

# Industrial Digital Twin Association

Standardising interoperable Digital Twins

# Agenda



**1** **WHO**  
Industrial Digital Twin Association (IDTA)

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**2** **WHY**  
Do we need interoperable digital twins?

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**3** **WHERE**  
Digital twins in use, for example in dataspaces like Catena-X

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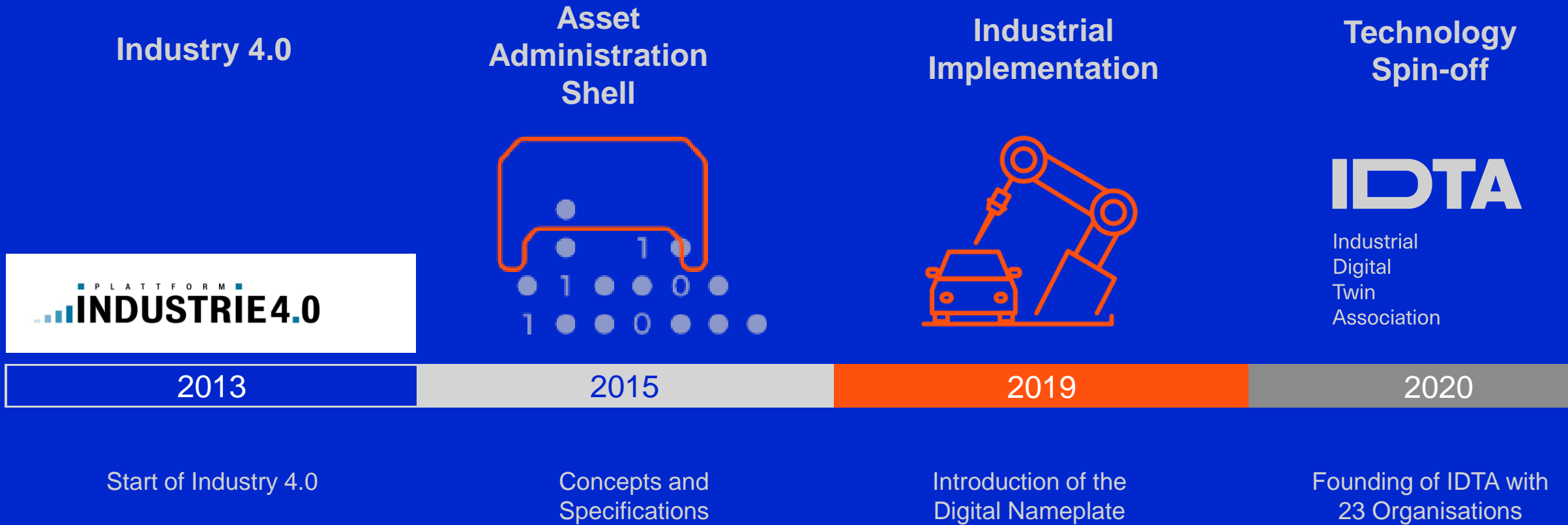
**4** **HOW**  
Business digital twins support implementing Digital Product Passports (DPP)

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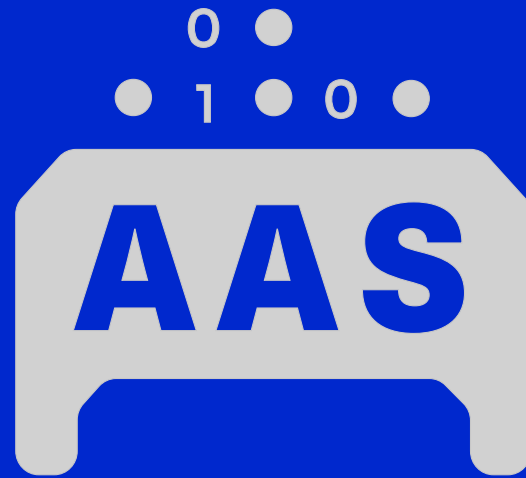


# WHO

# Evolution of Industry 4.0



# Asset Administration Shell



and the journey continues ...

Worldwide Standard for  
the Industrial Digital Twin

# MEMBERS: SUPPLIERS – USERS | OT – IT



116 Members from 17 nations



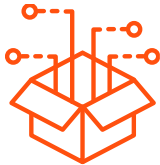
Human



## **Building a global network**

Creating an international standard for the Industrial Digital Twin

Scaling



## **Open access to standards, implementations and information models**

Making the digital twin available for all industries

Technology



## **Collaboration along the value chain**

Bringing companies together, creating use cases, developing to consortial standards

# ∴ AAS: Digital Twin for the entire Product Life Cycle

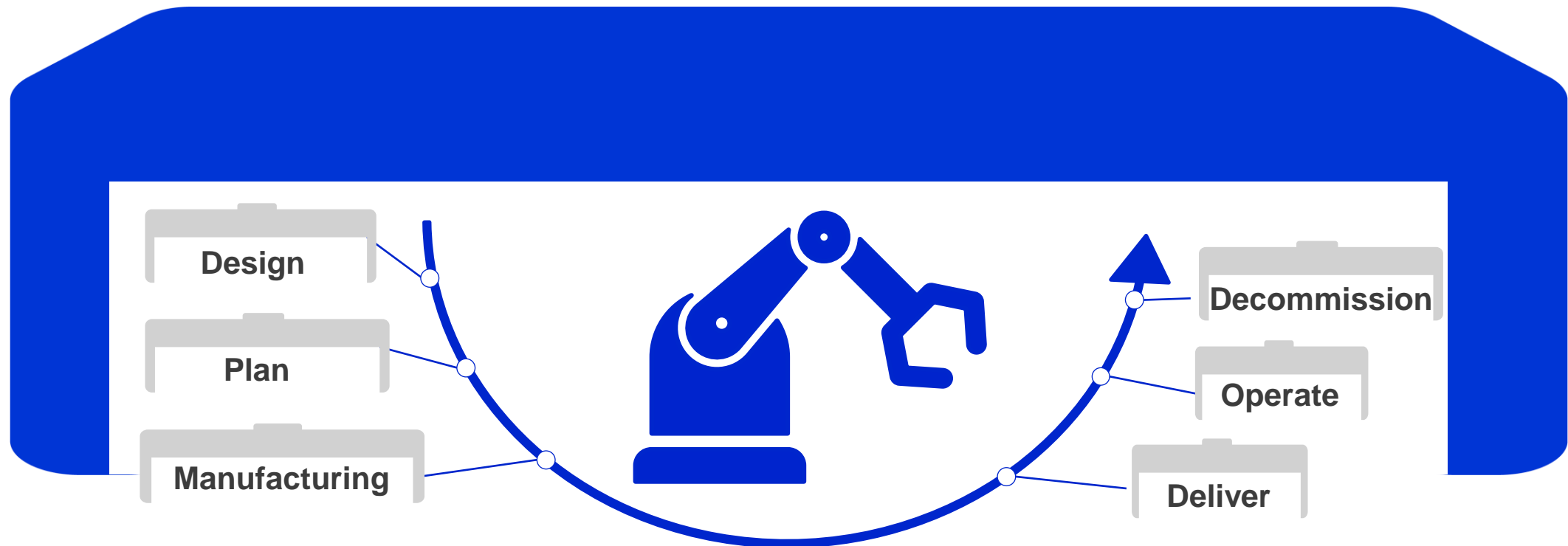


## Digital Twins today

- Application driven
- Specific & Efficient
- One Life Cycle Element

## Our goal

- Standardization
- Efficient scaling
- Entire product life cycle

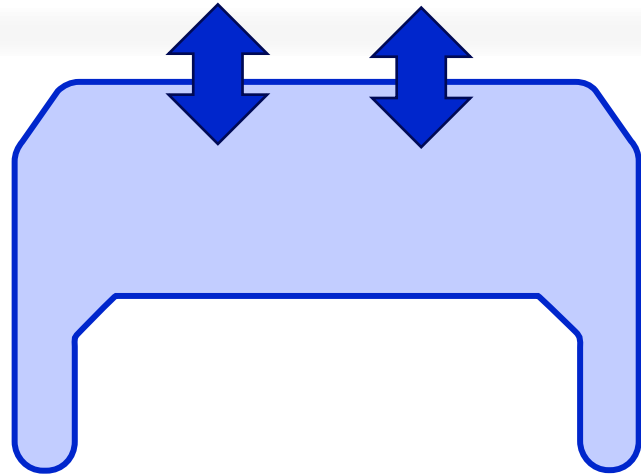




# IDTA conducts two Standardisation Tracks

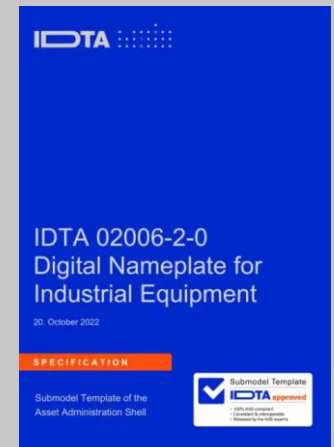
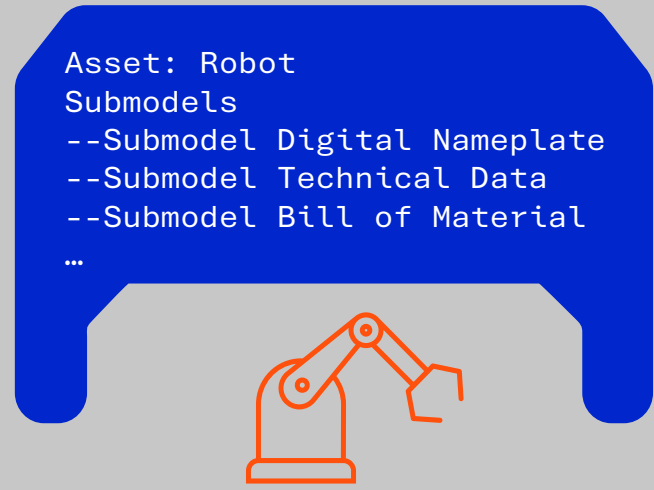


**1. AAS Specifications**  
Define how digital twins look like and how data shall be shared or exchanged in a secure and trusted way



IEC

**2. Submodel Template Specifications**  
Define which data shall be exchanged, what the data means and why it should be exchanged

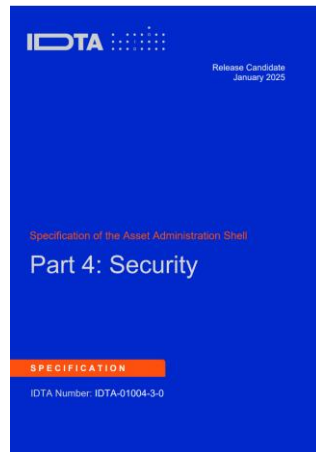
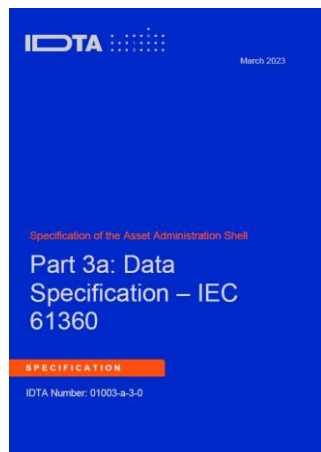
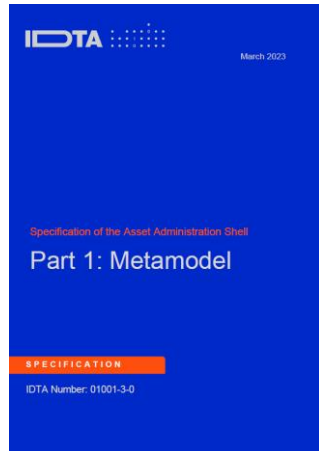


IDTA

# AAS Specification: Ready for the industrial Implementation



1.



## AAS Specification in Version 3.0

- Part 1: Metamodel
- Part 2: Application Programming Interfaces
- Part 3a: Data Specification IEC61360
- Part 4: Security
- Part 5: Package File Format (AASX)



IEC 63278-x

IEC 63278-1  
published in  
December 2023



# Submodels: Content of the AAS

## 2.

### Standardised information models

Digital Nameplate	Contact Information	Handover Documentation	Module Type Package (MTP)	OPC UA Server Data Sheet
Software Nameplate	Engineering of Power Drives Trains	Product Carbon Footprint	Energy Monitoring	Time Series Data
Technical Data	Bill of Material (BOM)	3D CAD	Plant Asset Management	Simulation



Static/Life Cycle related

Active/Functions




80+ Submodels in the IDTA repository published or in development



IDTA the agile platform for developing information models



AAS the industry solution for the  Digital Product Passport

# Solutions in the IDTA Solutions Hub

Startseite

## AAS Solutions Hub

Spezifikationen definieren Softwarestruktur, Schnittstelle und die Semantik der Verwaltungsschale und bilden damit die Grundlage für den standardisierten Digitalen Zwilling. Alle Spezifikationen für das Informationsmodell der Verwaltungsschale sind hier zu finden.

Filter

Solution Type ▾ Maturity Level ▾ Target market ▾ AAS Standards ▾ Lifecyclephases ▾ Submodels ▾ Applications ▾

Vendor Name	Solution Name	Solution Type	Maturity Level
<b>BOSCH</b> Vendor Name: Bosch Connected Industry	<b>Bosch Semantic Stack</b>	Software	Industry ready
<b>complement</b> Vendor Name: complement AG	twinsphere Suite	Software	Industry ready
<b>inevo</b> Vendor Name: inevo solutions	Digital Product Passport	Software	Industry ready
<b>HARTING</b> Vendor Name: HARTING Stiftung & Co. KG	DPP4.0 @ HARTING	Service	PoC / Demo
<b>SAP</b> Vendor Name: SAP SE	Digital Twin Administration	Software	Industry ready

<b>bill-X</b> Vendor Name: bill-X GmbH	ActiveDB	Software	Industry ready
<b>Fraunhofer</b> Vendor Name: Fraunhofer IESE	AAS Proof-of-concept Devel...	Running Prototyp...	PoC / Demo
<b>Fraunhofer</b> Vendor Name: Fraunhofer IESE	AAS Potential Analysis Work...	Consulting	Concept phase
<b>msg</b> Vendor Name: msg systems ag	AAS Readiness Assessment	Consulting	Industry ready
<b>msg</b> Vendor Name: msg systems ag	MeterVerse IoT Framework	Software	Industry ready
<b>STAHL</b> Vendor Name: R. STAHL Schaltgeräte GmbH	Digital Nameplate	Service	PoC / Demo
<b>NEOCEPTION</b> Vendor Name: Neception GmbH	Neception 4 Digital Twin In...	Software	Industry ready
<b>Meta-Level</b> Vendor Name: Meta-Level Software AG	AAS Suite	Software	Industry ready
<b>BCON</b> Vendor Name: BCON GmbH	BEATS	Software	Industry ready
<b>rexroth</b> Vendor Name: Bosch Rexroth AG	Digital Service Assistant (DS...	Software	Industry ready
<b>Fraunhofer</b> Vendor Name: Fraunhofer IOSB-INA	R&D Consulting & Support f...	Consulting	Industry ready
<b>msg</b> Vendor Name: msg systems ag	MeterVerse	Product	Industry ready
<b>IDTA</b> Vendor Name: IDTA	AASX Package Explorer	Software	Prototype

# Shaping the Digital Twin Ecosystem

## Founding Associations



bitkom



PLATTFORM  
INDUSTRIE 4.0



VDMA



zvei  
electrifying  
ideas

## MoUs signed



digital twin.  
CONSORTIUM



Digital Data Chain  
Consortium



Alliance  
INDUSTRIE  
DU FUTUR



EUROMAP  
European Plastics and Rubber Machinery



CLASS



BaSys



KOSMO  
스마트제조혁신추진단  
KOREA SMART MANUFACTURING OFFICE



NAMUR



OPC<sup>®</sup>  
FOUNDATION



OPEN INDUSTRY 4.0  
ALLIANCE



Catena-X  
Automotive Network



PI  
PROFIBUS • PROFINET



smartFactory<sup>KL</sup>



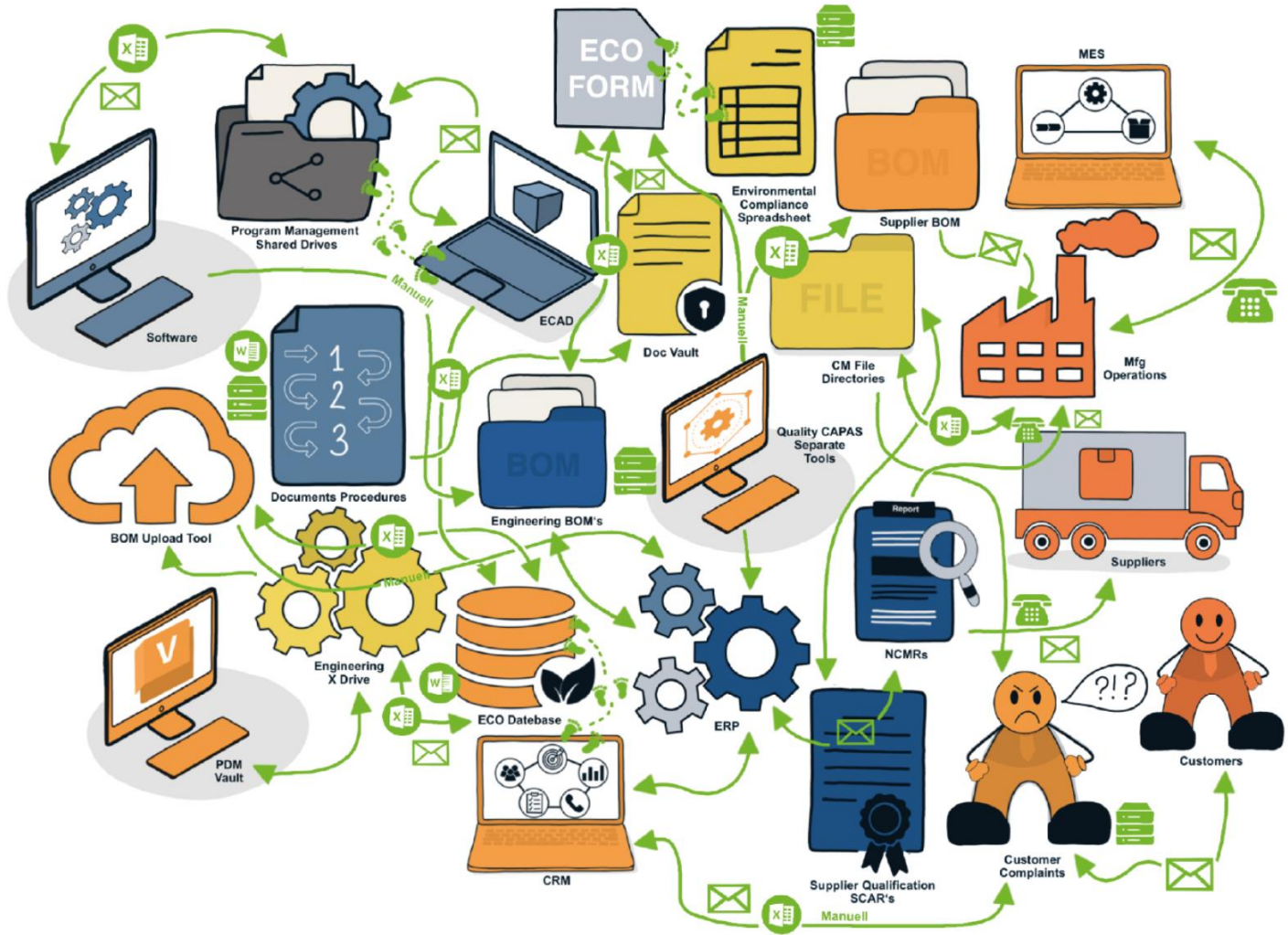
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ENERGIEEFFIZIENZ



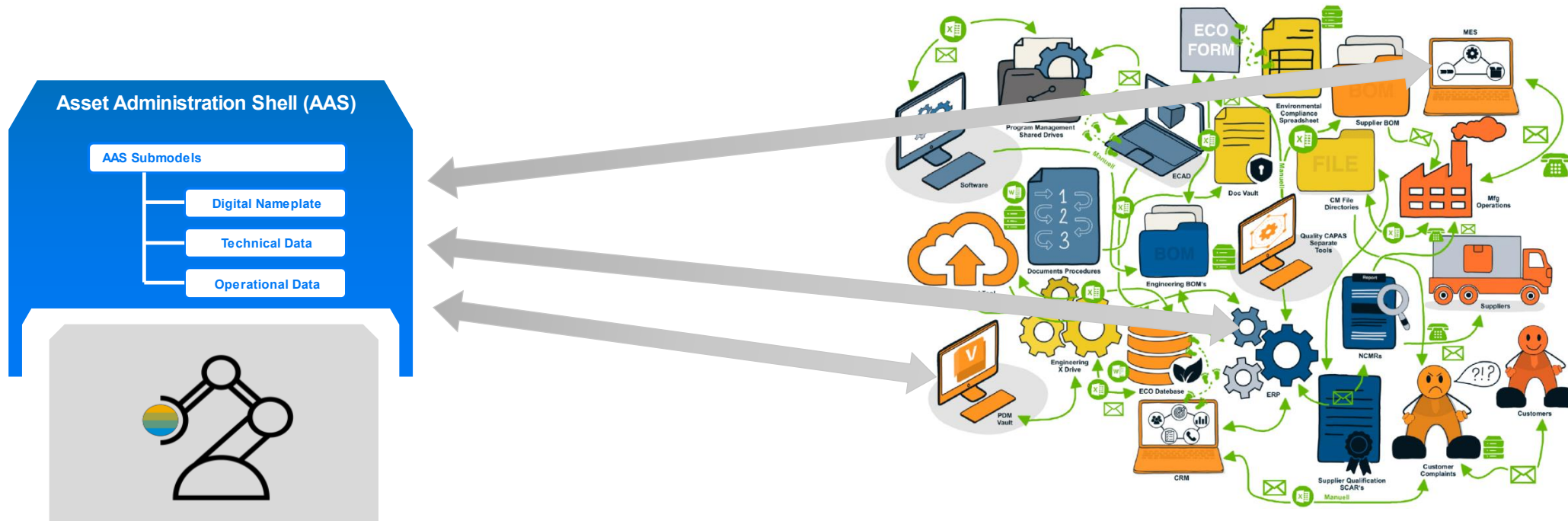
# WHY

# WHY – “System landscape and daily workarounds”

Big mess !!!



# WHY - Asset Administration Shell (AAS) to create Digital Twins

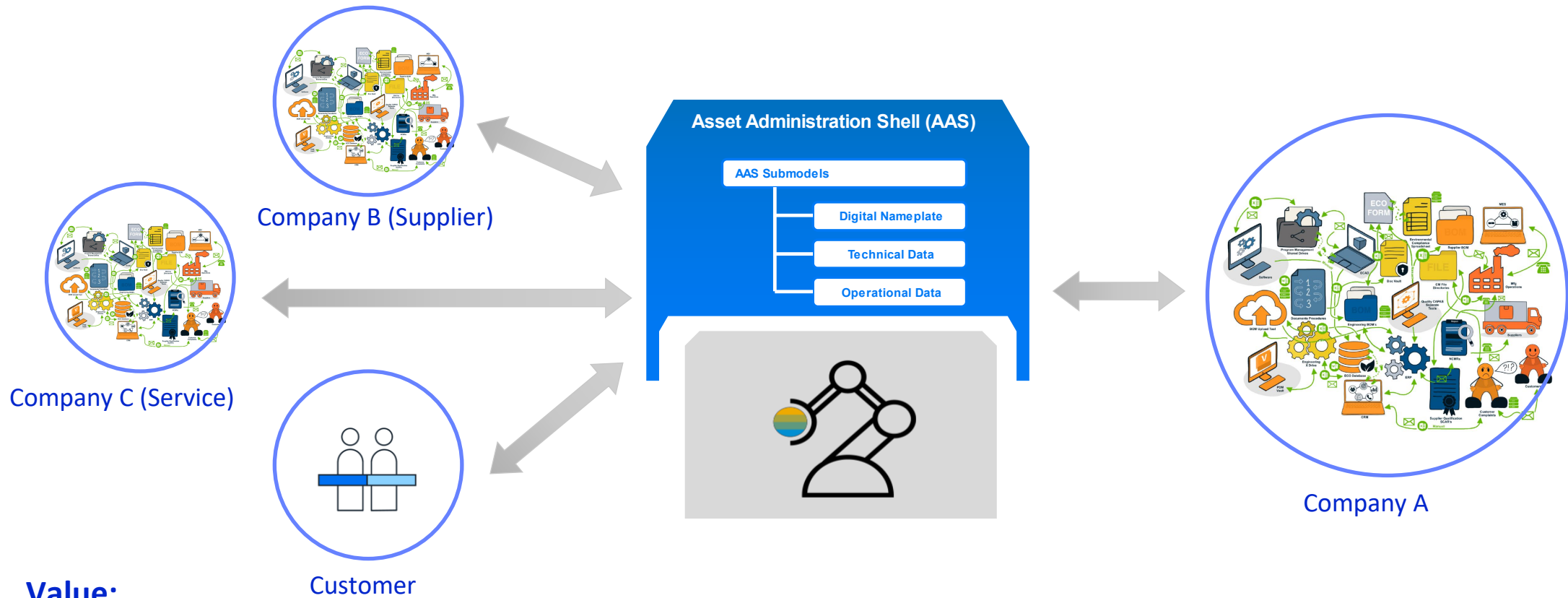


## Value:

- AAS is an Industry Standard (a rule book) to describe the administrative and business view of a Digital Twin.
- AAS helps to bring asset-related, product-related or system-related data in a structured form, which helps stakeholders to make processes within the product lifecycle more efficient.



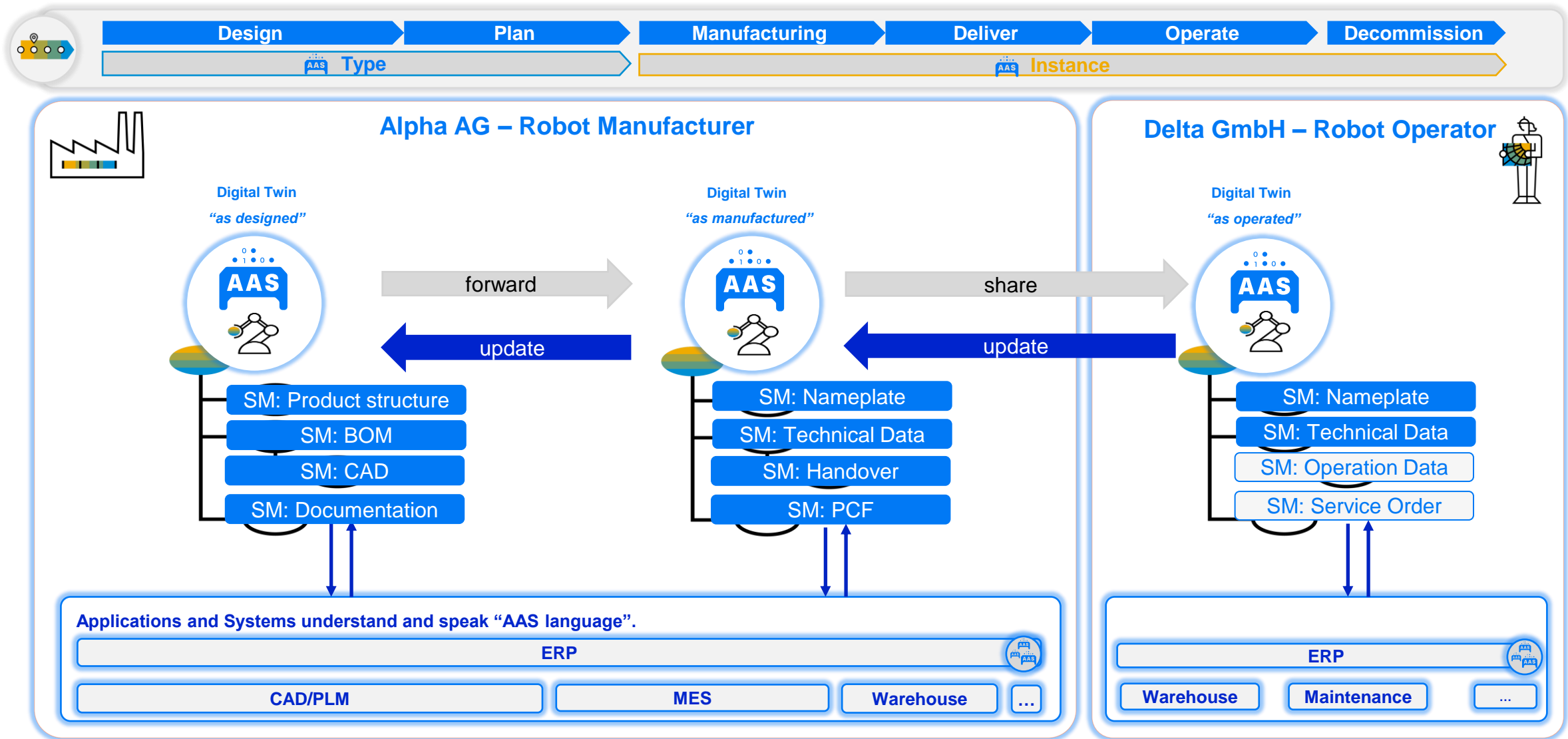
# WHY – AAS Data Model to speak “la lingua franca of Industry 4.0”



## Value:

- Use AAS to find information (e.g., about a product, asset, equipment) in a heterogeneous OT/IT landscape.
- Share information with suppliers, manufacturers, operators, customers, ... with a standardized data model and syntax across the value chain.


# WHY - AAS Digital Twin “Data Model” along the Product Lifecycle



# WHY – AAS Digital Twin Uses Cases

 Representation of assets following standardized data model, syntax and semantics

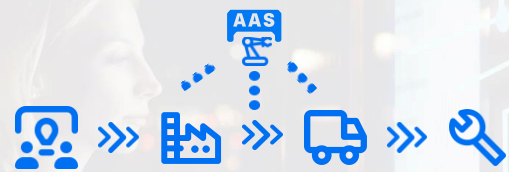
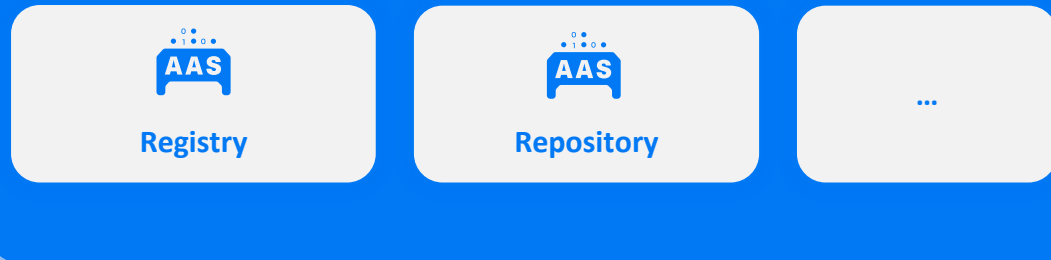


 Integration to IT backend systems in context of business processes



## AAS Infrastructure

Applications built on AAS specifications to create and manage any type of Digital Twins with focus on business data and processes.



 Connect the dots (data and processes) and contextualize asset-specific data across the product life cycle



 Create value by sharing digital twins in industry ecosystems and business networks (aka data spaces)



# WHERE

> 1 million

EV batteries are expected to be available for recycling in Europe by 2030

Source: <https://www.bosch.com/stories/ev-battery-recycling/>

# Digital Battery Passport

Sustainability through Transparency

Source Figure: Bosch

20  
50

## CARBON NEUTRALITY FOR THE EU

The **European Green Deal** is the EU's strategy to combat climate change & environmental degradation while fostering sustainable growth. Central to this initiative is the **circular economy act**, which aims to minimize waste and optimize resource use through longer product lifecycles as well as recycling and reuse.

## MORE PRODUCT TRANSPARENCY

The **Digital Battery Passport** initiative aims to improve transparency in battery lifecycle management, documenting along other attributes origin, composition, and environmental impact of the battery. Key functionalities include digital tracking for traceability and facilitating compliance with sustainability standards.

20  
27

## MAIN GOALS

ENHANCING  
TRANSPARENCY

TRANSITIONING TO  
CIRCULAR ECONOMY

ECONOMIC GROWTH  
& INNOVATION

# Digital Product Passport

zvei Product Carbon Footprint Showcase Disclaimer: displayed PCF values are for demo purposes only

**1972.7 kg CO<sub>2</sub>e**

Submodels:  
 Nameplate ProductCarbonFootprint HandoverDocumentation  
 BoM\_SpareParts TechnicalData CAD

FootprintInformationModule1

Methodology	ISO 14067
CO2eq in kg	4.4
LifeCyclePhase	Cradle-to-gate
ReferenceQuantity	piece
UnitOfQuantity	1

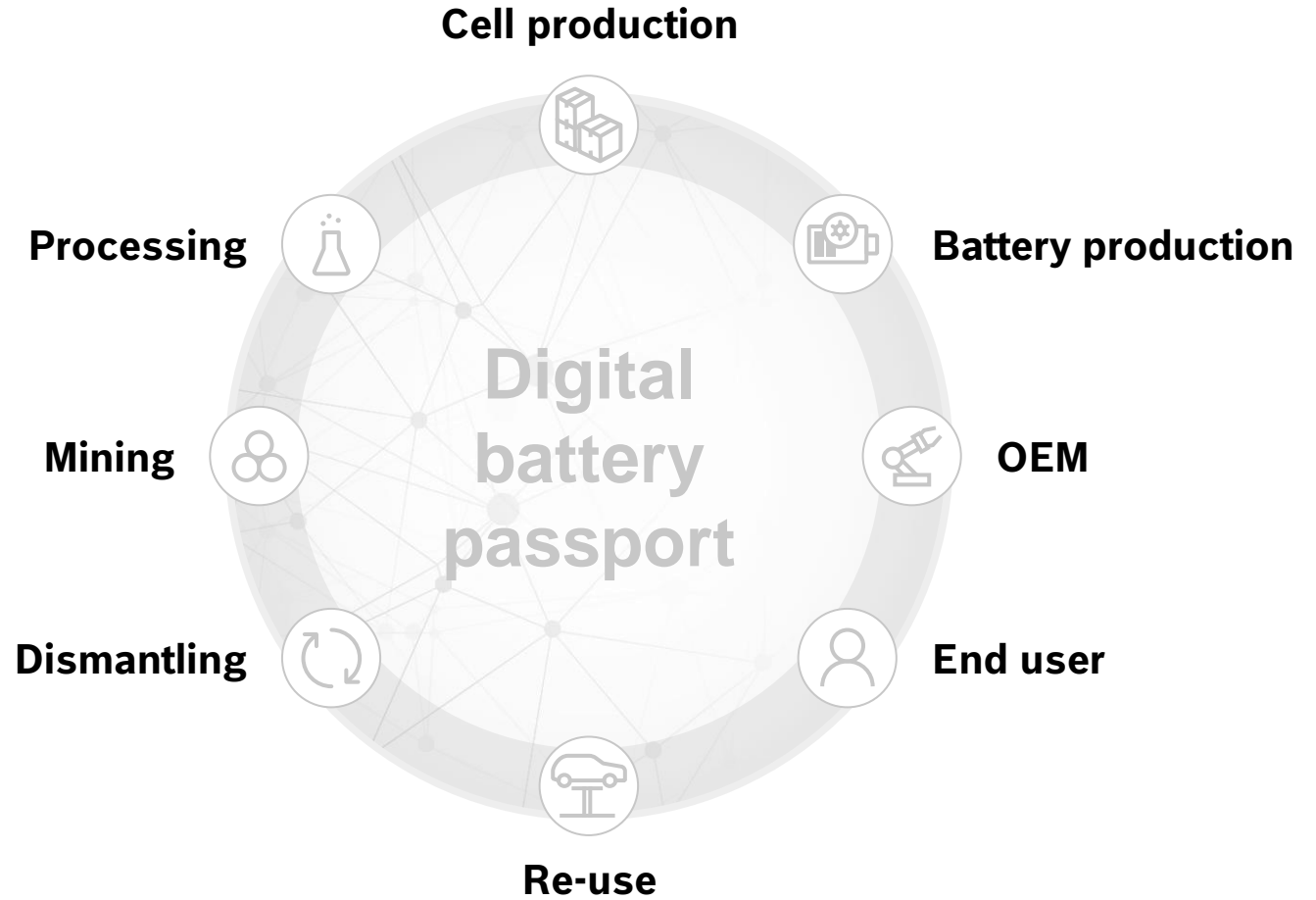
GoodsTransferLocation

FootprintInformationModule2

zvei Combination - Control Cabinet PCF Demo

- Wall-mounted cooling unit Blue e+ S
- rexroth Directional Spool Valve
- IFB3004BBPKG/US-104
- PFA 60000 55 UV 7035
- FESTO Motion Terminal VTEM

<https://dpp40-2-v1.industrialdigitaltwin.org/backend/pcf>



Source Figure: Bosch

# Manufacturing-X: Initiative to digitalize supply chains in the industry



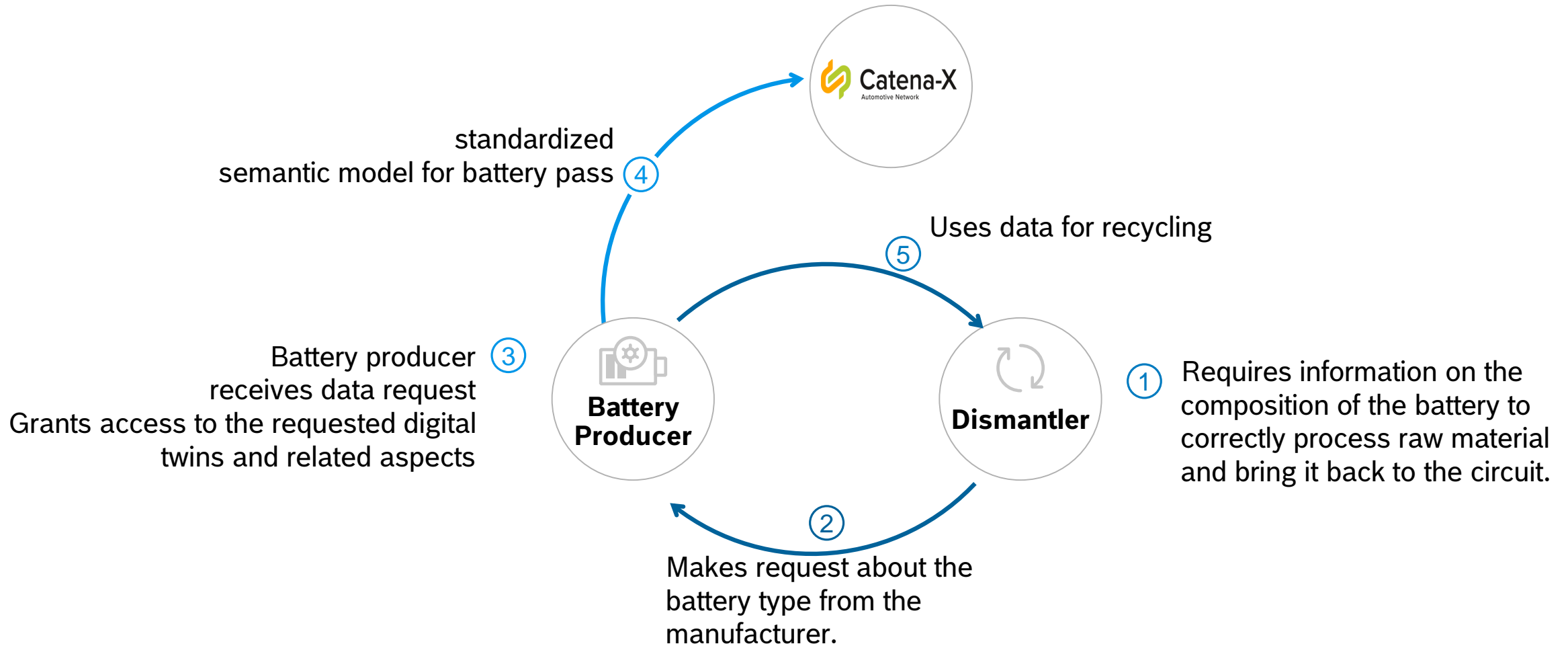
**IDTA** Industrial Digital Twin Association

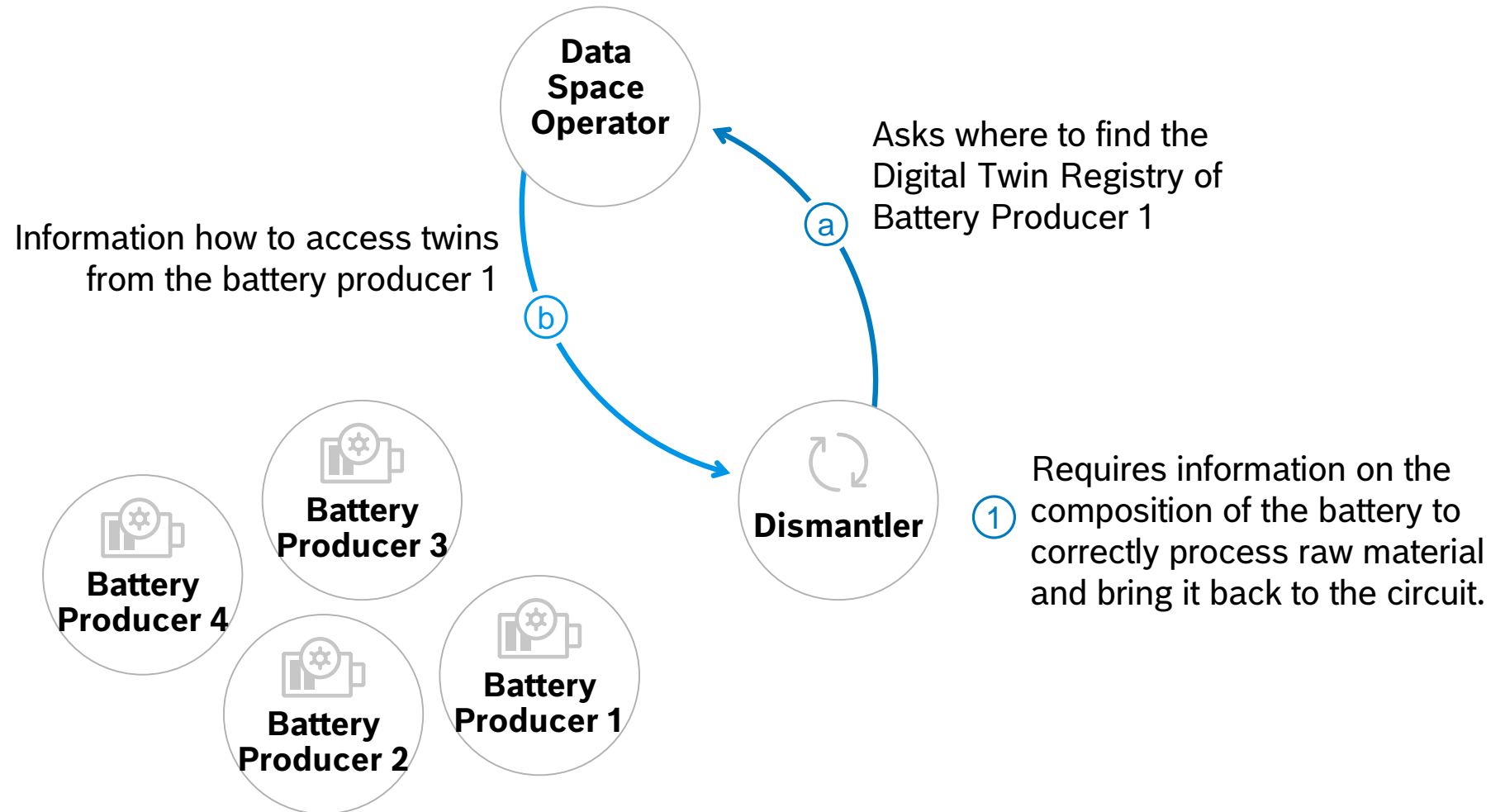


Offers enabling technology

<https://www.plattform-i40.de/IP/Navigation/EN/Manufacturing-X/Manufacturing-X.html>

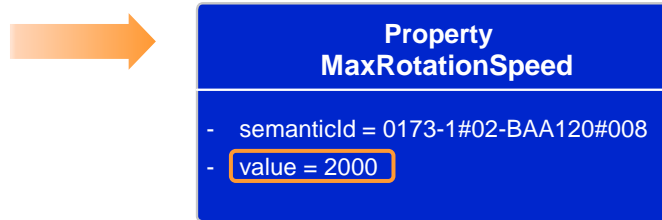
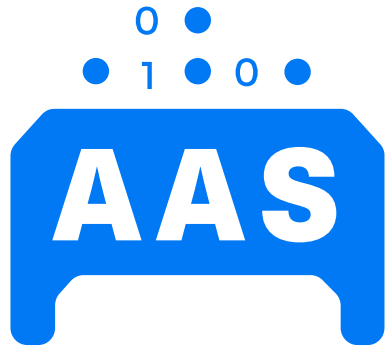








# How



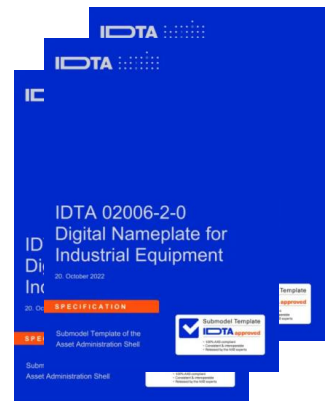
2000 = year?  
2000 = Dollar?  
2000 = Steps?  
2000 = ...?

semanticid



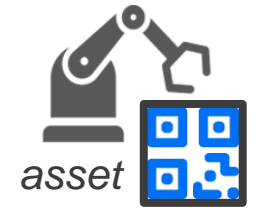
Property	0173-1#02-BAA120#008 Max. rotation speed
Data type	INTEGER_MEASURE
Unit of measure	1/min
Definition	Greatest possible rotation speed with which the motor or feeding unit may be operated

2000 = Max. rotation speed (1/min)

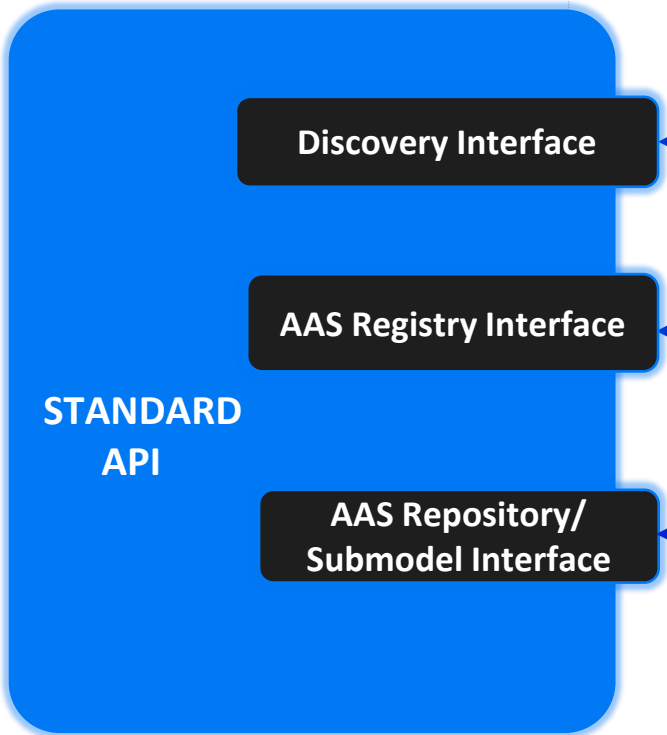


<https://industrialdigitaltwin.org/en/content-hub/submodels>

# HOW – AAS: Application Programming Interface (API)



Supplier's Business applications (e.g. ERP, PDM, CRM, MES, ...)



GET

AAS ID

GET

AAS and Submodel Endpoints

GET



Submodel

Read AssetId



Operator's Business applications



# Closing

# Topics to remember



## WHO

Industrial Digital Twin Association (IDTA) is driving the standardization of the interoperable Digital Twin

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## WHY

We need interoperable digital twins across the value chain to speed up business and lower cost for data management

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## WHERE

The Digital Product Passports (DPP) makes products “transparent” and more valuable. Digital twins are used in dataspace like Manufacturing-X to ensure interoperability between business partners.

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## HOW

Modular and scalable approach. Harmonized / standardized semantic models help business partners to look into the product. Standardized APIs for sharing data between systems and companies.

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**=> Only together we are STRONG** (IDTA and DTC) 😊

# IDTA

IDTA  
WE MAKE  
DIGITAL TWINS





## Lets connect...

My goal:  
"Make Digital Twins  
interoperable"



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My goal:  
"La lingua franca" for  
global interoperability.