Digital Twins in Data Spaces

Dr. Birgit Boss
Bosch Connected Industry, 10th February 2023

CIIT TechTalk
17th February 2023

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Digital Twins in Data Spaces
Dr. Birgit Boss, Bosch Connected Industry

- Board member of the Industrial Digital Twin Association (IDTA) & Chair of the Working Group “Open Technology”
- Chair of the joint working group “Asset Administration Shell” between IDTA and the Working Group “Reference Architecture, Standards and Norms” of the Plattform Industrie 4.0
- Chair of the Working Group “Semantic Layer including Digital Twins” of Catena-X
- PMC member of the Eclipse Digital Twin Top Level Project

Connect on:

www.linkedin.com/in/birgit-boss/

Digital Twins in Data Spaces
CLIMATE CHANGE

WE WERE **THE FIRST**

CO_2 neutral

NO CARBON FOOTPRINT

At all our locations WORLDWIDE since February 2020

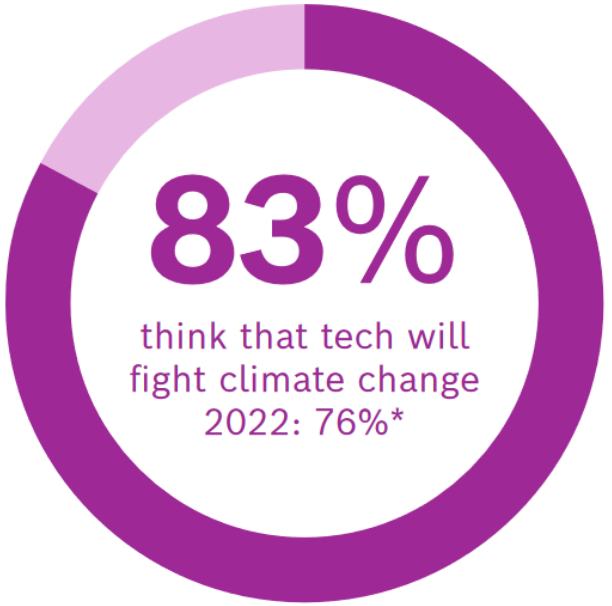
“COMPANIES SHOULDN’T HAVE TO CHOOSE BETWEEN BEING PROFITABLE AND DOING WHAT’S BEST FOR THE PLANET.
IF THE RIGHT PATH IS CHOSEN, BOTH AIMS GO HAND IN HAND.”

Dr. Stefan Hartung, Chairman of the board of management of Robert Bosch GmbH

Tech Compass 2023

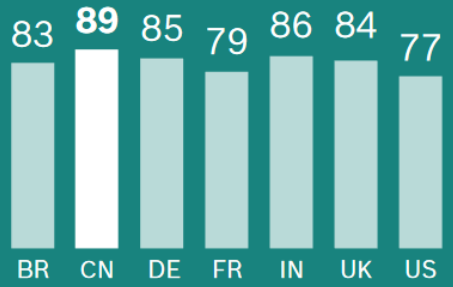
COMBATING CLIMATE CHANGE

To what extent do you personally agree with the statement 'Future technological progress will play the key role in combating climate change.'?



REGIONAL

In every country surveyed, a majority of respondents believe that technology is the key to fighting climate change. This view is most widespread in China (89%), and least common in the US (77%) – though even there, most people would agree with it.



BRA N = 2035, China N = 2023, DE N = 1016, FR N = 1031, UK N = 1015, USA N = 2035, India N = 2024. Answers in %.

GLOBAL INDEX

83% of respondents worldwide believe that future technological progress will be the key to combating combating climate change – 7 percentage points more than last year.

*For ease of reading and interpretation, the global index for 2023 based on 7 countries is compared with the index of 2022 based on 5 countries. Calculating a global index for 2023 based on the 5 previous countries provided equivalent results.

Answers were scaled from 1 to 4. Top-2-Box Results. 2023 All Countries N = 11179, 2023 Previous Countries N = 8113, 2022 N = 8076. Answers in %."

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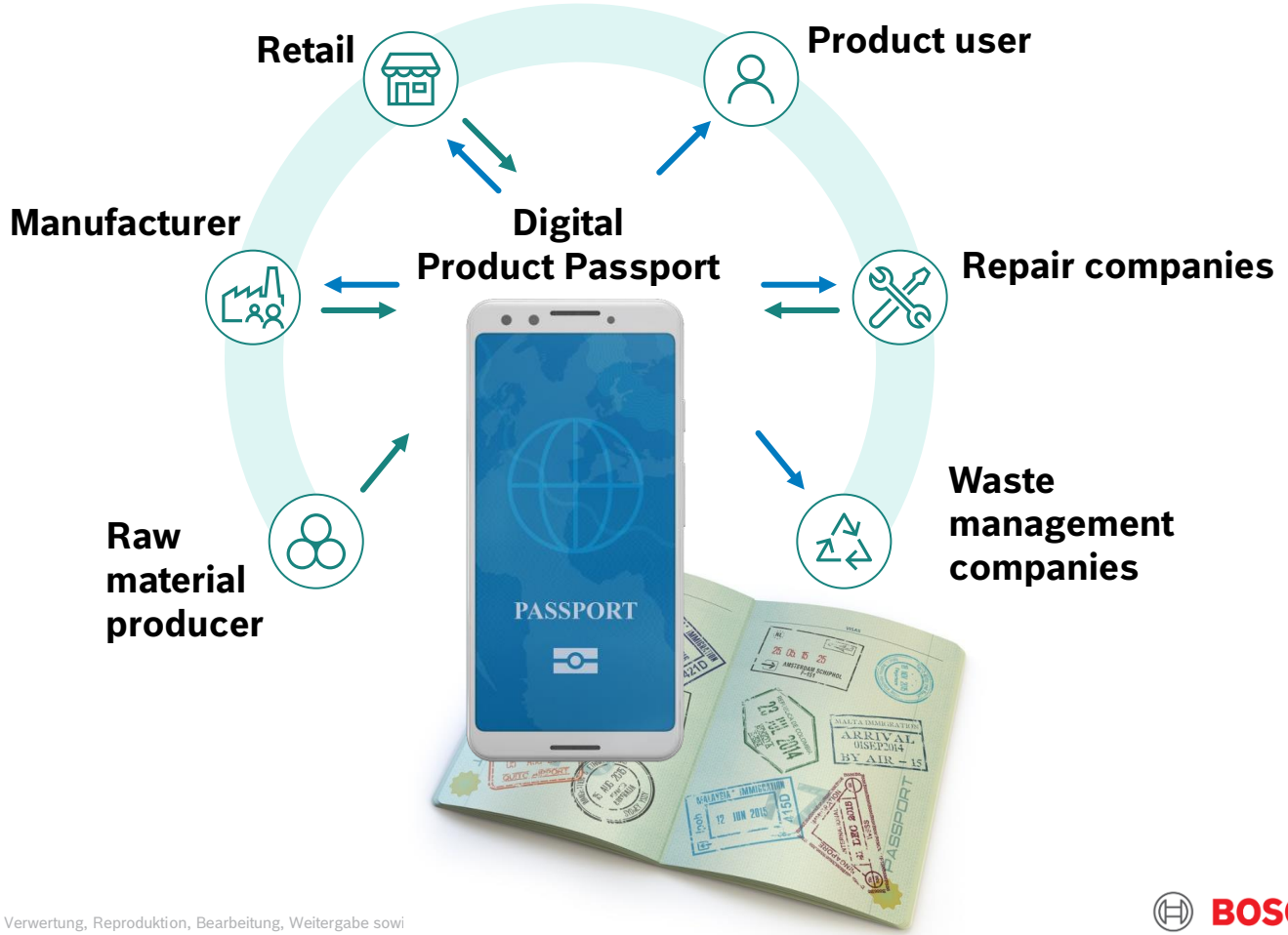
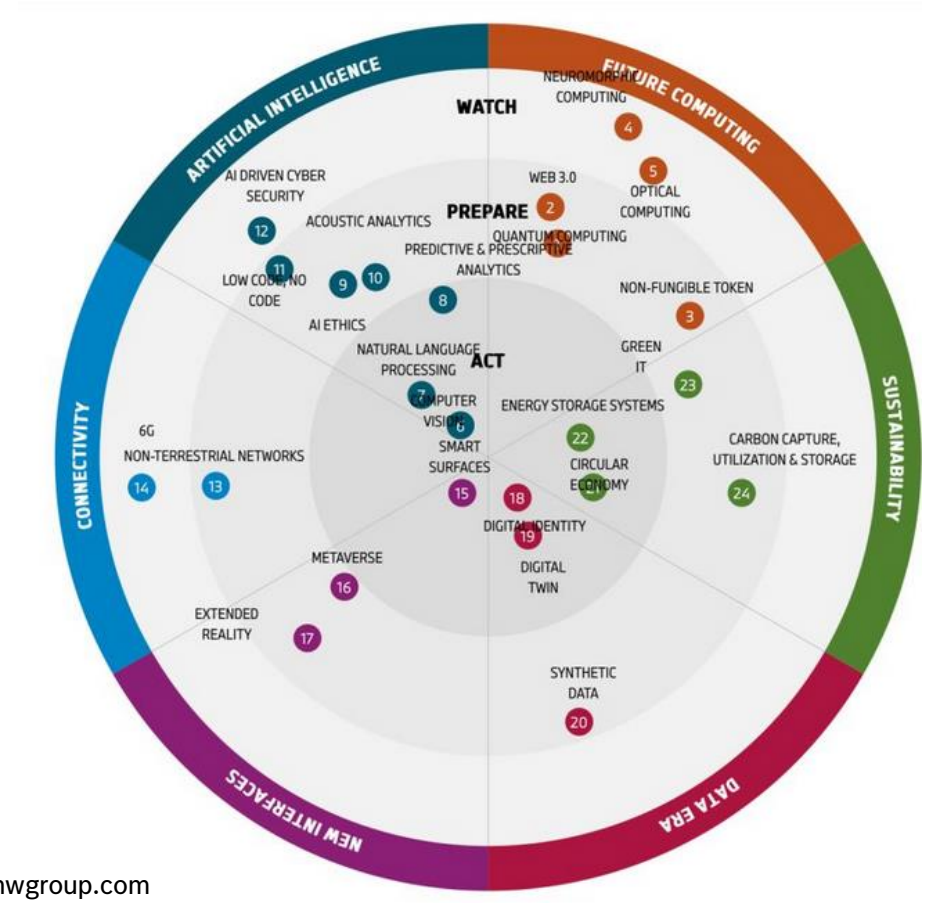
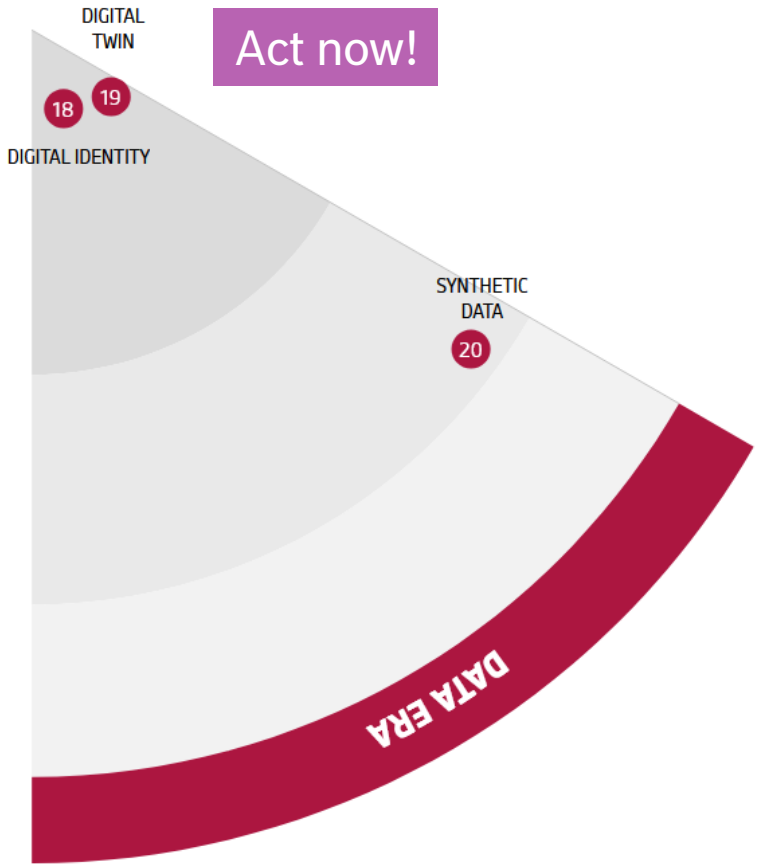
Digital Twins in Data Spaces
The Digital Product Passport as Digital Twin

The Digital Product Passport can be represented by aspects of a **digital twin**. Each stamp represents data provided or needed by different stakeholders and apps in the lifecycle of the product.



Digital Twins in Data Spaces
BMW Group Technology Trend Radar





Source: bmwgroup.com


Digital Twins
providing data from the entire product lifecycle.
as produced
as engineered
as operated

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“Companies face a paradox. They are increasingly expected to take responsibility for their social, environmental and economic impacts, yet they cannot directly control many of them […]”

The SustainAbility Institute by ERM

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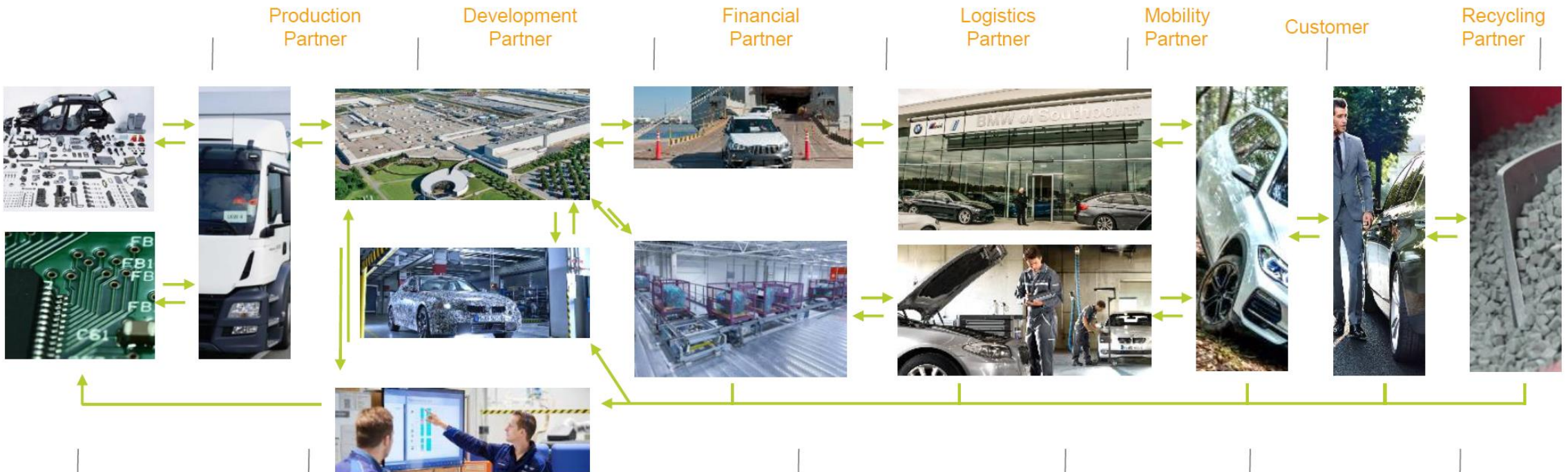
Digital Twins in Data Spaces

Dataspace Catena-X: “Data Driven Value Chain”



Industry Platform

Providing the most user-friendly environment for **building, operating and collaboratively using end-to-end data chains** along the entire (automotive) value chain.

Catena-X Automotive Network

Source: Catena-X

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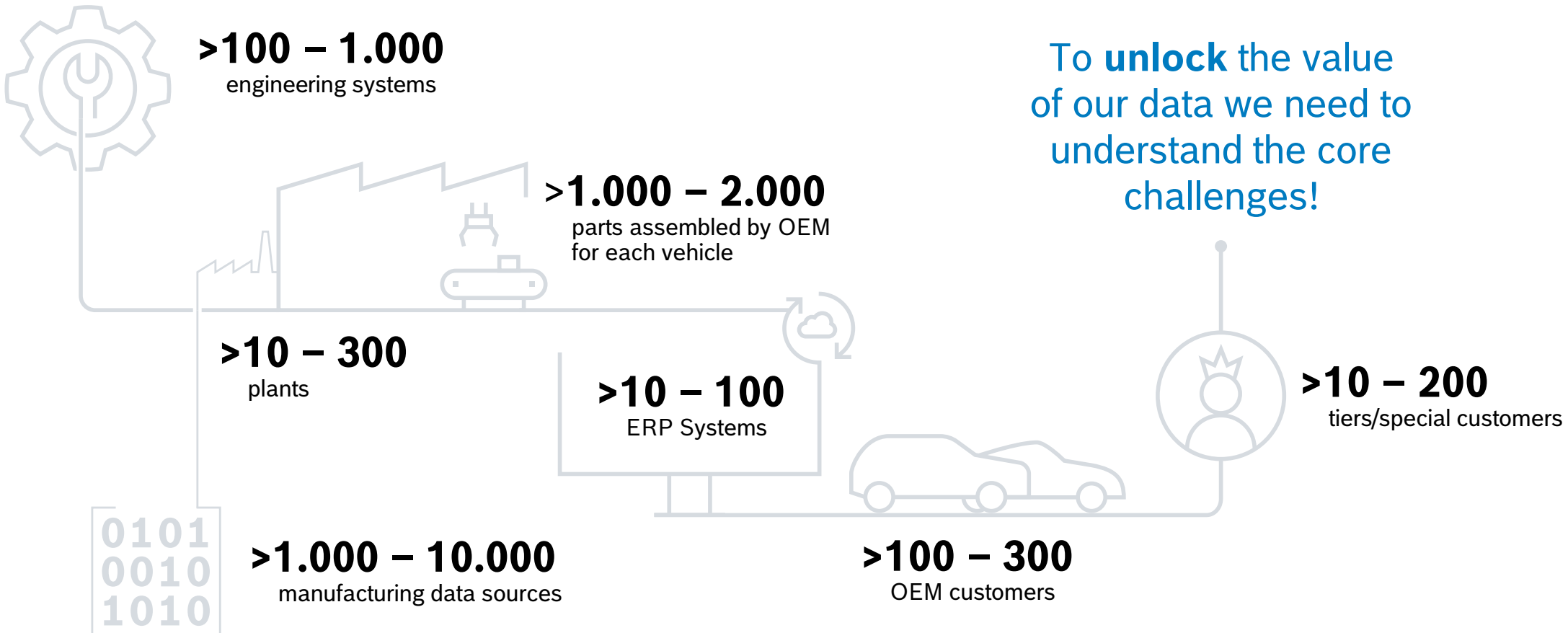
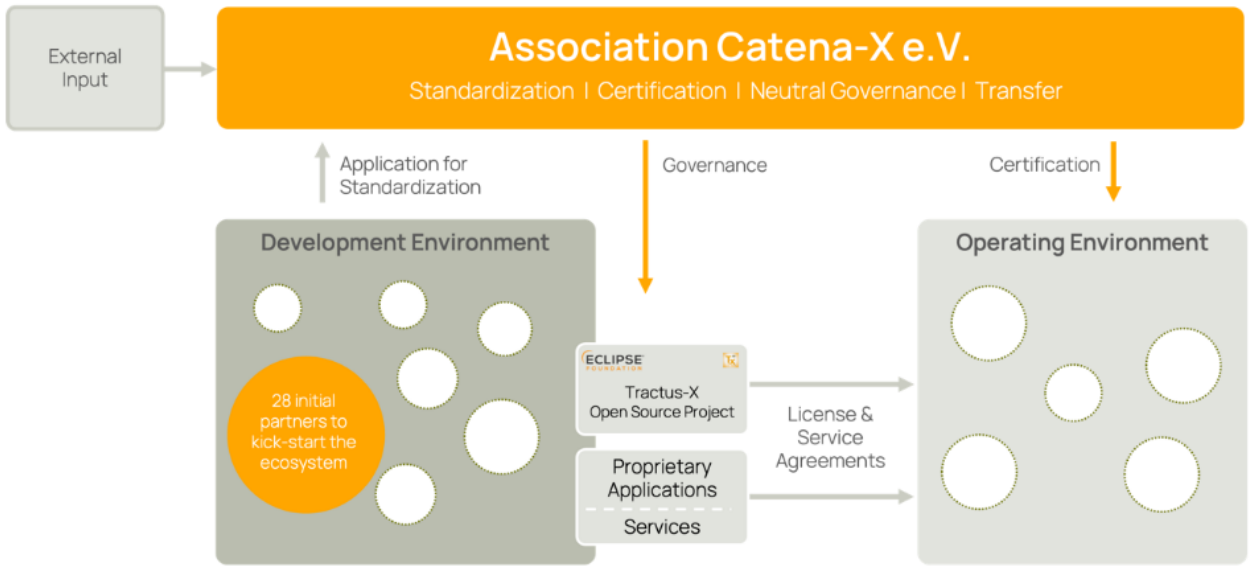
Digital Twins in Data Spaces
In numbers for Original Equipment Suppliers (OES)



To **unlock** the value of our data we need to understand the core challenges!

Digital Twins in Data Spaces
Operating Data Spaces

First Request for tender in Jan. 2023



Digital Twins in Data Spaces
Coming together

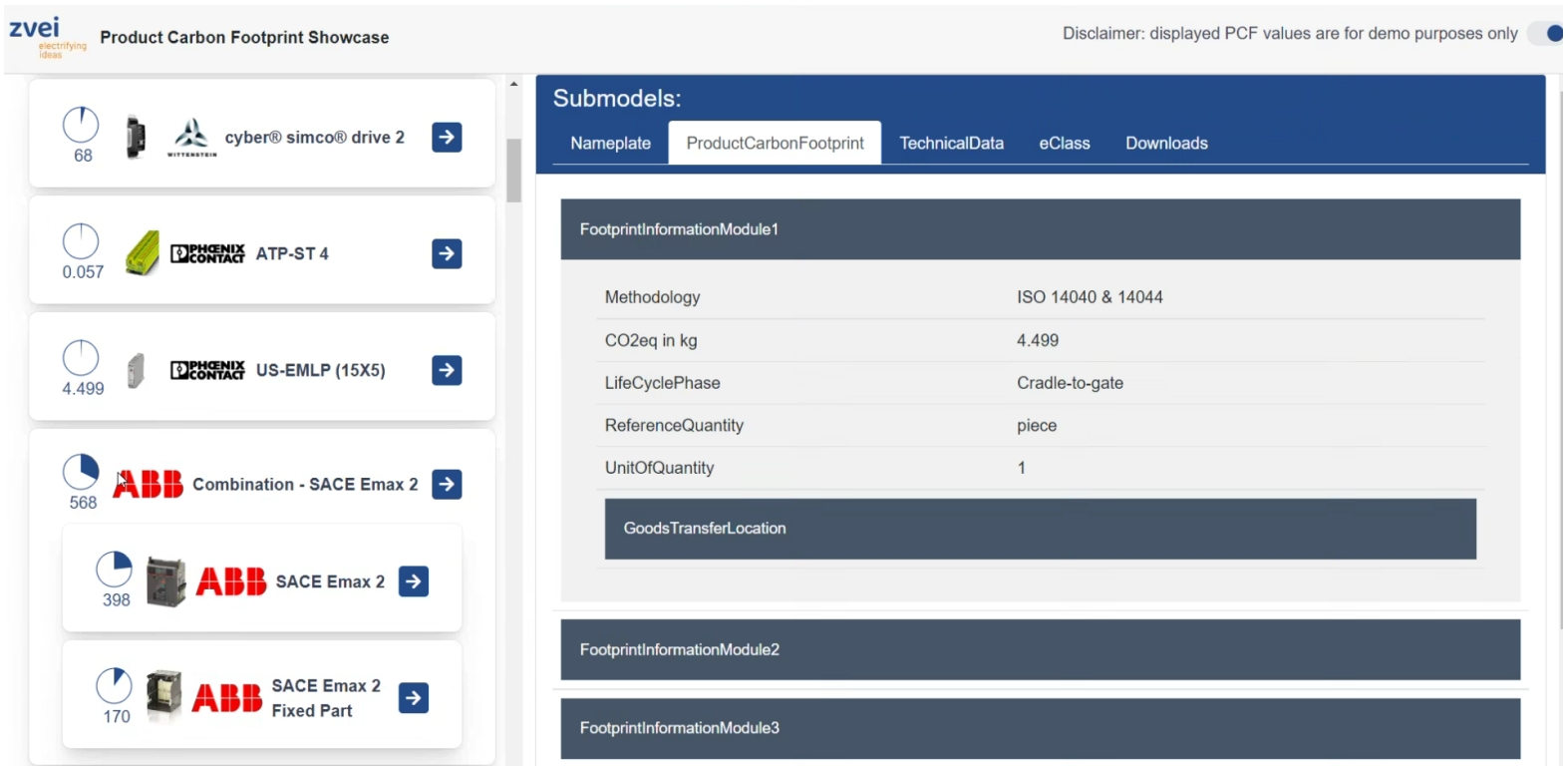
- event of the Industrial Digital Twin Association (IDTA)
- 28 funded projects KoPa35c

Source: atpinfo.de

Digital Twins in Data Spaces

Resilient and sustainable supply chains with the digital twin

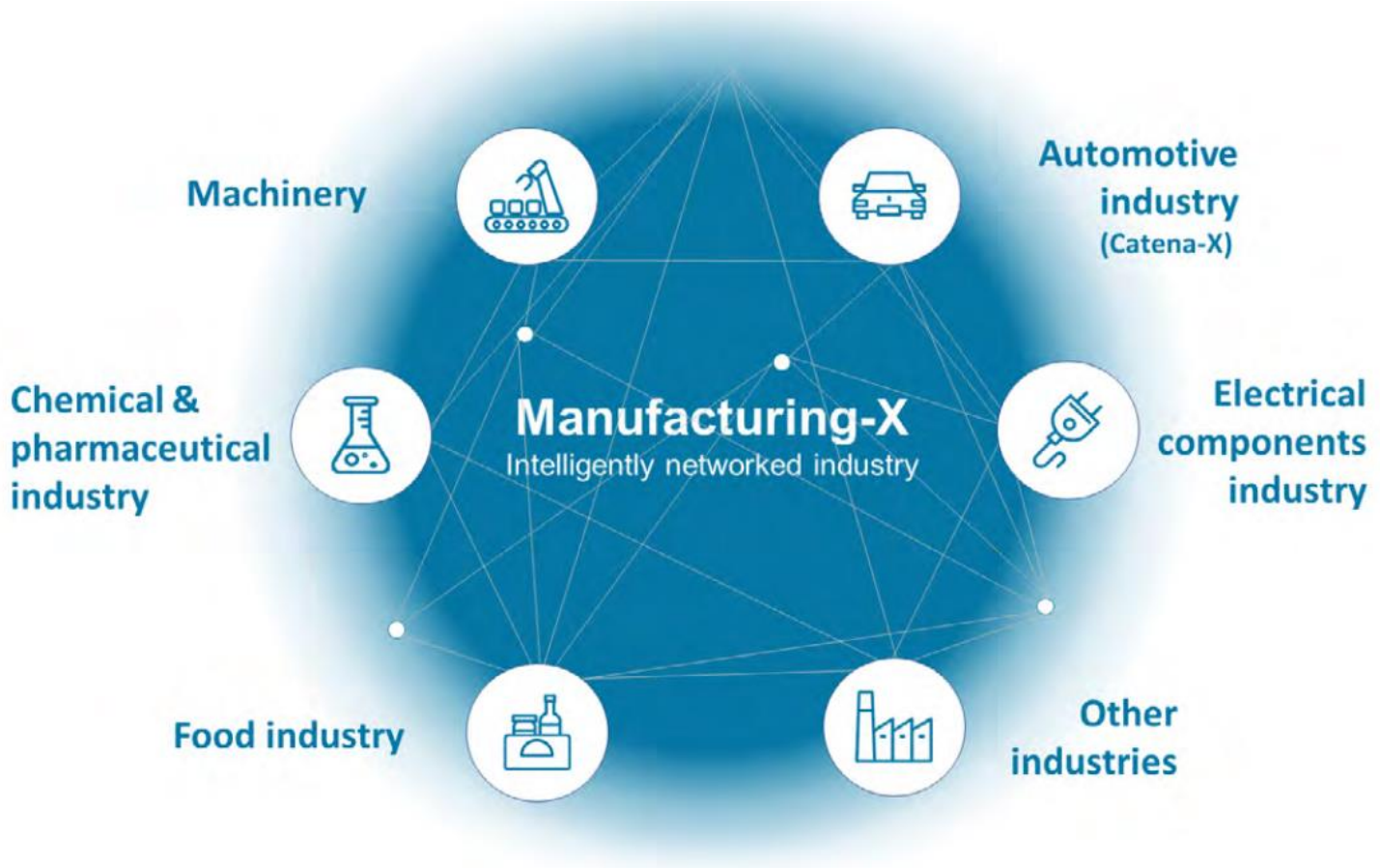
German Digital Summit 2022



https://www.elektro-automatisierung-digital.de/branchennews/digital-gipfel-2022-zvei-stellt-bundeskanzler-scholz-pcfcontrol-cabinet-vor

https://zvei-pcf.germanywestcentral.cloudapp.azure.com/backend/pcf

Digital Twins in Data Spaces
Dataspace: Manufacturing-X



Digital Twins in Data Spaces
Open and Collaborative Communities

Catena-X
Automotive Network

+

IDTA

+

ECLIPSE FOUNDATION

Home / Projects / Eclipse Automotive / Eclipse Tractus-X /

Eclipse Tractus-X

ECLIPSE FOUNDATION

Home / Projects / Eclipse Digital Twin

Eclipse Digital Twin

Project Hierarchy:

- Eclipse Digital Twin
  - Eclipse AAS Model for Java
  - Eclipse AAS Web Client
  - Eclipse AASX Package Explo…
  - Eclipse BaSyx™
  - Eclipse Semantic Modeling F…

AAS

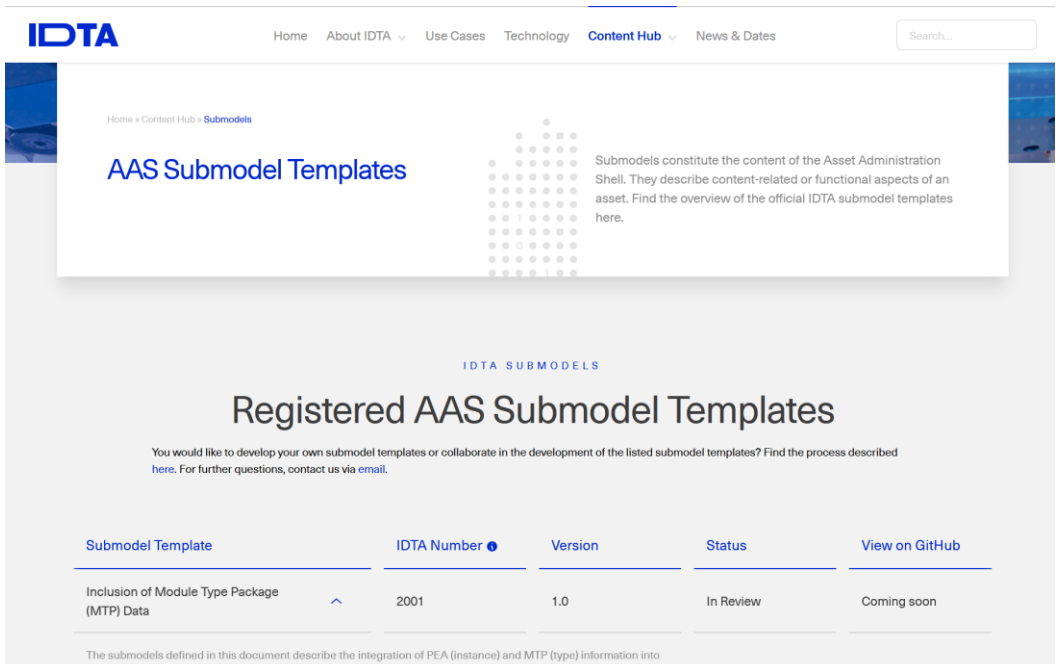
admin-shell-io by IDTA

Industrial Digital Twin Association e.V.

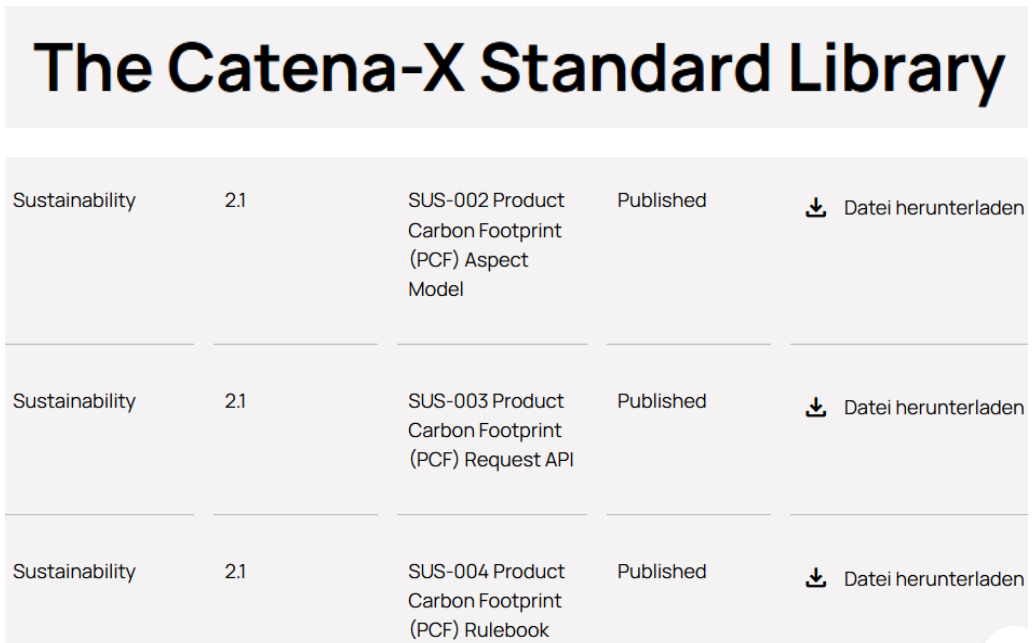
61 followers https://idtwin.org/

Digital Twins in Data Spaces
Open Standards for Data Exchange

Both, data provider and data consumer need to understand the data



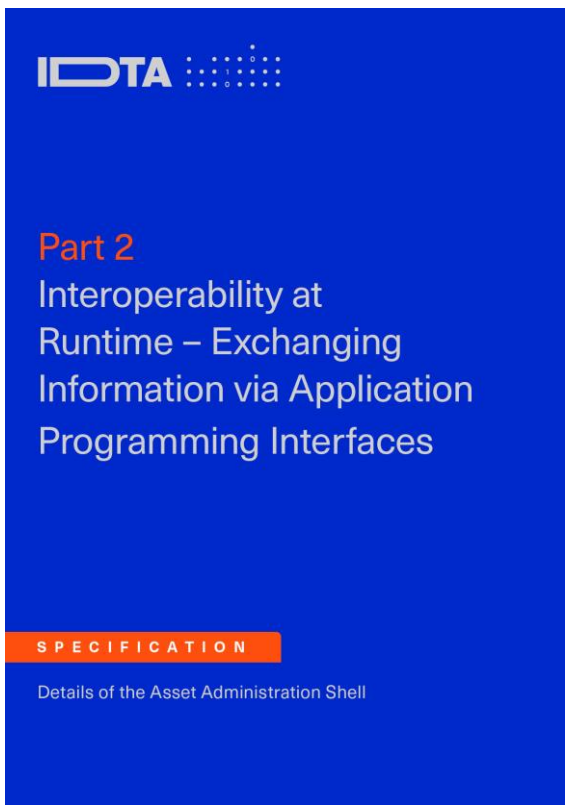
https://industrialdigitaltwin.org/en/content-hub/submodels



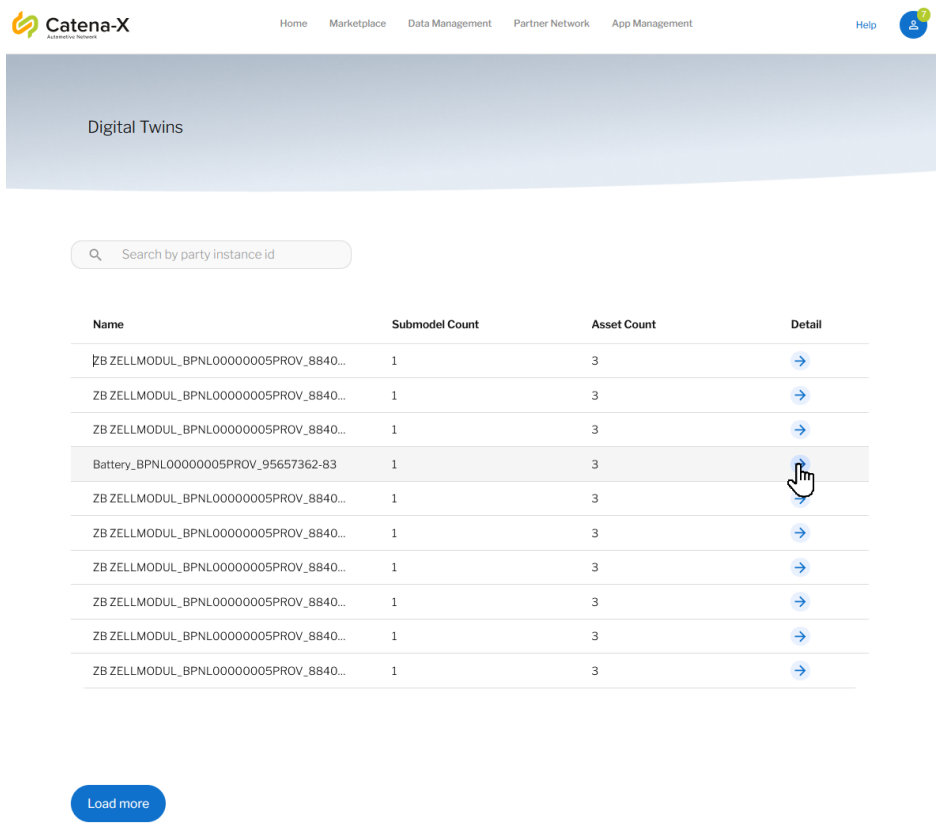
https://catena-x.net/de/standard-library

Digital Twins in Data Spaces
Open API Standards

data consumer need to find the data provided



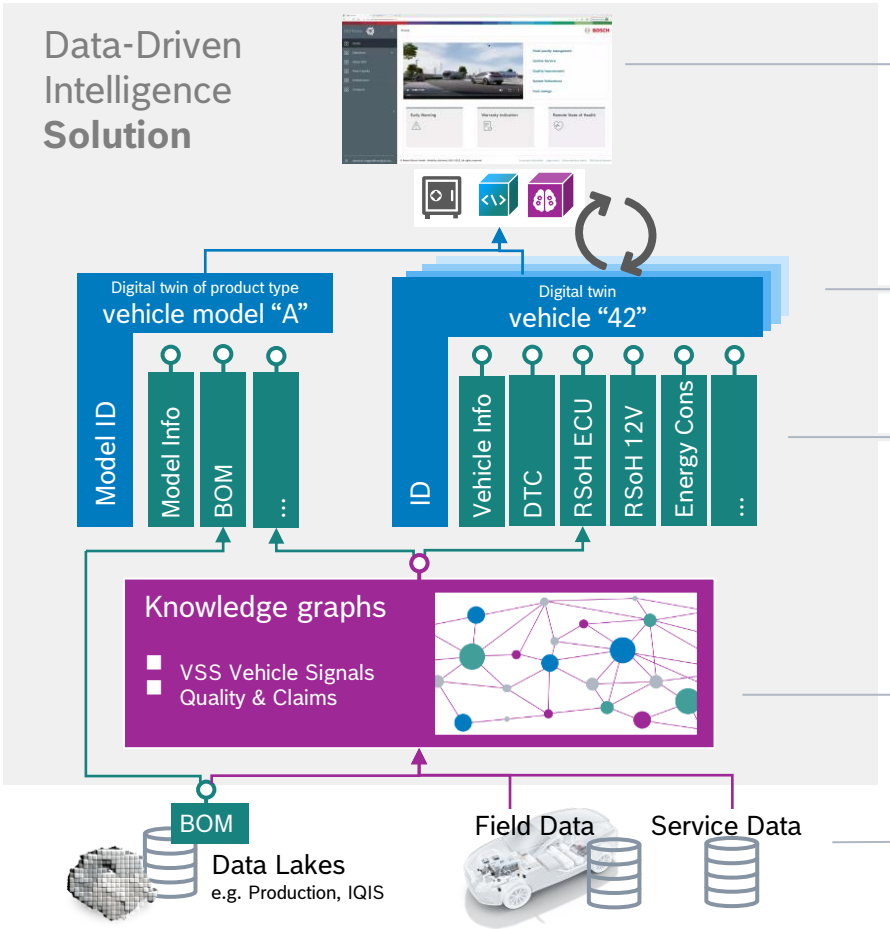
Digital Twin Discovery and Registry



Digital Twins in Data Spaces

„Semantic work on data will be the future”

Digital Twins
Bosch Semantic Stack



Know the relevant
- **product** and
- **valuable questions**

answered with **domain knowledge** & **meaningful data**

Introduce **semantic digital twins** for **product types** and **products**

Describe the required **domain-specific data** in small & encapsuled **semantic models:**

i.e., create required **aspects** for your digital twins
- With APIs compliant to the semantic model
- providing meaningful & domain specific data

Combine, relate and structure data and knowledge upfront using **knowledge graphs**

Adapt the required data sources **once** fitting to the semantic models

Digital Twins

How to get your data-driven project **going**

White paper: your data-driven projects in 4 steps I Bosch Semantic Stack

1 Scope	2 Prepare	3 Execute	4 Scale
Initial talks Use case workshop Feasibility check / implementation check	Project team selection Software & support organization	Implement & launch	Scaling plans Planning of further projects
Business owner Key users Product/process experts Data experts	Project leader Product/process experts Data experts	Project leader Project team with product/process experts and data experts Key users	Project leader Project team with product/process experts and data experts Key users
1 Month	1-3 Months	3-9 Months	3-6 Months
Use case profile Value definition & strategic fit Business & system context Ready-to-decide	Project roadmap Initial architecture Effort estimation Ready-to-execute	Productive solution (defined scope) Result presentation Ready-to-use	Scale productive solution Blueprint for additional use cases Ready-to-reuse

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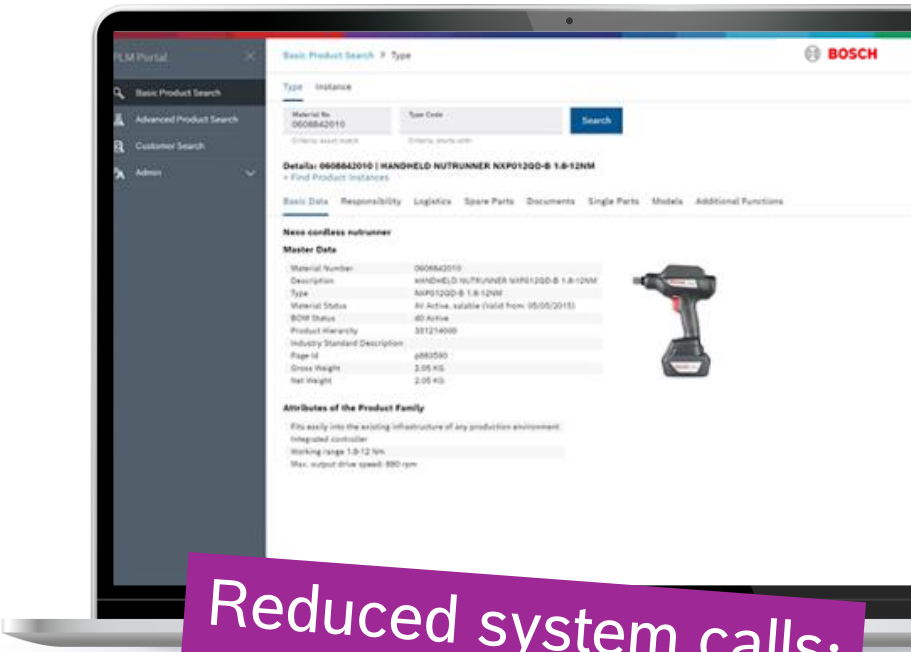
PLM Portal @ Bosch Rexroth: **Lifecycle management powered by Bosch Semantic Stack**

All product knowledge in a central place

Bosch Rexroth's Product Lifecycle Management (PLM) portal is the home for **more than 170 million digital twins**, making it a central knowledge pool for the service team. Every inquiry can be answered immediately and without tedious manual searching – for maximum customer satisfaction.



Reduced system calls: From 32 to 1 system

Growing transparency

Optimized customer support

Basis for intelligent services

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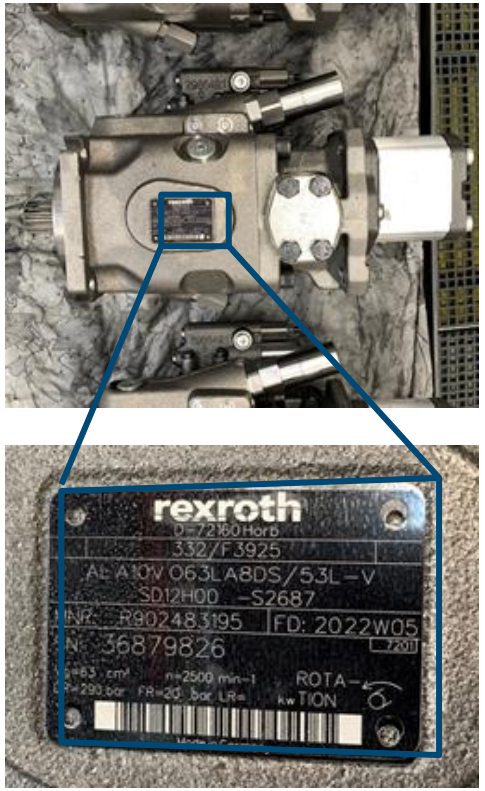
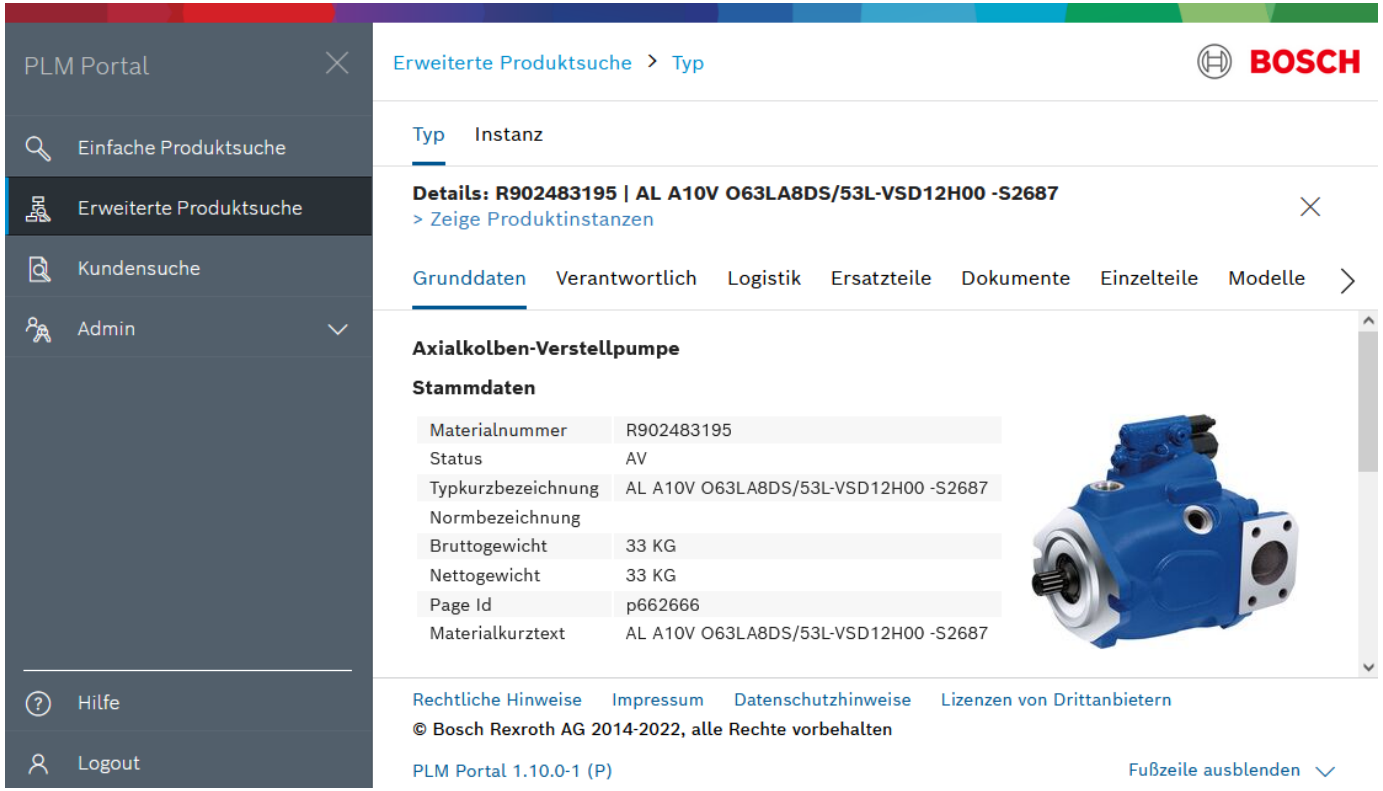
Digital Twins
Example: PLM Portal @Bosch Rexroth





One portal for the digital twins of the Bosch Rexroth products

Material Number (MNR) → Type Twin
Material Number (MNR) + Serial Number (SN) → Instance Twin

Data-Driven Intelligence solutions with **Bosch Mobility Solutions**

3 ready to use solutions for the **automotive quality experts**

We build 3 use case specific solutions with our colleague's form Bosch Mobility Solutions that **leverage the data and the Bosch domain knowledge** into **actionable insights.** E.g., **Warranty Indication**: You don’t need a physical inspection, you get **remotely indicate warranty claims**

Simple data integration

Data-based decision making

Optimal scaling effects

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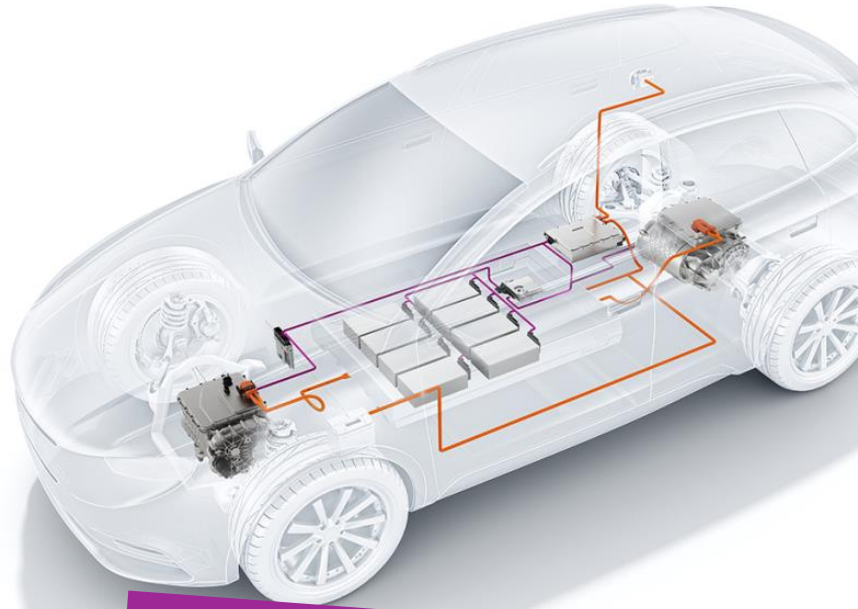
DigitalCV @**Bosch Powertrain Solutions**

The entire automotive product life cycle

Bosch Powertrain Solutions offers highly complex drive units for electrical vehicles. With the DigitalCV – **a digital resumé for each produced unit and its components** – the manufacturer can always view the information from the complete life cycle as well as all cross-connections at a glance and can answer even difficult questions quickly.



20% reduction of failure costs by early failure identification

Continuous life-cycle transparency

Cost and time savings

Improved decision-making

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Digital Twins in Data Spaces
Closing

„Digital twins are the key of our work in the connected world. Semantic work on data will be the future.”
Stefan Hartung

Stefan Hartung, Chairman of the Board of Management, Robert Bosch GmbH at BCW 2022

Data-Driven Intelligence

powered by Bosch Semantic Stack

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