

INDUSTRIAL DATA SPACE – DIGITAL SOVEREIGNTY OVER DATA

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Bonn, Germany

Digitising European Industry
WG2 Meeting

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 **Fraunhofer**

Industrial Data Space Research Project and Association

INDUSTRIAL DATA
SPACE ASSOCIATION



<http://www.industrialdataspace.org>

Key Data of the BMBF Project

- Start: 1 October 2015
- Duration : 36 months
- Budget: 5 M EUR

Highlights

- January 2016: Chartered Association
- Round-table on EU level
- CeBIT and Hannover Messe

Fraunhofer Consortium

- 12 Institutes
- AISEC, FIT, FKIE, FOKUS, IAIS, IAO, IESE, IML, IOSB, IPA, ISST, SIT

Project Status

- First Software Demonstrators available
- 12 active use case projects
- MoU with OPC Foundation

Industrial Data Space e.V.: 40+ Members from 8 Countries



Induced Follow-up Activities

- Domain specific verticalisation: Materials Data Space, Medical Data Space etc.
- Internationalisation and Standardisation

Motivation

Why does Industry Need The Industrial Data Space?

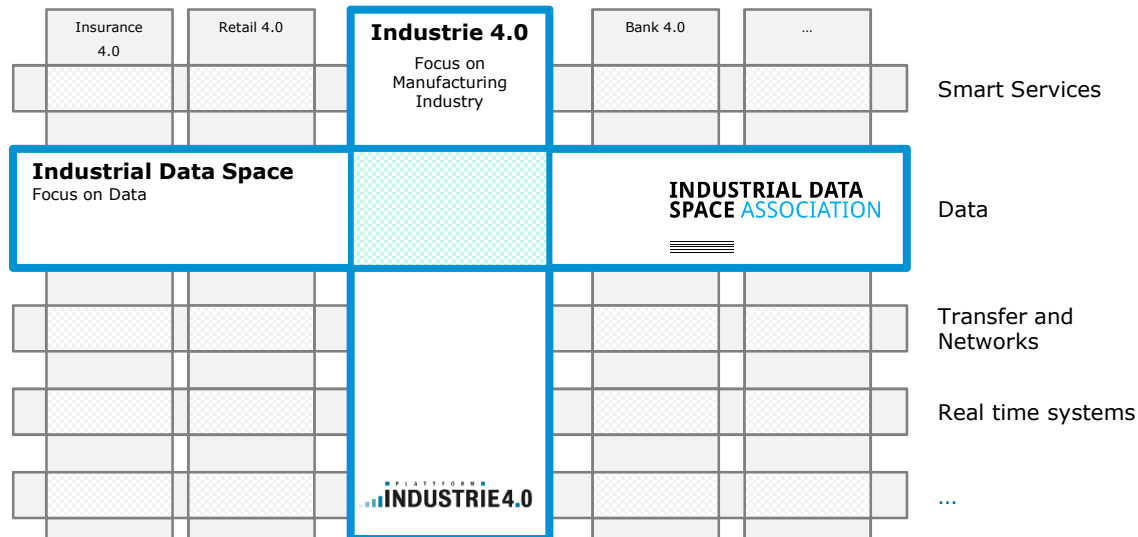
One of the essential elements behind digital transformation in industry is the **exchange of data and services between industrial companies.**

Benefit: by networking companies, **exchanging data between companies and integrating publicly available data**, added value is generated in the form of new products and smart services. This means that new, digital business models are also possible in conventional industries.

This guarantees the competitiveness of industrial companies and their **independence from IT companies! Data security and trust** in secure data exchange are essential prerequisites here.



LOCATION IN THE CONTEXT OF "INDUSTRY 4.0" FOCUS ON DATA



The development and promotion of the Industrial Data Space are being conducted in close cooperation with "Plattform Industrie 4.0" initiative.



INDUSTRIAL DATA SPACE ASSOCIATION SELF-PERCEPTION



IDS stands for secure data exchange between companies where the producer of data remains the owner of the data and maintains sovereignty over the use of that data.

IDS Assoc. aims to define the conditions and governance for a reference architecture and interfaces aiming at international standards. This standard is actively developed and updated on the basis of use cases. It forms the basis for a number of certified software solutions and business models, the development of which is fostered by the association.

Digitisation of Industry

Digitisation Enables Data Driven Business Models

... for Example Precision Farming



"Precision Farming"



Value Creation in the "Ecosystem"

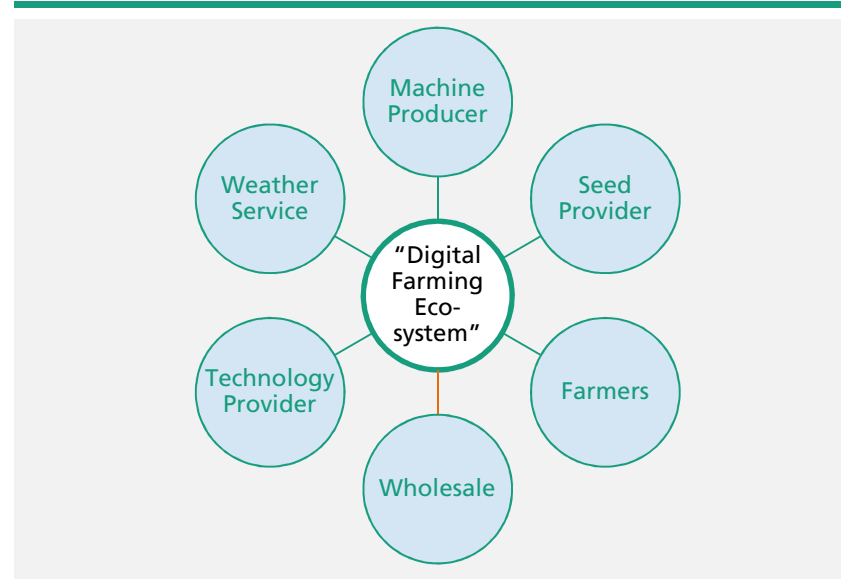
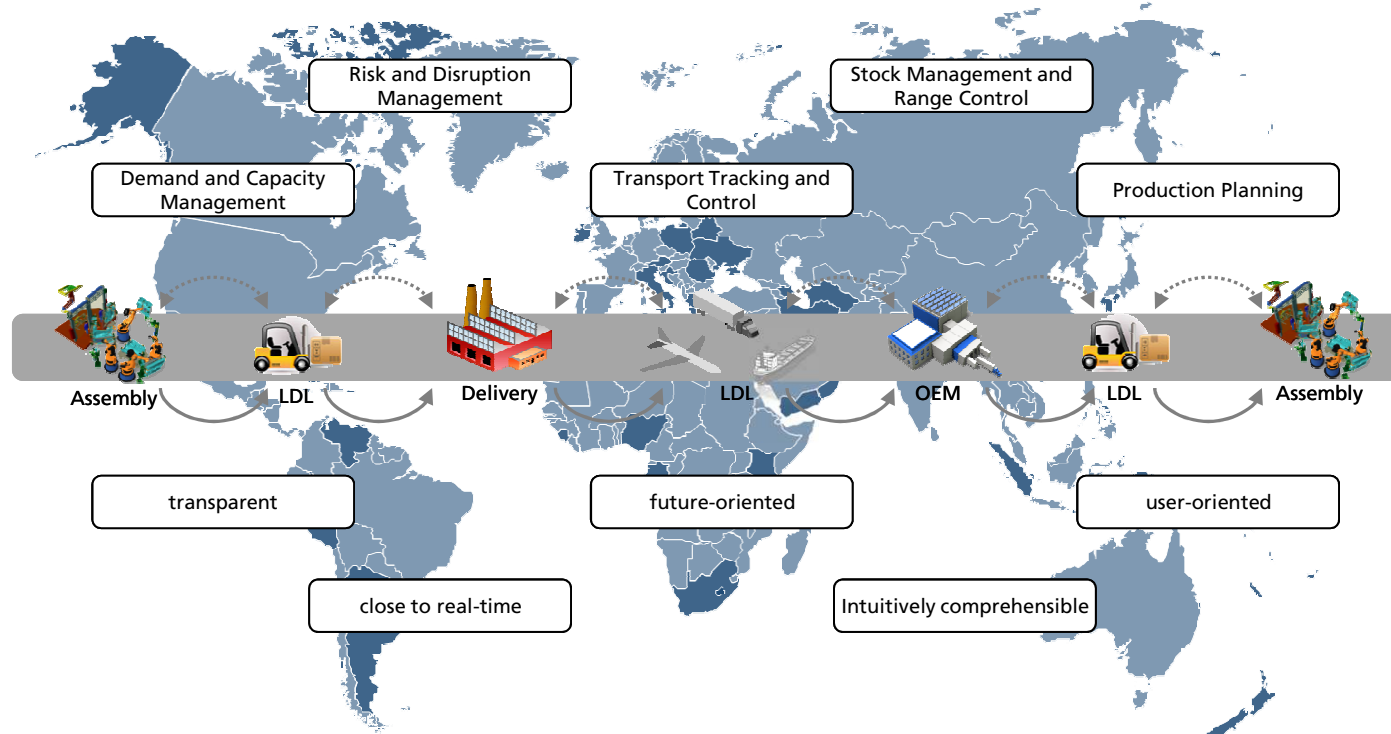


Image sources: wiwo, traction-magazin.de. Quelle: Beecham Research Ltd. (2014).

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Digitisation of Industry

Digitisation is not only Visible in Products, but also in Processes



Sources: VILOMA Projekt. Legende: LDL – Logistikdienstleister. OEM – Original Equipment Manufacturer.

Digitisation of Industry

Digitisation is both Driver and Enabler of Innovative Business Models



A core competence of business model innovation is the combination of data in an "ecosystem" or data value chain.

Digital offerings follow common architectural principles:

- Services are decoupled from physical platforms/products
- Architectural layers are decoupled
- Products become platforms and vice versa
- Ecosystems develop around platforms
- Innovation happens via collaboration

CL17

Hierzu gibt's eine noch bessere Folie

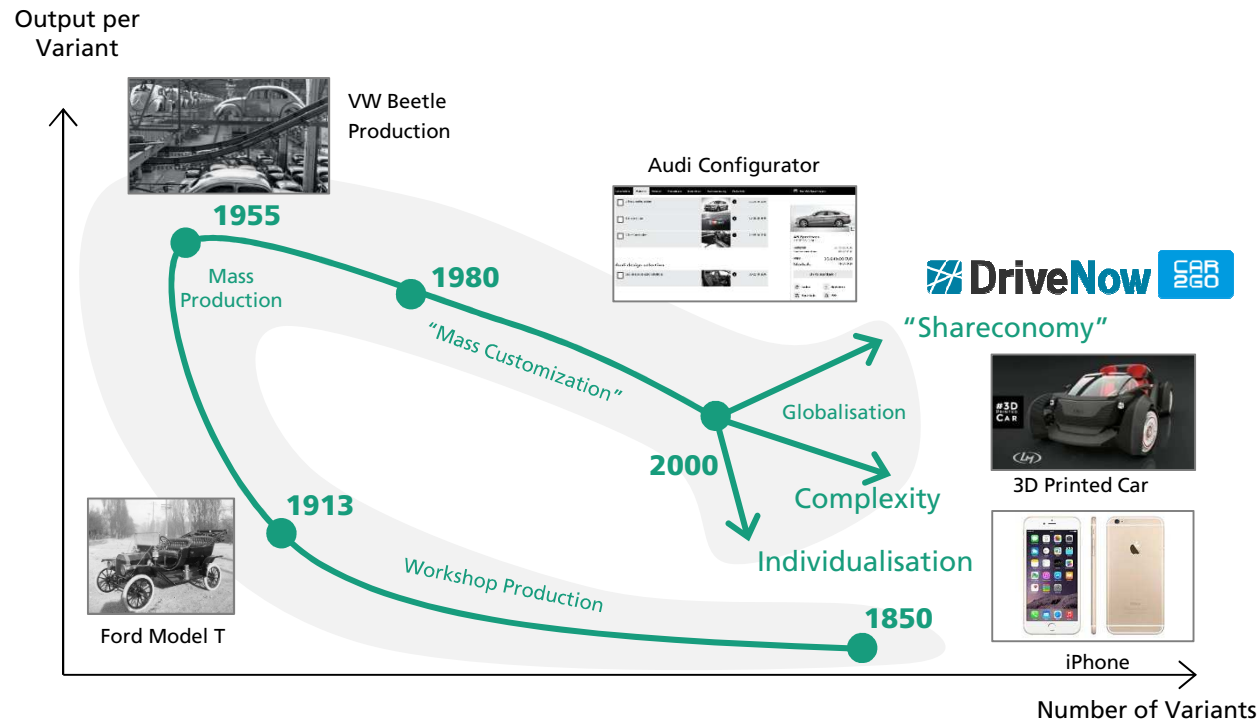
Christoph Lange, 05/12/2016

Digitisation of Industry

As a Consequence of the "Smart Service World", the Complexity of Service Creation is Increasing.



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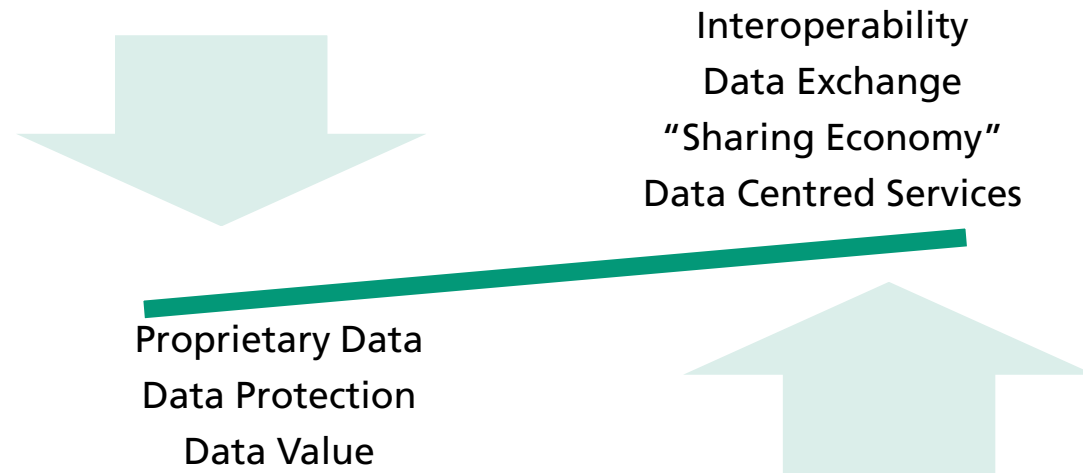
Source: Koren (2010), quoted in Bauernhansl (2014).
 Image sources: <https://en.wikipedia.org> (2015), <https://www.impulse.de> (2015), [audi.de](https://www.audi.de) (2015), o2.co.uk (2015), computerbild.de (2015).
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Goal and Architecture of the Industrial Data Space

Squaring the Circle of Data Management: between Property and Added Value



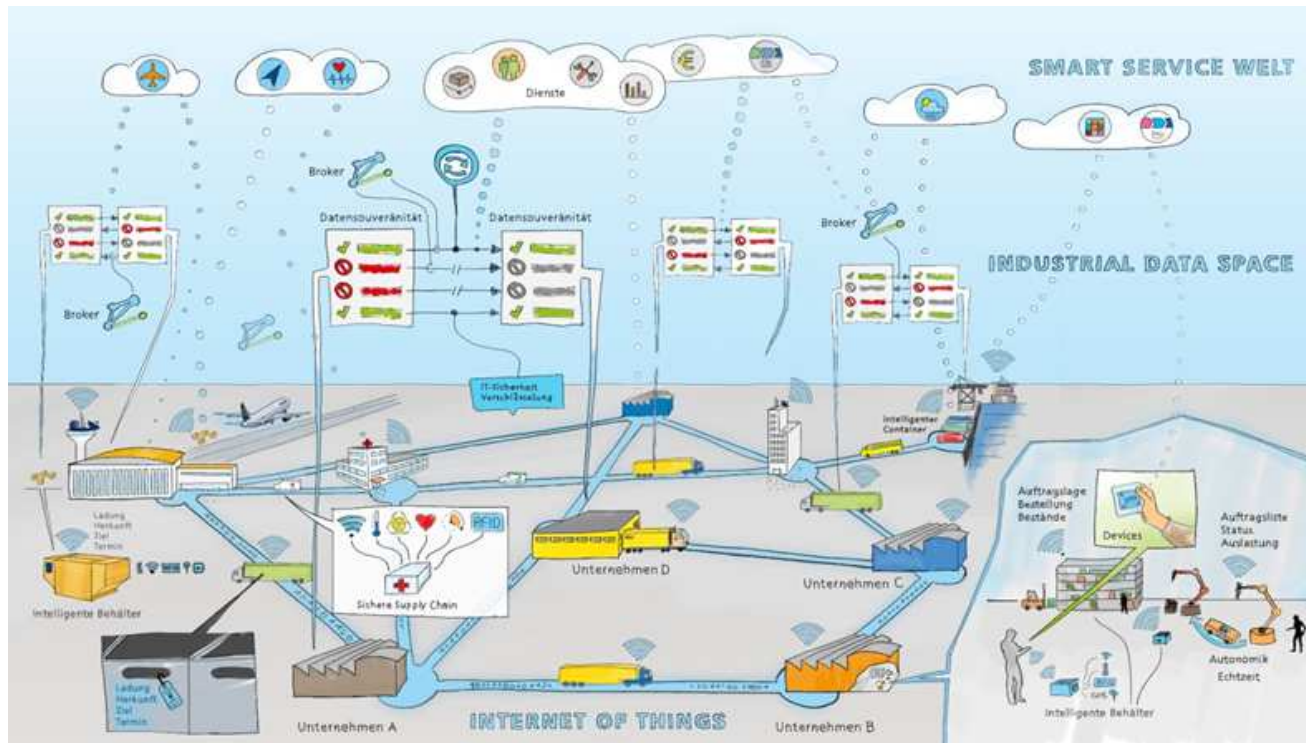
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Digital Sovereignty is the ability of a natural or legal person to exclusively self-determine their use of data assets.

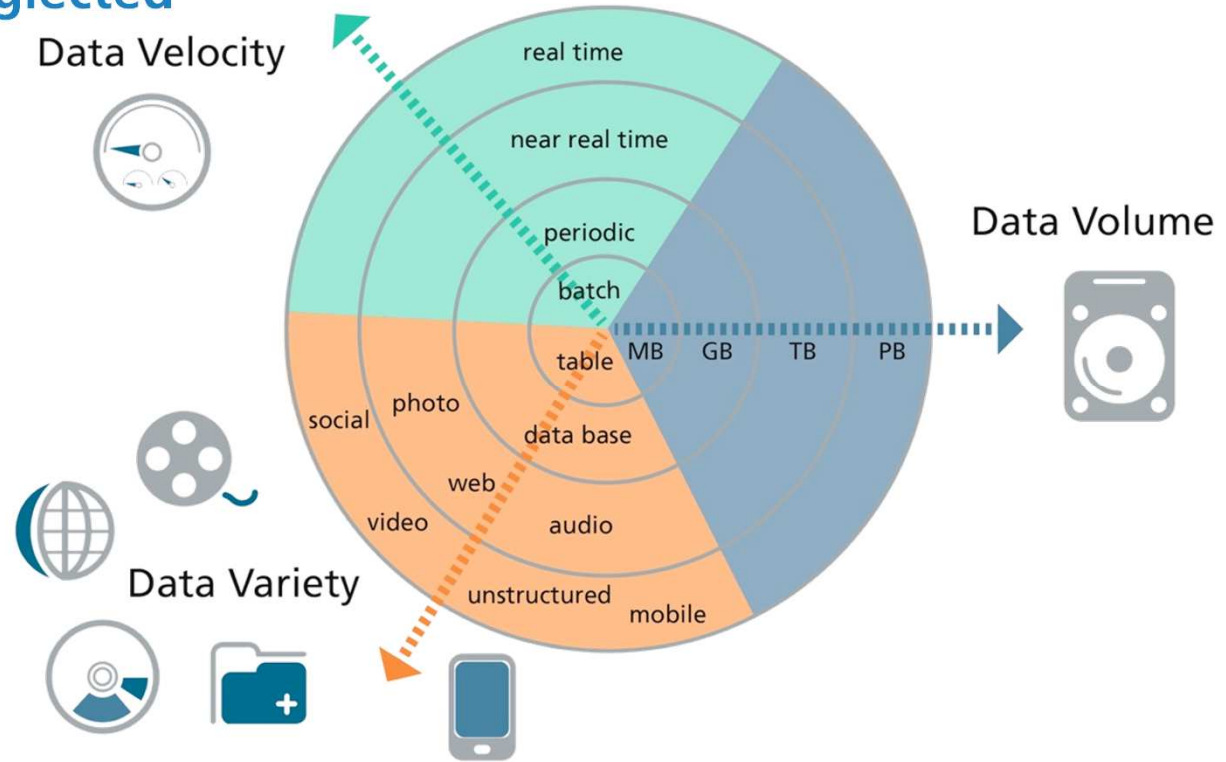
Goal and Architecture of the Industrial Data Space

The Industrial Data Space Connects the Internet of Things and Smart Services.



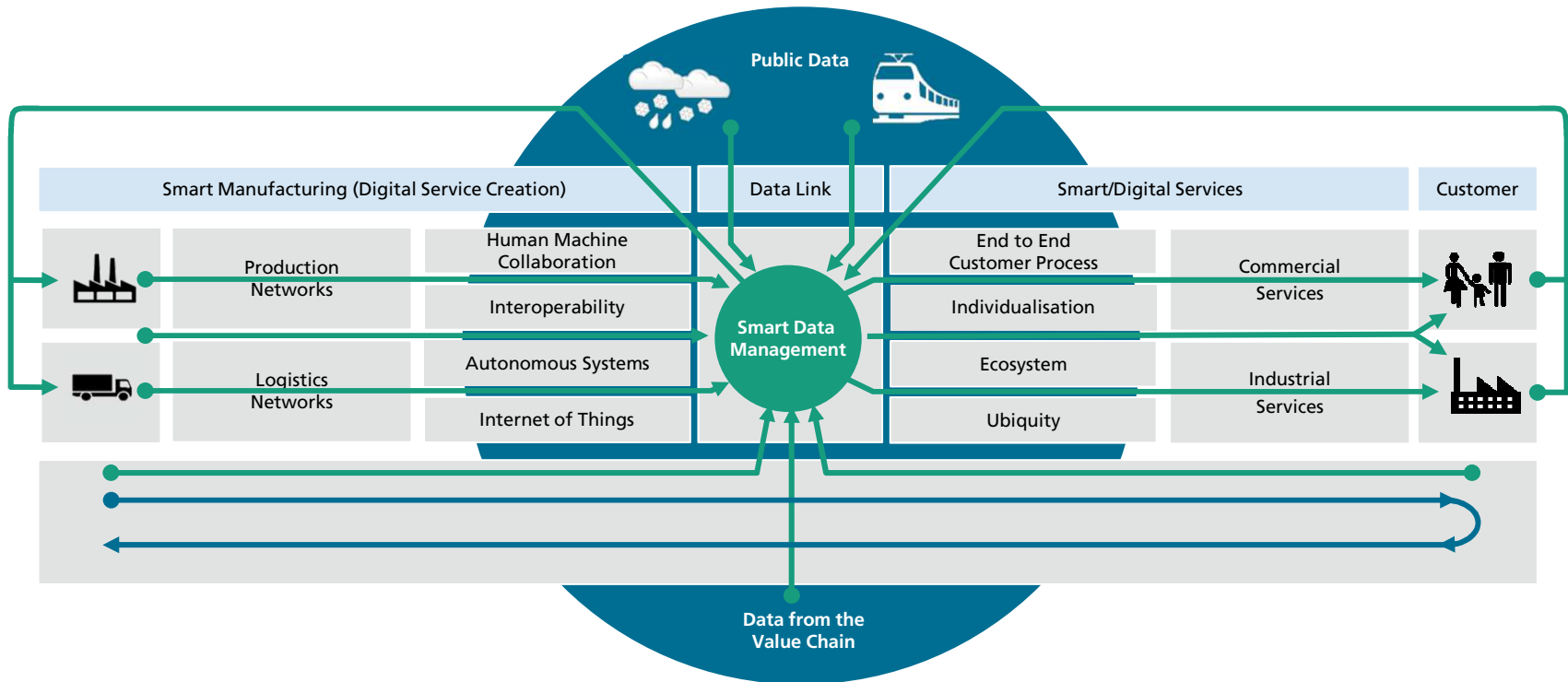
Goal and Architecture of the Industrial Data Space

The Three "V" of Big Data – Variety is often Neglected



Goal and Architecture of the Industrial Data Space

Smart Data Management Links Service Offers and Service Creation.

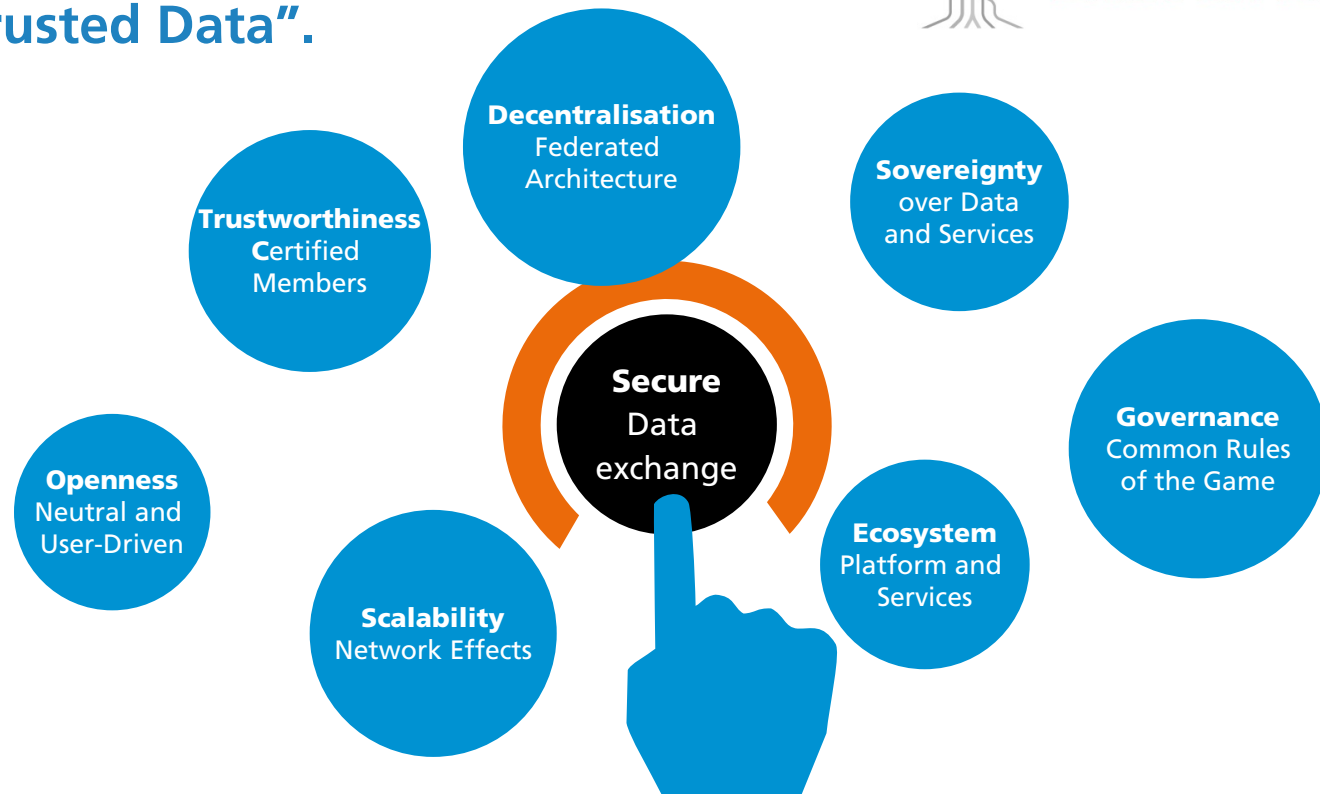


Goal and Architecture of the Industrial Data Space

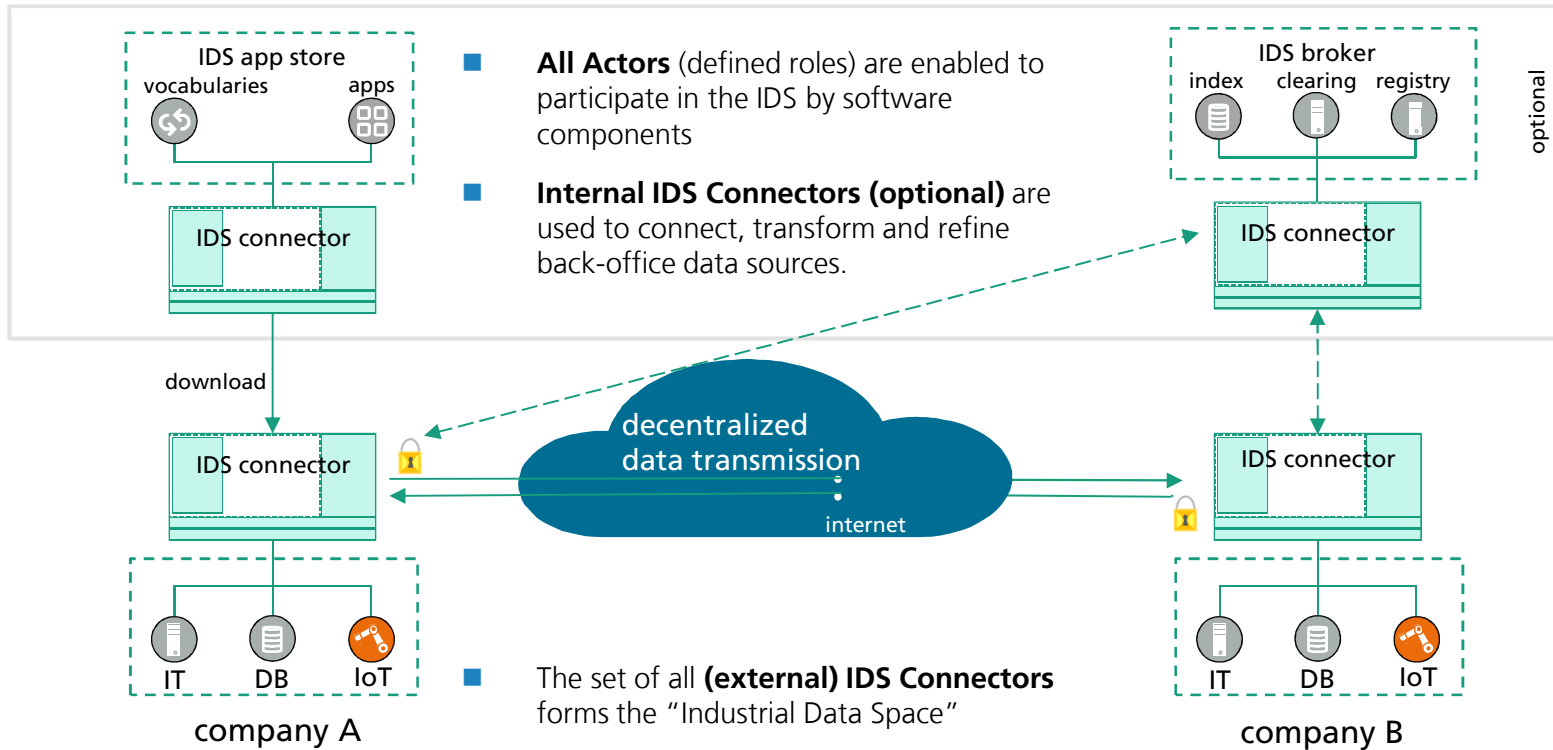
The Industrial Data Space aims at blueprinting a “Network of Trusted Data”.



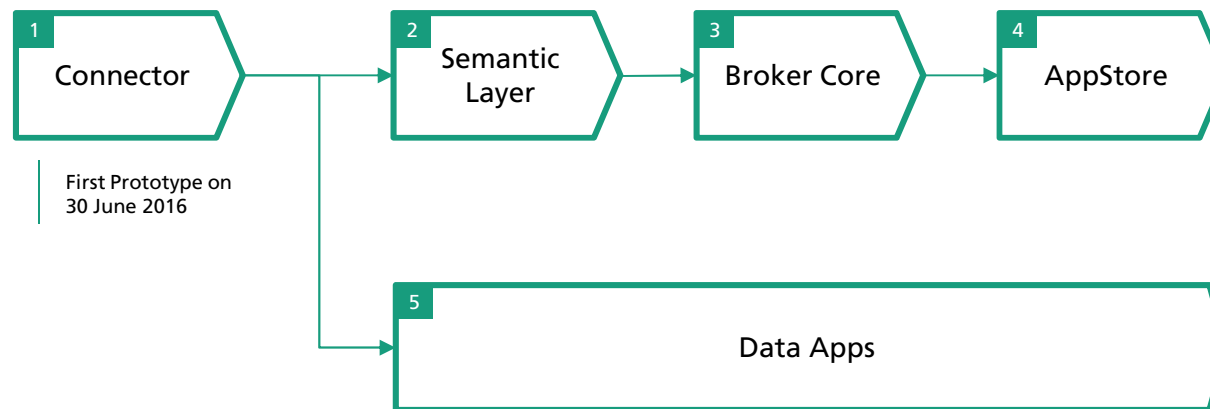
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Goal and Architecture of the Industrial Data Space Component Reference Architecture



Research Project and Industrial Data Space Association Development Roadmap at a Glance



- After the development of the connector, basic data services (“semantic layer”) will be designed and realised as prototypes.
- In parallel, the design of further data services (“data apps”) is starting.
- Broker and AppStore will be realised as special add-on packages based on the Connector.

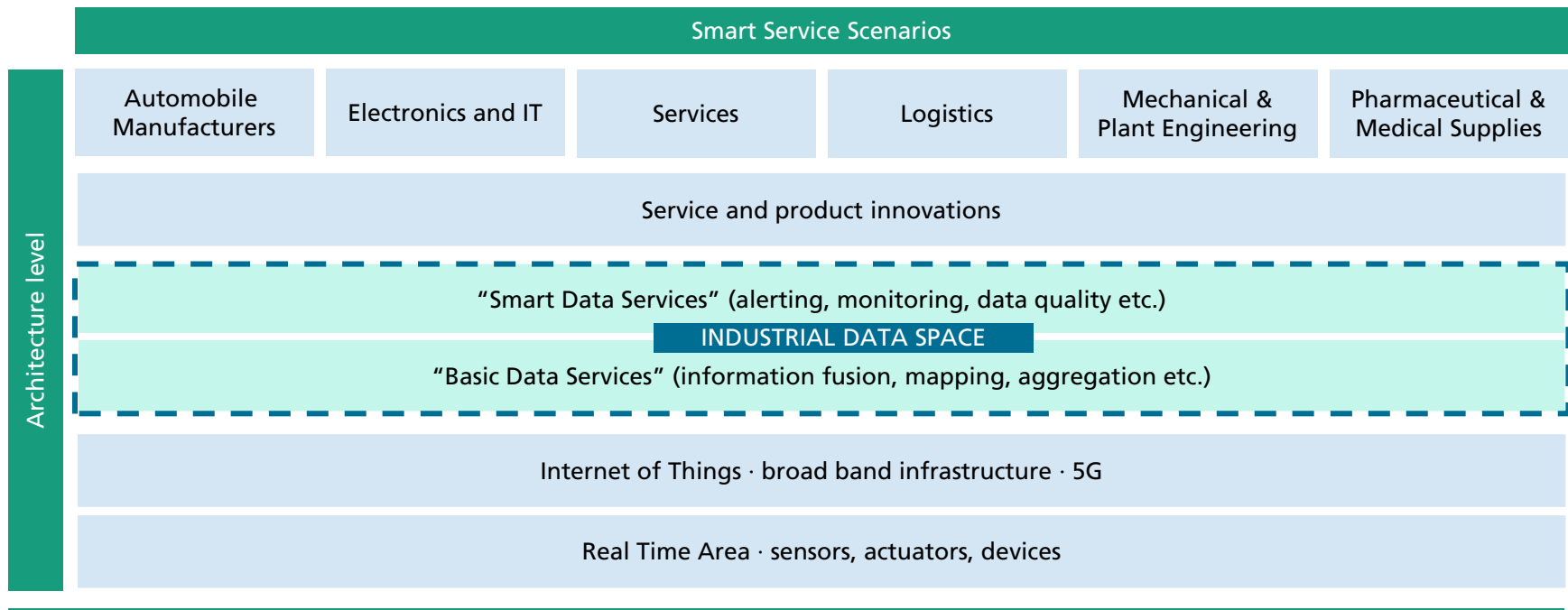


RANGE OF FUNCTIONS BUSINESS MAP OF BASIC SERVICES

Industrial Data Space App Store	Basic Data Services Provisioning	Data Service Management and Use	Vocabulary Management	Software Curation
	Data Provenance Reporting Data Transformation Data Curation Data Anonymization	Data Service Publication Data Service Search Data Service Request Data Service Subscription	Vocabulary Creation Collaborative Vocabulary Maintenance Vocabulary/Schema Matching Knowledge Database Management	Software Quality and Security Testing
Industrial Data Space Broker	Data Source Management	Data Source Search	Data Exchange Agreement	Data Exchange Monitoring
	Data Source Publication Data Source Maintenance Version Controlling	Key Word Search Taxonomy Search Multi-criteria Search	»One Click« Agreement Data Source Subscription	Transaction Accounting Data Exchange Clearing Data Usage Reporting
Industrial Data Space Connector	Data Exchange Execution		Data Preprocessing Software Injection	Remote Software Execution
	Data Request from Certified Endpoint Usage Information Maintenance (Expiration etc.) Data Mapping (from Source to Target Schema) Secure Data Transmission between Trusted Endpoints		Preprocessing Software Deployment and Execution at Trusted Endpoint	Data Compliance Monitoring (Usage Restrictions etc.) Remote Attestation Endpoint Authentication

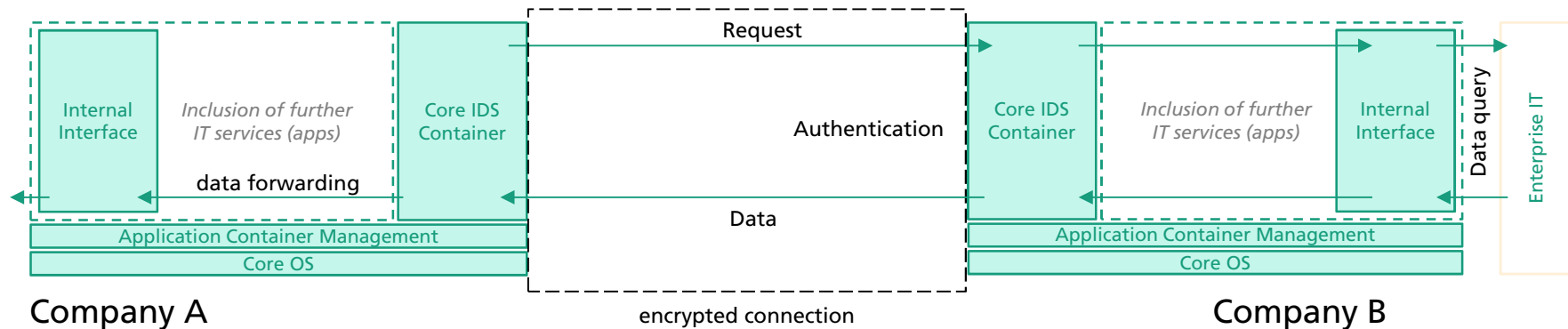
Goal and Architecture of the Industrial Data Space

The Industrial Data Space focuses on the Architecture of Basic and Added Value Services.



Data Exchange in the Industrial Data Space

Simple Data Exchange with the Connector

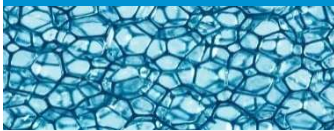


- Company A requests data from Company B
- Company B checks the request and sends the data requested
- Alternative 1: Data exchange with **Trusted App** (Work in Progress);
- Alternative 2: Data exchange by **Remote execution** (Work in Progress);



APPLICATION DOMAINS OF THE INDUSTRIAL DATA SPACE VERTICAL COOPERATION

Material Sciences



Exchange of material and material properties over the entire life cycle from product creation through to scrapping

Energy Business



Common use of status data for the predictive maintenance of wind power stations

Life Sciences



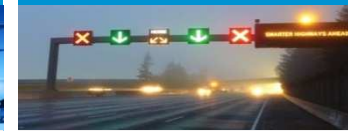
Design of a jointly used data platform for the development of medical and pharmaceutical products

High Performance Supply Chains



Exchange of status and quality data for transport goods along the entire supply chain

Traffic Management



Use of traffic management data for innovative digital services inside the vehicle and for controlling traffic flow

Research Project and Industrial Data Space Association Use Cases of the Companies are bundled to Reference Use Cases



Reference Use Case "Logistics"



Thyssen
Salzgitter KOMSA
Bayer
VW Bosch
Atos

Reference Use Case "Production"



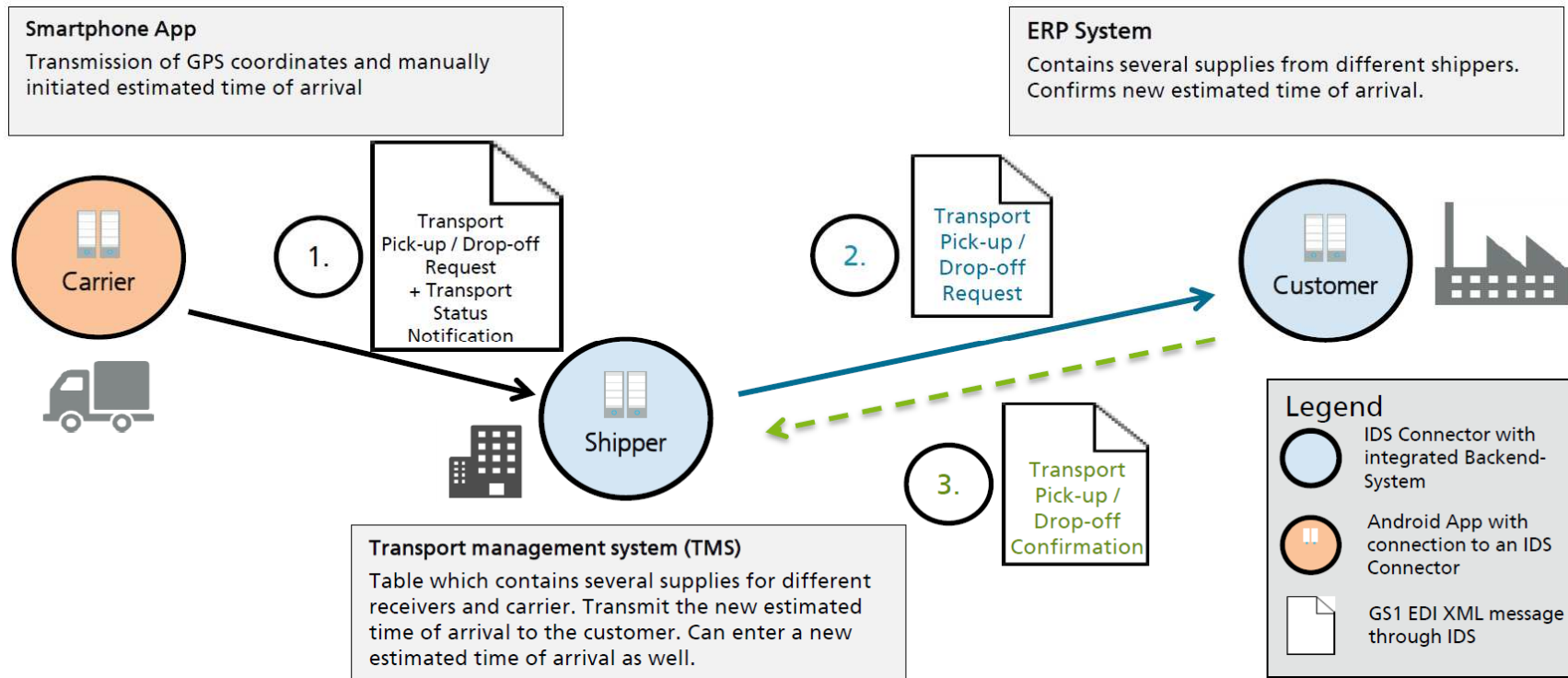
Schaeffler Festo
Salzgitter SICK

Further Reference Use Cases

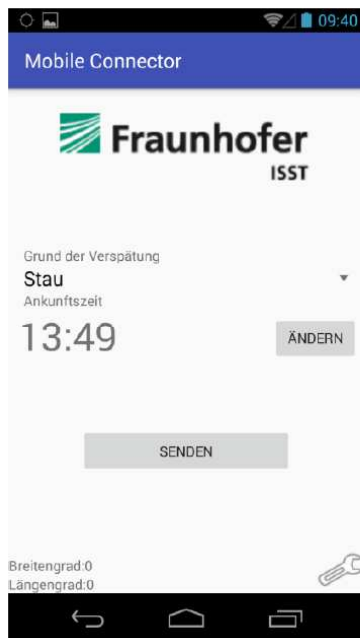


KOMSA
Salzgitter Boehringer

Research Project and Industrial Data Space Association Concept Reference Use Case "Logistics"



Research Project and Industrial Data Space Association First Prototype Reference Use Case "Logistics"



Spediteur - Transportübersicht			
Transportkennung ◊	Sendungskennung ◊	Fahrzeugkennung ◊	Voraussichtlicher Ankunftszeitpunkt
4711	SHPMNT0000021	TRUCK2	8/26/16 12:17 PM
0815	SHPMNT0000010	TRUCK1	8/26/16 12:47 PM
1234	SHPMNT0000022	TRUCK2	8/26/16 1:17 PM
7777	SHPMNT0000032	SPEDIXTRA	8/26/16 1:31 PM



Kunde customer0815 - Sendungsübersicht			
Transportkennung ◊	Sendungskennung ◊	Fahrzeugkennung ◊	Voraussichtlicher Ankunftszeitpunkt
0815	SHPMNT0000010	TRUCK1	8/29/16 10:15 AM
1234	SHPMNT0000022	TRUCK2	8/29/16 10:45 AM
7777	SHPMNT0000032	SPEDIXTRA	8/29/16 10:59 AM
4711	SHPMNT0000021	TRUCK2	8/29/16 1:35 PM

Industrial Data Space Association

How to get Involved



Use Cases

- Piloting, applying and testing Industrial Data Space
- Early access to software
- Implementing requirements in the development of the architecture
- Development of Smart Services

Working groups

- Participation in working groups
- Regular exchange with all member companies
- Dealing jointly with problems concerning data exchange

Exchange of information

- Transferring the content of the research project
- Common events; networking events
- Organisation of marketing activities / fairs

Exploitation

- Development of business models in the IDS
- Innovation camp
- Development of common user models

Architecture

- Support to help design the reference architecture
- Contribution of company-specific know-how

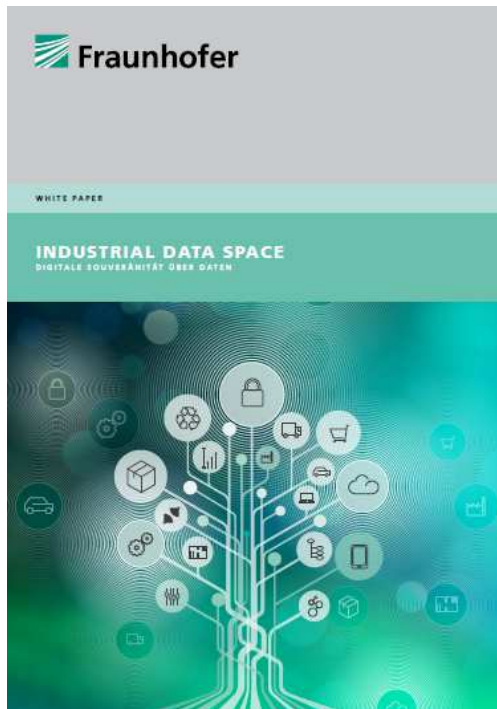
Standardisation/Certification

- Defining and implementing standards
- Designing certification measures

Research Project and Industrial Data Space Association Whitepaper



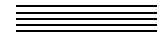
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<https://www.fraunhofer.de/content/dam/zv/en/fields-of-research/industrial-data-space/whitepaper-industrial-data-space-eng.pdf>

Overview on goals and architecture of the Industrial Data Space
Presentation of selected use cases
Presentation of the Industrial Data Space Association

**INDUSTRIAL DATA
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