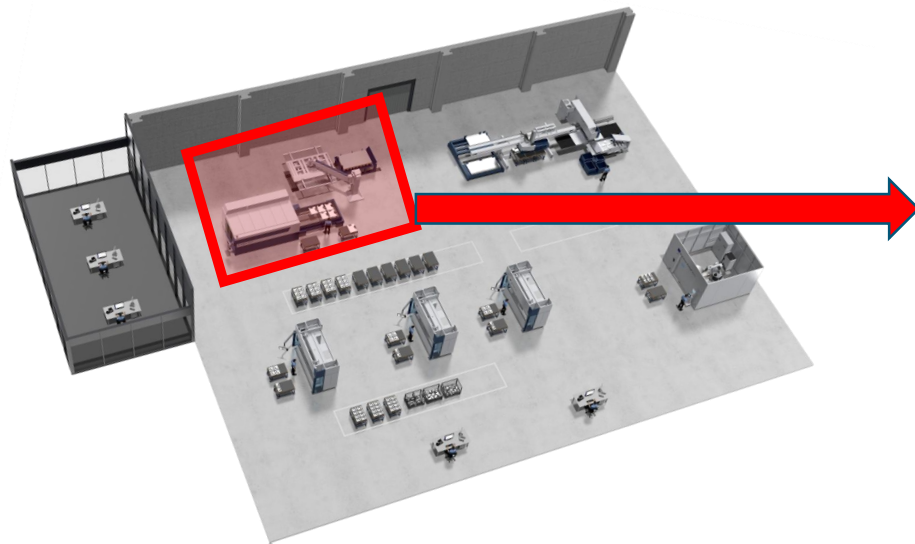
Collaborative Condition Monitoring
## Current barriers to implementing collaborative business models

Lack of cooperation

mainly bilateral, carried out via market leverage

Lack of trust

fear of competitors and theft of trade secrets

Barriers

Lack of scalability

primarily bilateral nature of business cooperation

Lack of a framework for digital intrapreneurship and entrepreneurship

structural and cultural framework conditions hinder the profitable use of data

Lack of a business model

insufficient approaches which share overall benefit fairly
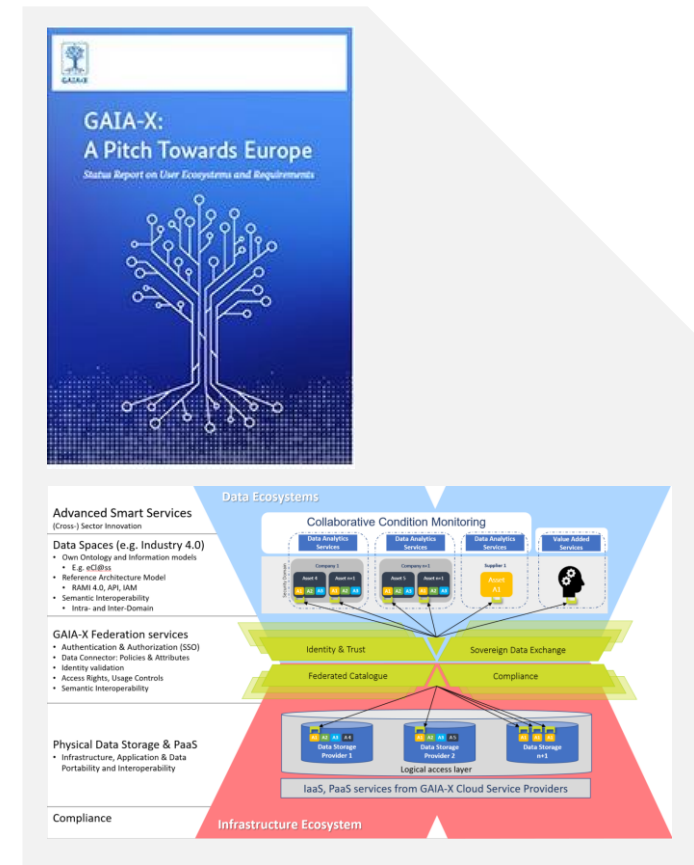
What would be a suitable information model and platform approach?

Collaborative Condition Monitoring
## Solution modules – Neutral integration platform
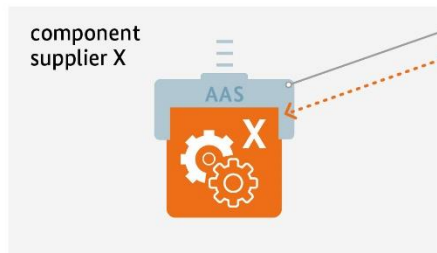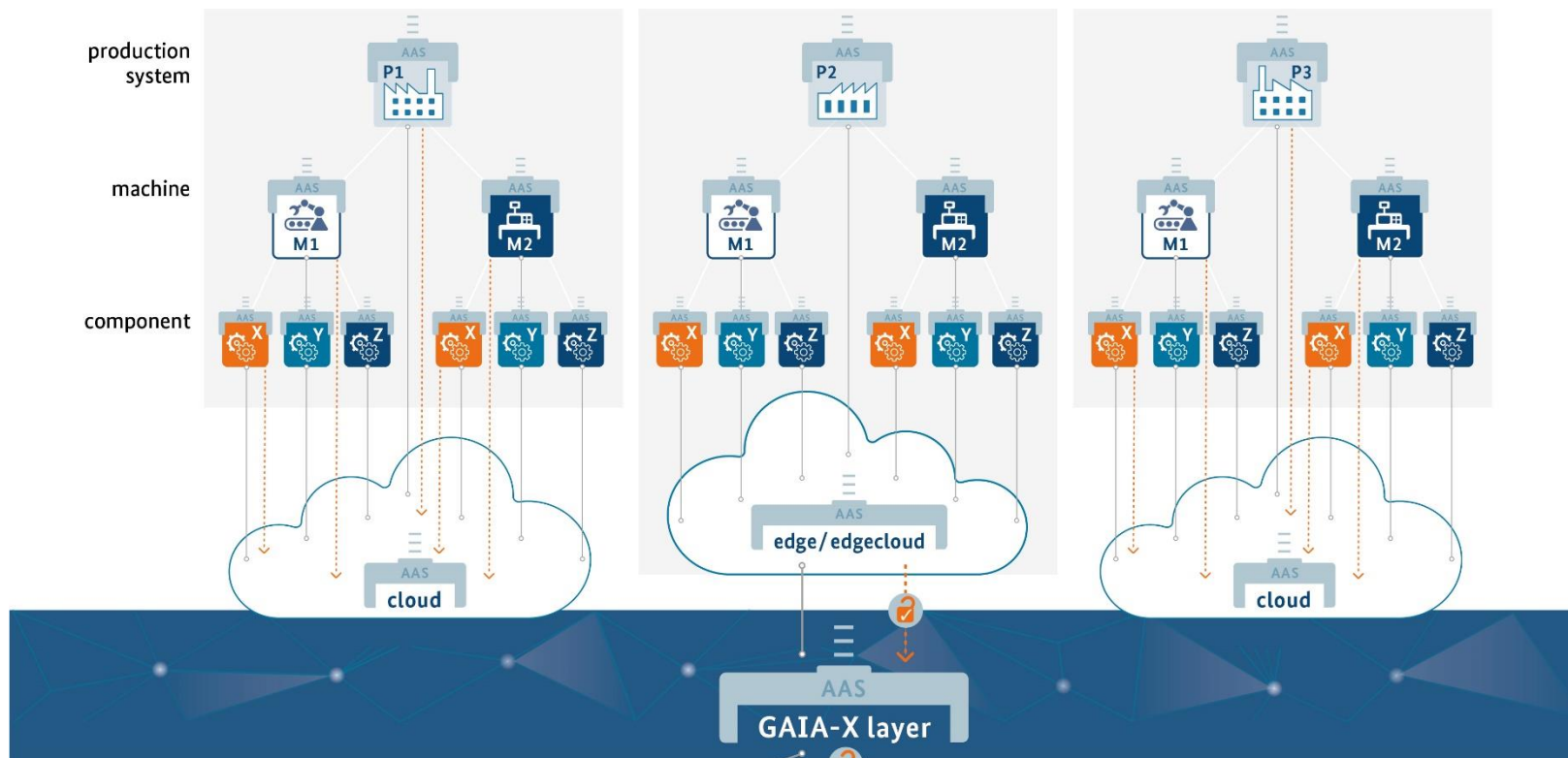
Note regarding graphics: this is an „Information" point of view: arrows show information relations, *not* network infrastructure

Collaborative Condition Monitoring
Solution modules – digital standards, e.g. Asset Administration Shell (AAS)

- Digital Standards
  - Use of AAS, semantically interoperable in terms of content and access rights
  - Submodel of AAS for asset-specific data on reliability and service life
  - Secure access, authorization and communication

- Possible implementation
  - The component supplier provides a component with an AAS that contains data fields for data relevant to service life and reliability.
  - The machine supplier delivers his machine with its own AAS which also contains data fields for service life and reliability-related data.
    - The AAS of the machine will be upgraded to be able to forward the data of the machine and the components accumulated over the service life of the machine to a neutral platform
  - The factory operator supplements the data with relevant machine usage data (e.g. operating temperatures, maintenance intervals) based on the data fields in the administration shell.
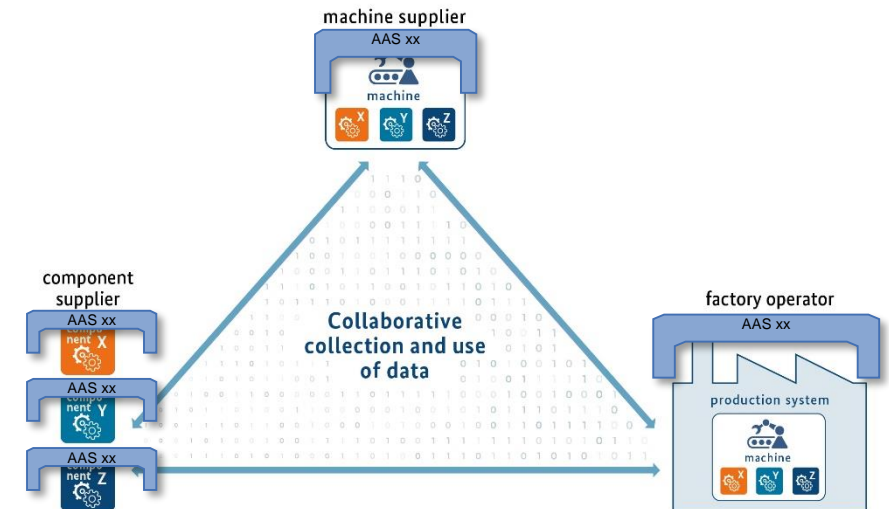
Collaborative Condition Monitoring
Further solution modules

➢ Digital identities

    ➢ Usable cross-company and cross-border for authentication

➢ Data sovereignity

    ➢ The data owner decides which data is shared with which user, with which access rights and for what purpose it is processed.

➢ Governance and legal framework

➢ Digital know how within the company

➢ Courage for data entrepreneurship: Field of action for industry

➢ PoC - Implementation

Collaborative Condition Monitoring
## Applicability in other industries

Example: production (physical assets)

- The smallest possible fractal of a multilateral structure is a three-point structure, shown here as a component supplier, machine supplier and factory operator
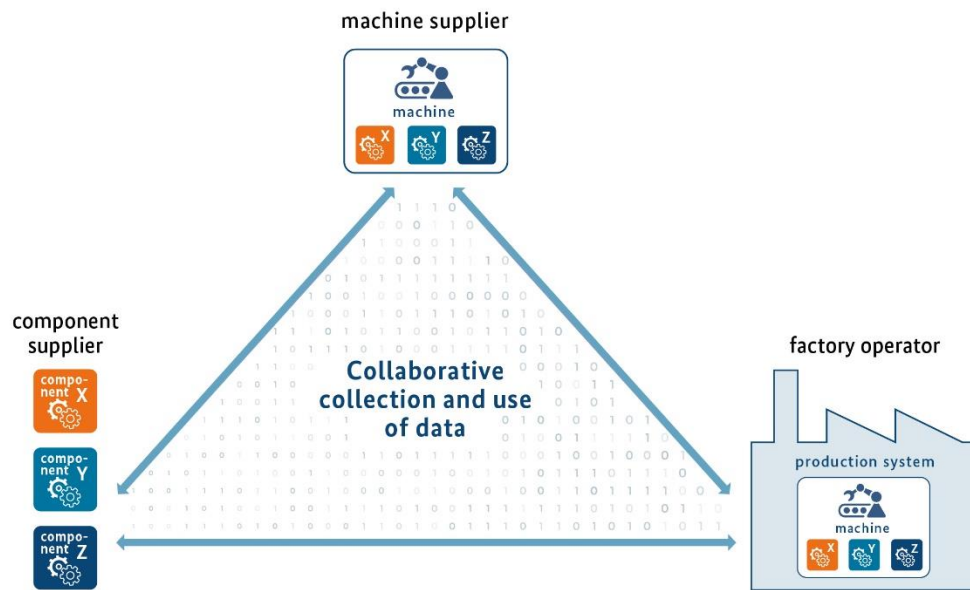
Example: virtual assets

- The smallest possible fractal of a multilateral structure is a three-point structure, shown here as a data producer, data hybrid (producer / consumer) and data consumer
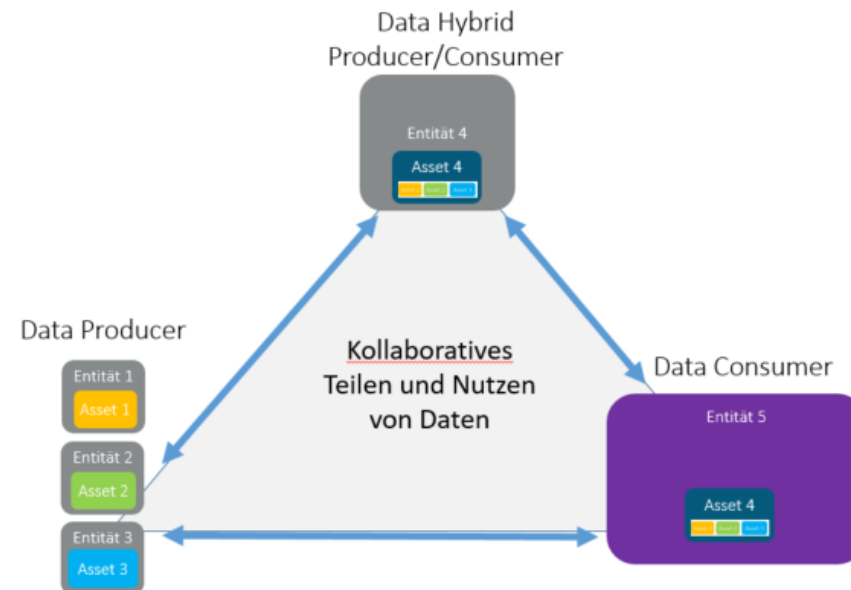
Reallabor für die Anwendung von Künstlicher Intelligenz in Industrie 4.0

Living Lab for the application of artificial intelligence in industry 4.0

Webinar „Collaborative Condition Monitoring"
Online, October 9th, 2020
Bastian Rössl
Fraunhofer IOSB-INA - Big Data Plattformen
Campusallee 1, 32657 Lemgo

Living Lab: SmartFactoryOWL

- Open research and demonstration platform

- Research - Transfer – Qualification

- Industrial IoT Experience Center (IIOT)

- Foundation: April 11th, 2016

- A joint initiative of the Fraunhofer Gesellschaft and Technische Hochschule Ostwestfalen-Lippe
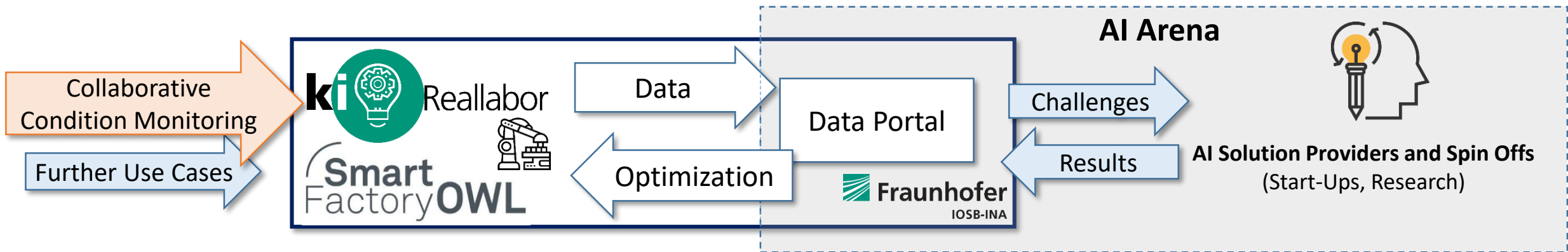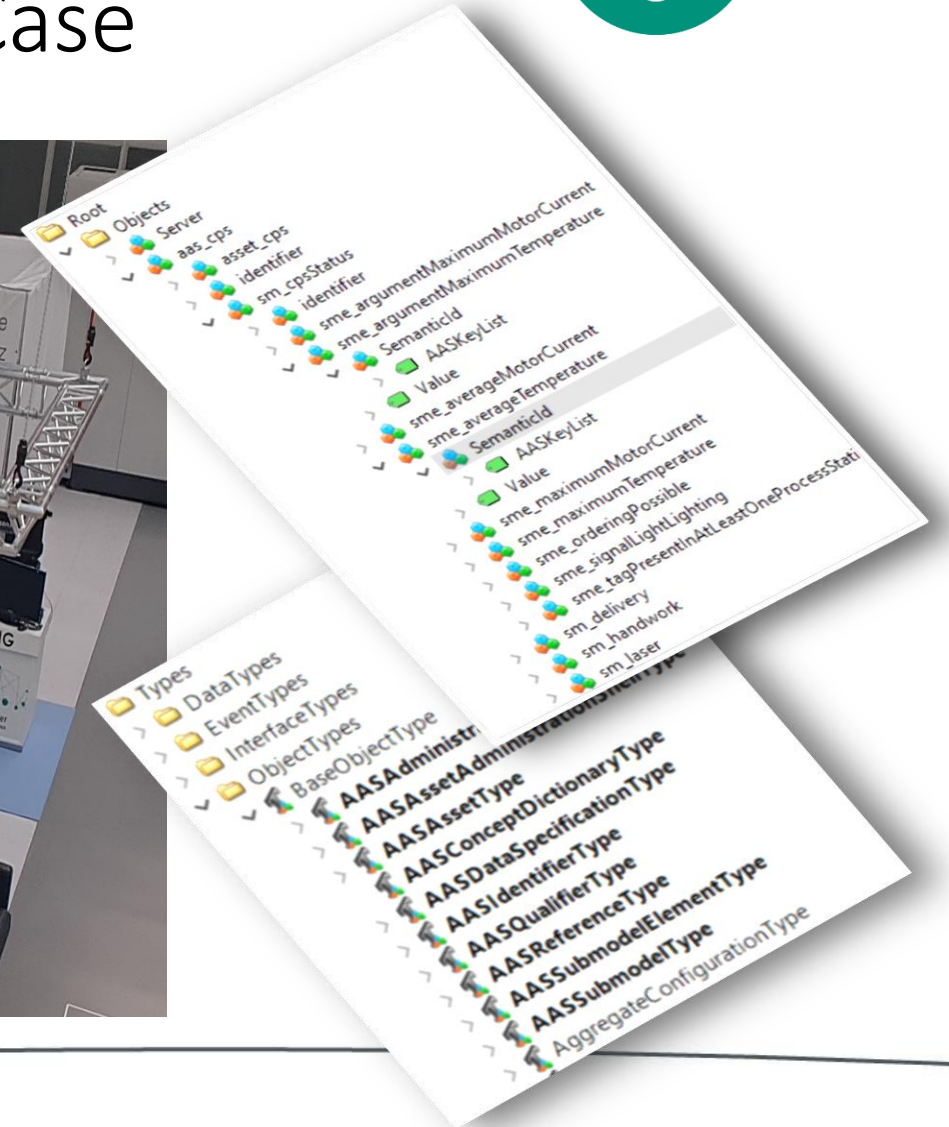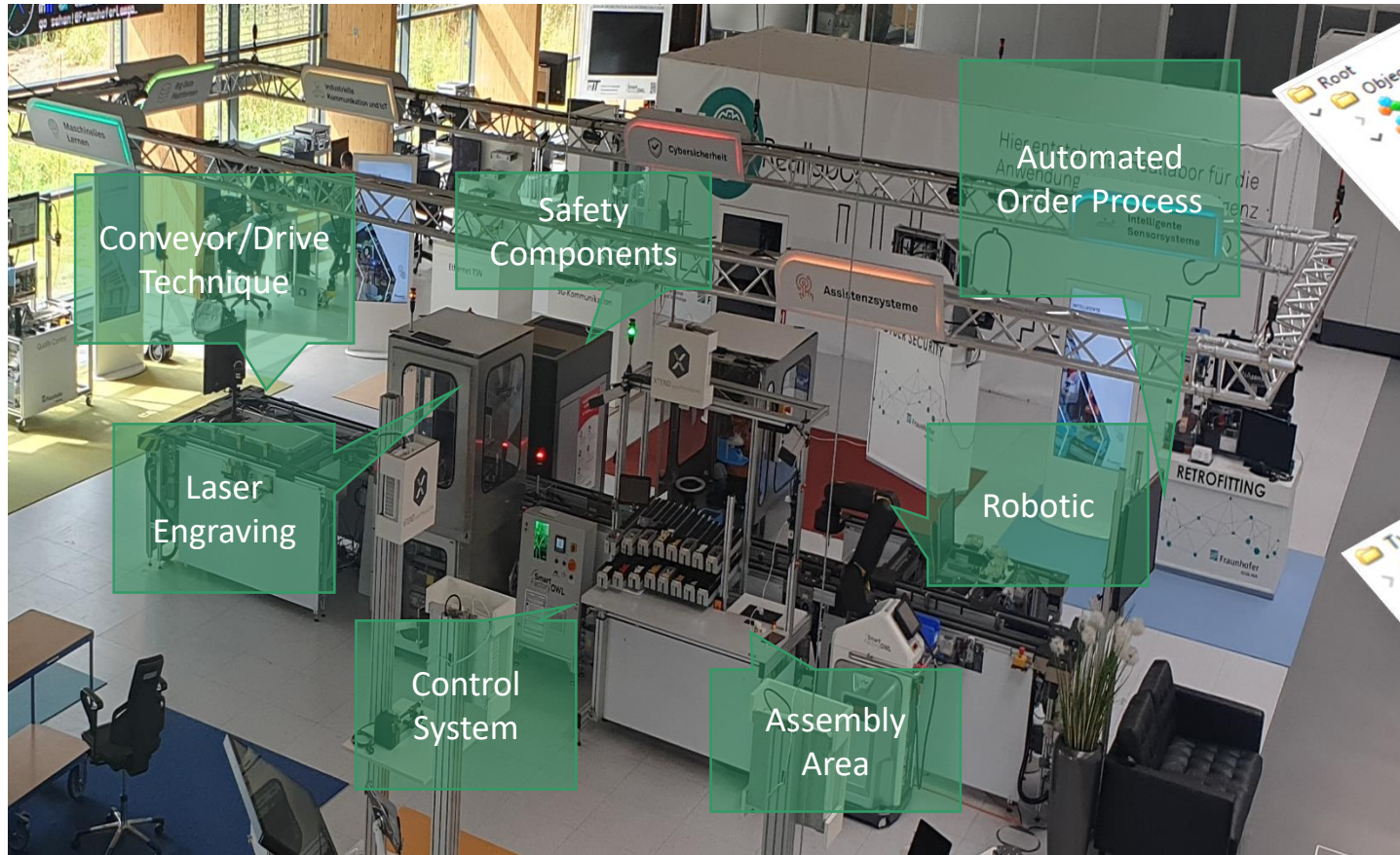
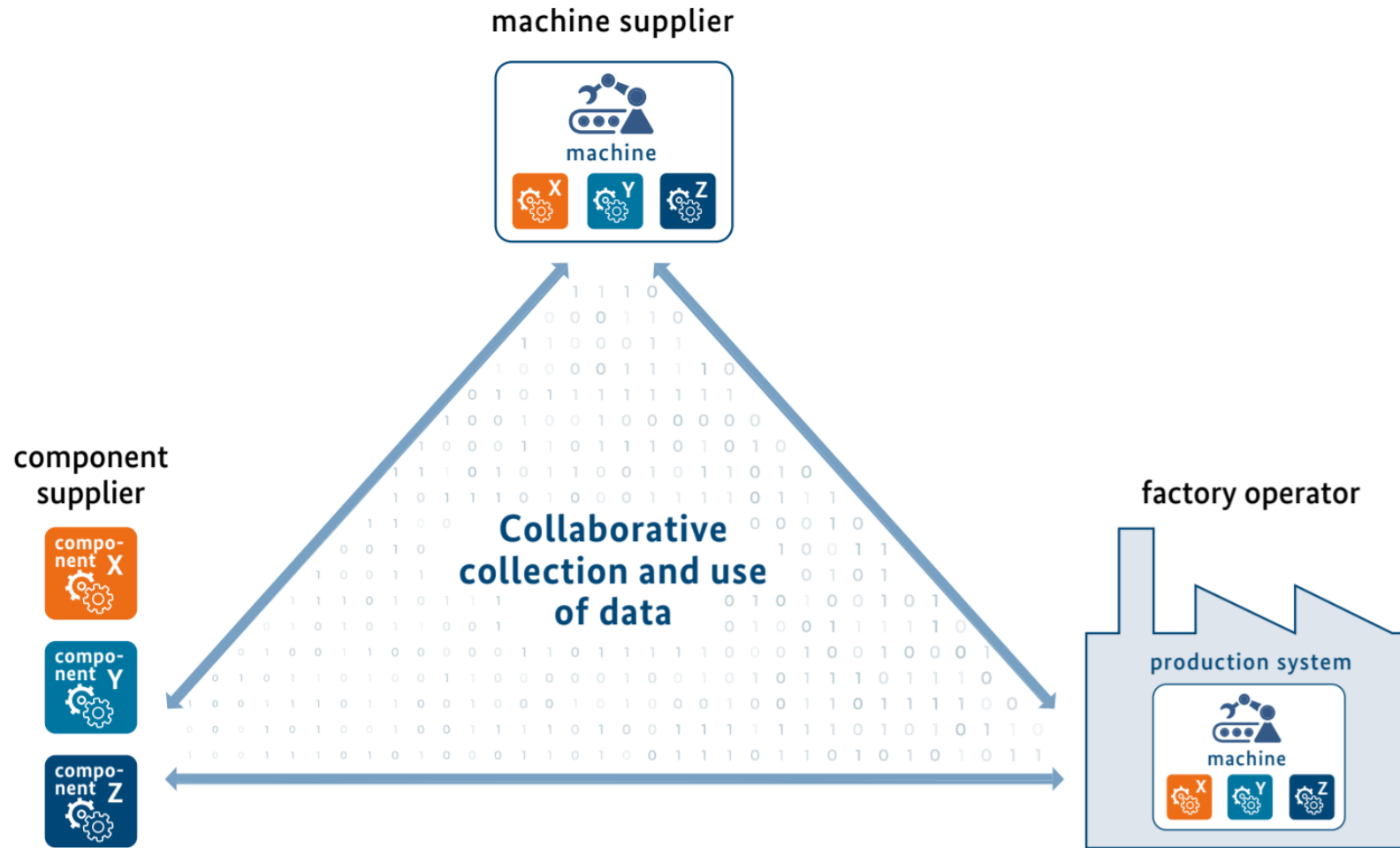www.smartfactory-owl.de

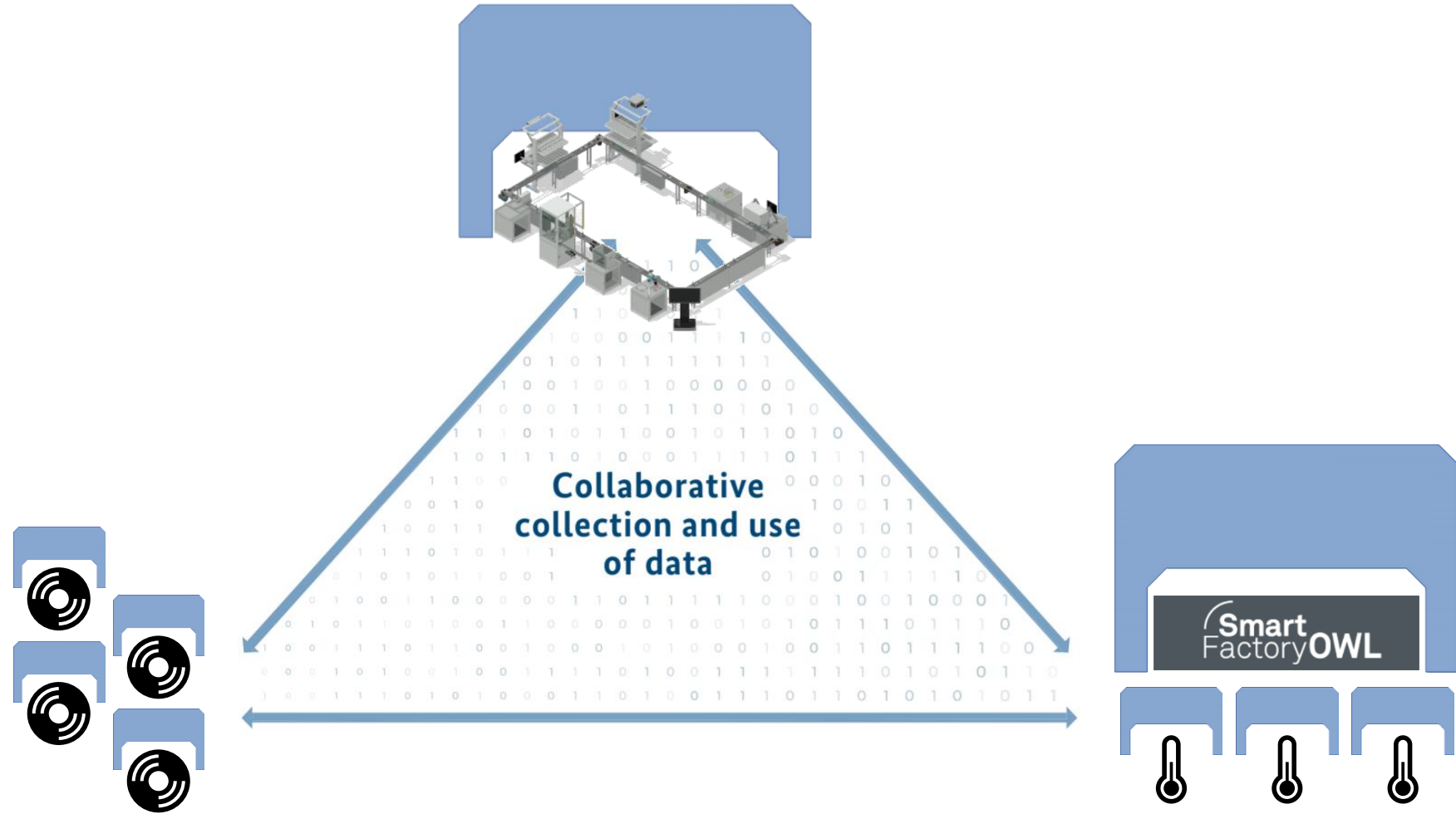# KI-Reallabor

Project overview - within context CCM

„Customized Production System" as Demonstrator for the CCM Use Case
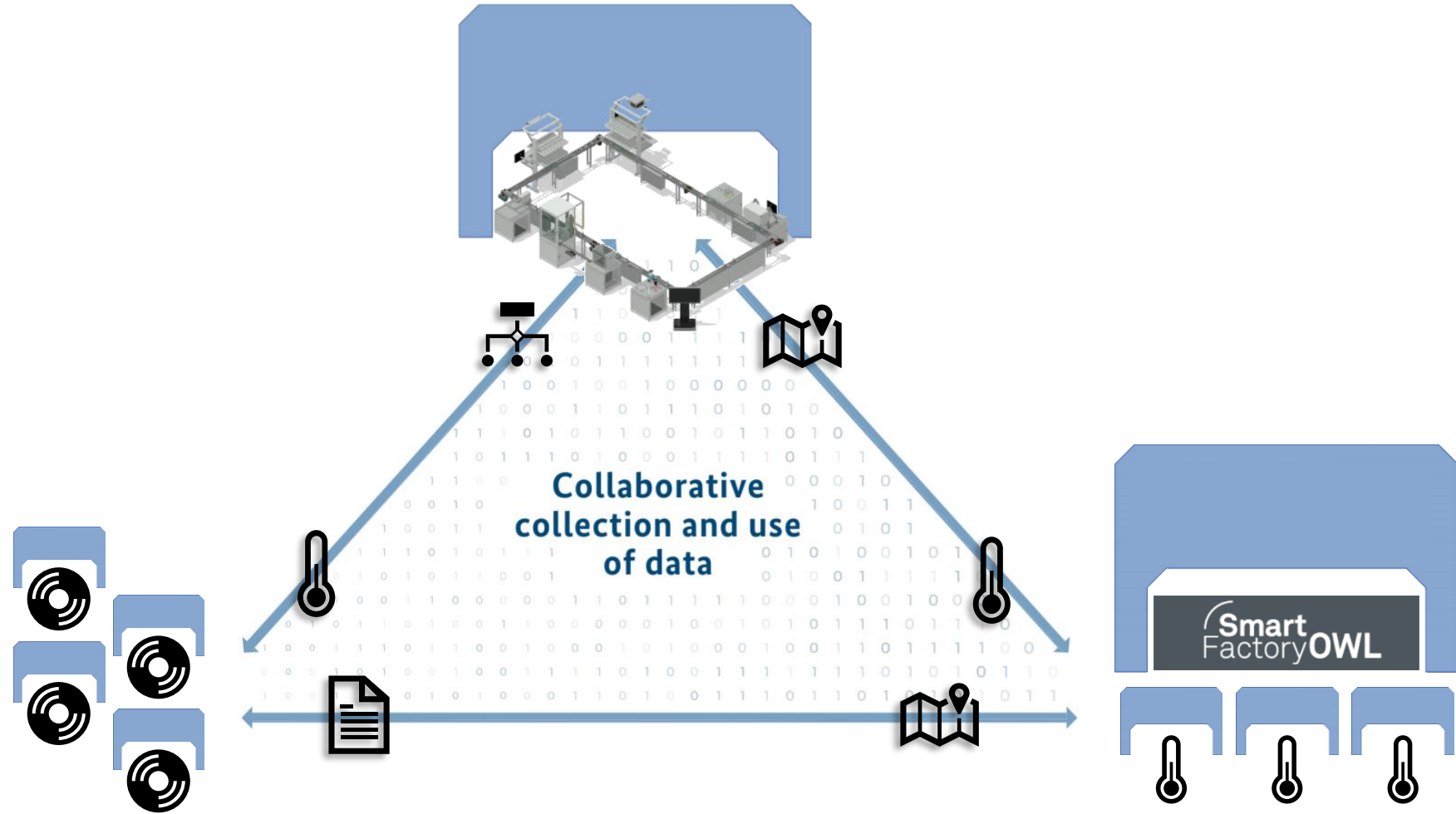
The multilateral three-point fractal …
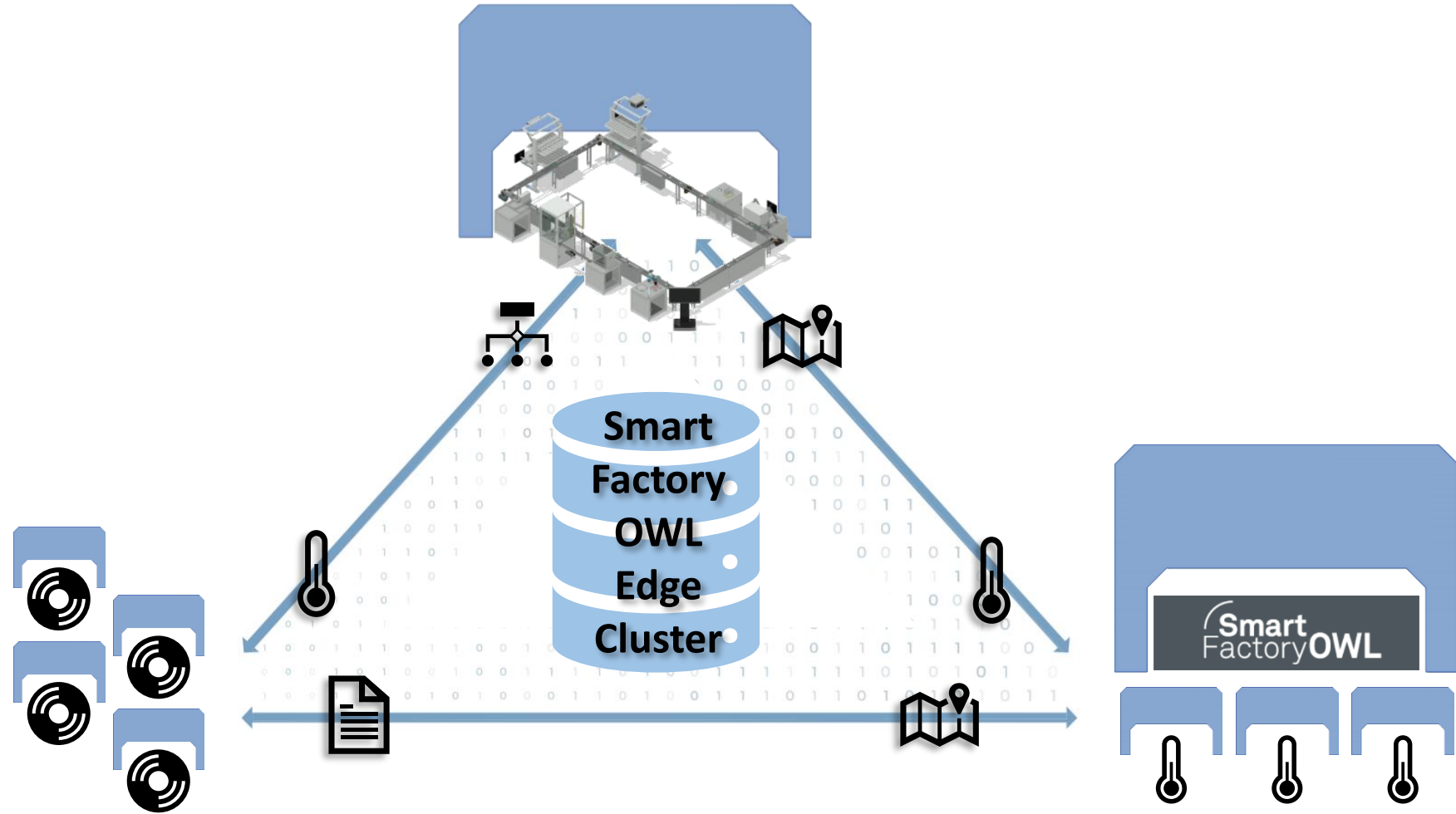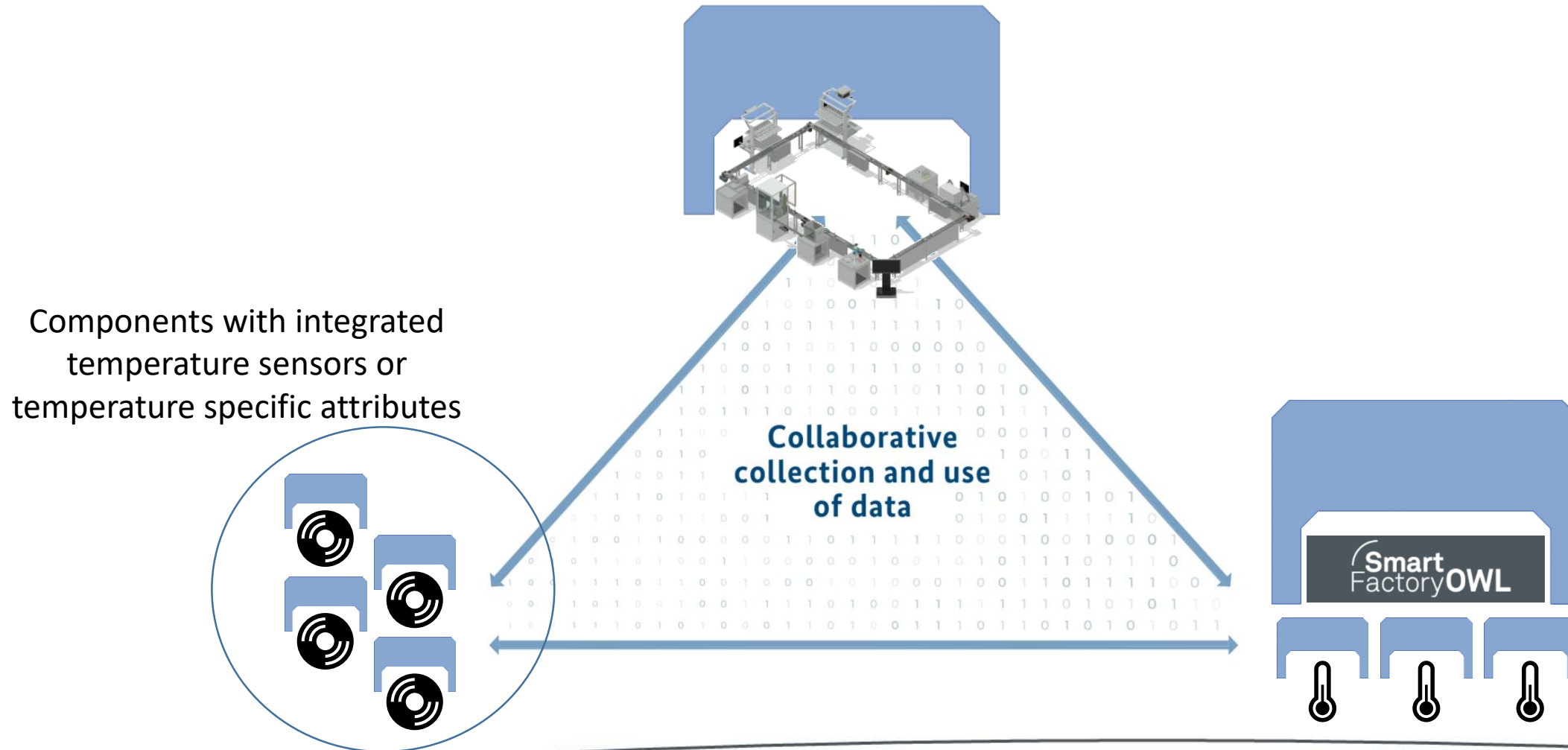
... with reference to the „Customized Production System"

Collaborative collection and use of data

Smart Factory OWL

Motivation

Collaborative collection and use of data

Motivation

Smart
Factory
OWL
Edge
Cluster

Temperature specific attributes on component level

Components with integrated temperature sensors or temperature specific attributes

Collaborative collection and use of data

SmartFactoryOWL

Submodels for temperature specific data on type level

Temperature specific process data on factory level

Collaborative collection and use of data

3 thermometer and hygrometer

Temperature specific process data on factory level

Asset

AAS

Data

https://www.hsu-hh.de
/aut/aas/nameplate

http://opcfoundation.org
/UA/I4AAS/
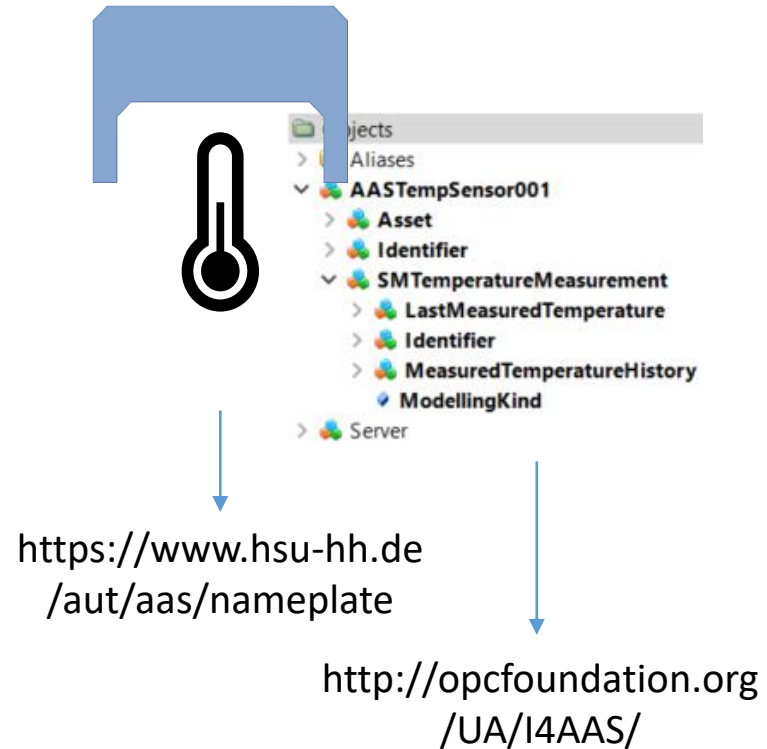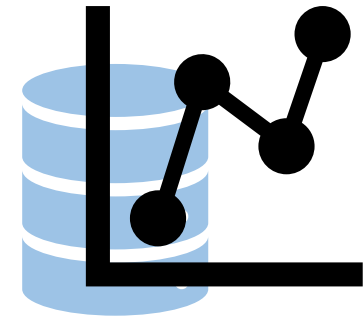
Motivation

Collaborative Condition Monitoring
Q&A

Collaborative Condition Monitoring
Conclusion

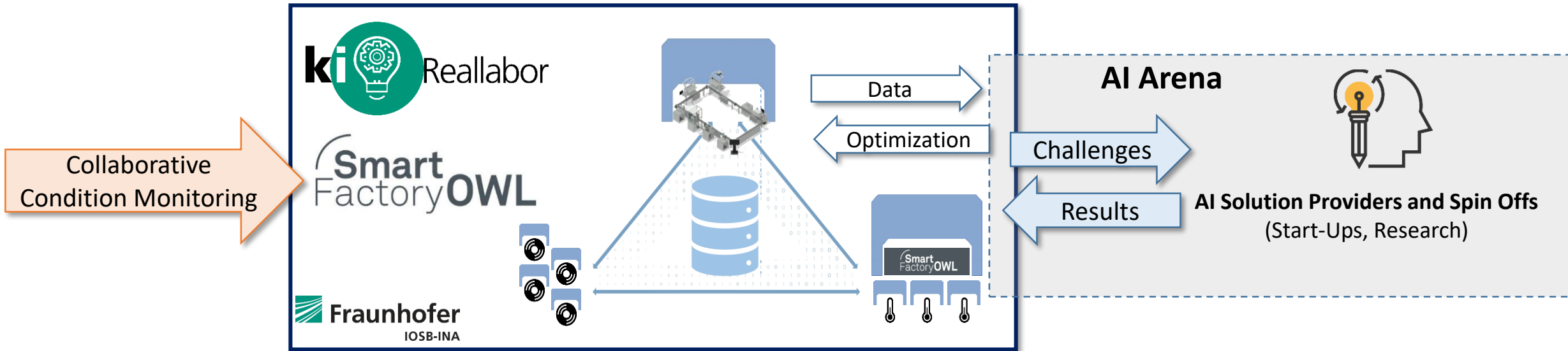- Hypothesis: CCM can generate an economic advantage within the digital ecosystem ("digital business model")

- We believe that interdisciplinary cooperation has added value

Collaborative Condition Monitoring
Possible next steps

- Especially within context of AI development: How to link large time series data with the AAS?

- How to ensure barrier-free data exchange and interoperability without downsides on high security standards?

- How to build an AAS of the machine based on different AAS from the component suppliers? How to make a composition?

- We are open for Collaboration, Feedback and further Input!

- We would like to invite you to further detail the hypothesis and the necessary solution modules

Collaborative Condition Monitoring

Thank you

https://www.plattform-i40.de/PI40/Redaktion/DE/Downloads/Publikation/kollaborative-datenbasierte-geschaeftsmodelle.html

https://www.plattform-i40.de/PI40/Redaktion/EN/Downloads/Publikation/collaborative-data-driven-business-models.html

Collaborative Condition Monitoring
Contact details 1/2

Klaus Bauer

TRUMPF GmbH + Co. KG, klaus.bauer@de.trumpf.com,
+49 7156 3033 1108

Michael Jochem

Robert Bosch GmbH, michael.jochem@de.bosch.com,
+49 160 702 9468

Collaborative Condition Monitoring
Contact details 2/2

Stefan Pollmeier
ESR Pollmeier GmbH Servo Drive Technology, gl@esr-pollmeier.de,
+49 6167 913060

Bastian Rössl
Fraunhofer IOSB-INA, bastian.roessl@iosb-ina.fraunhofer.de,
+49 5261 942 90 22