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Prof. Dr.-Ing. Boris Otto · Mainz · 22 October 2024

Data Spaces as a Collective Action to Create an Infrastructure for the Data Economy

Table of Contents

Data Spaces as a Collective Action to Create an Infrastructure for the Data Economy

Business Drivers for Data Sharing in Automotive

Data Spaces as a Collective Action for the Data Economy

Common Use Cases

Circular Economy

- **Secondary use** of components, parts built of scarce and valuable resources (e.g. rare earth elements, batteries)

Traceability and Sustainability

- End-to-end, detailed reports on **carbon dioxide emissions** required by customers and the law
- Complex production and supply networks require **transparency about origin of parts**, capacity availability, and delivery status

Quality Management

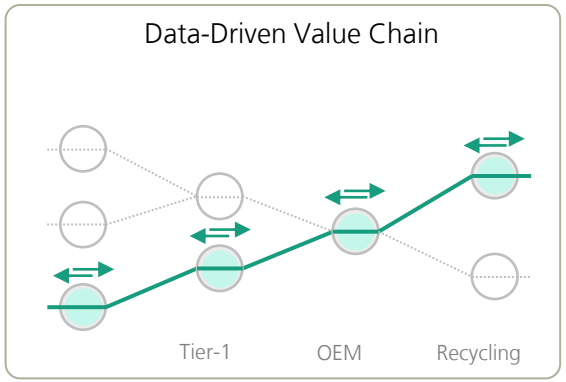
- **Cost of quality** of finished goods
- Reduction of **recalls costs**

Production System Complexity

Products

- More than 10^{30} theoretical **product variants** for a mid-class car
- Relatively low **vertical range of manufacture** (~ 25 %) at OEM
- Transformation towards electric mobility

Supply Network



© Siemens (2024).

Incentives and Barriers for Inter-Organizational Data Sharing

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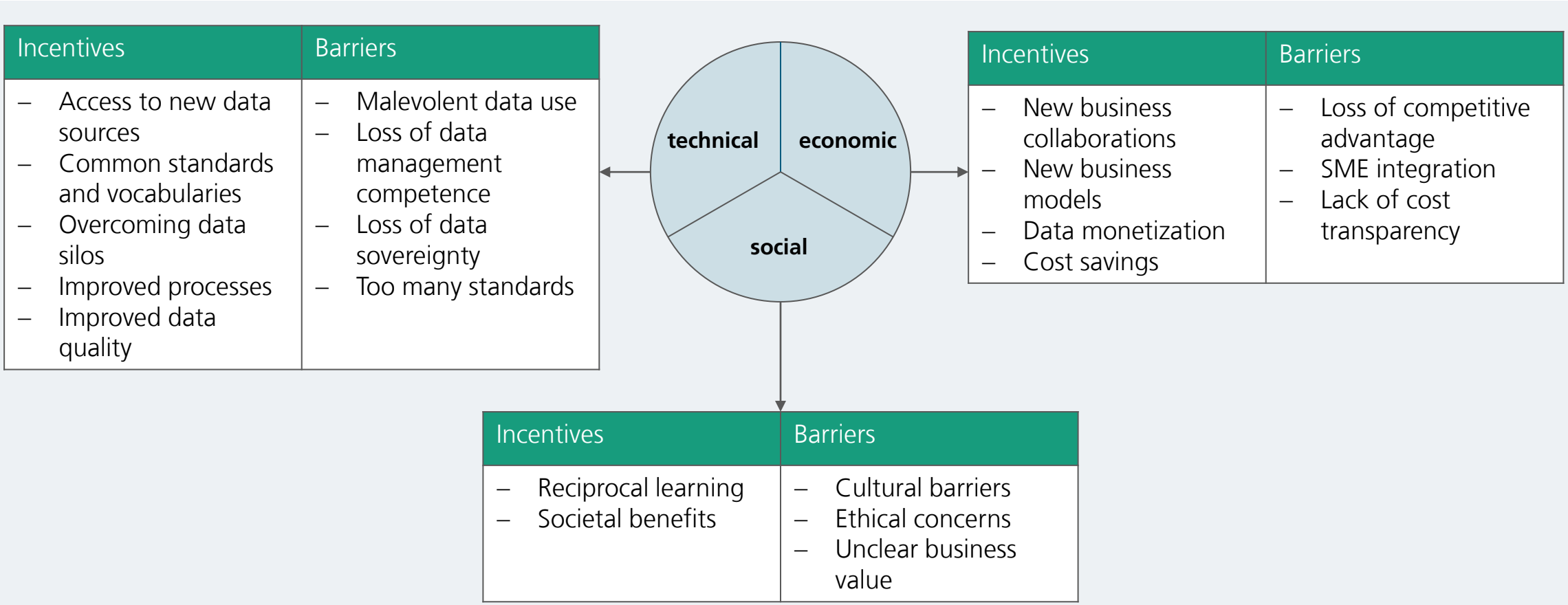

Source: Jussen, I.; Möller, F.; Schweihoff, J.; Gieß, A.; Giussani, G.; Otto, B.: Issues in inter-organizational data sharing: Findings from practice and research challenges. In: Data & Knowledge Engineering 150 (2024).

Common European Data Spaces

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A real **data economy**, on the other hand, would be a powerful engine for innovation and new jobs. And this is why we need to secure this data for Europe and make it widely accessible. **We need common data spaces** — for example, in the energy or healthcare sectors. This will support innovation ecosystems in which universities, companies and researchers **can access and collaborate on data.«**

State of the Union Address on 16 September 2020

Source: (EC, 2020).

Design Paradigm of the European Data Strategy

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Balancing the interests of a community—perhaps even the society or the European Union—in re-using the data and the interest of the individual data rights holder

Data Ecosystems · Data Spaces · Data Infrastructures

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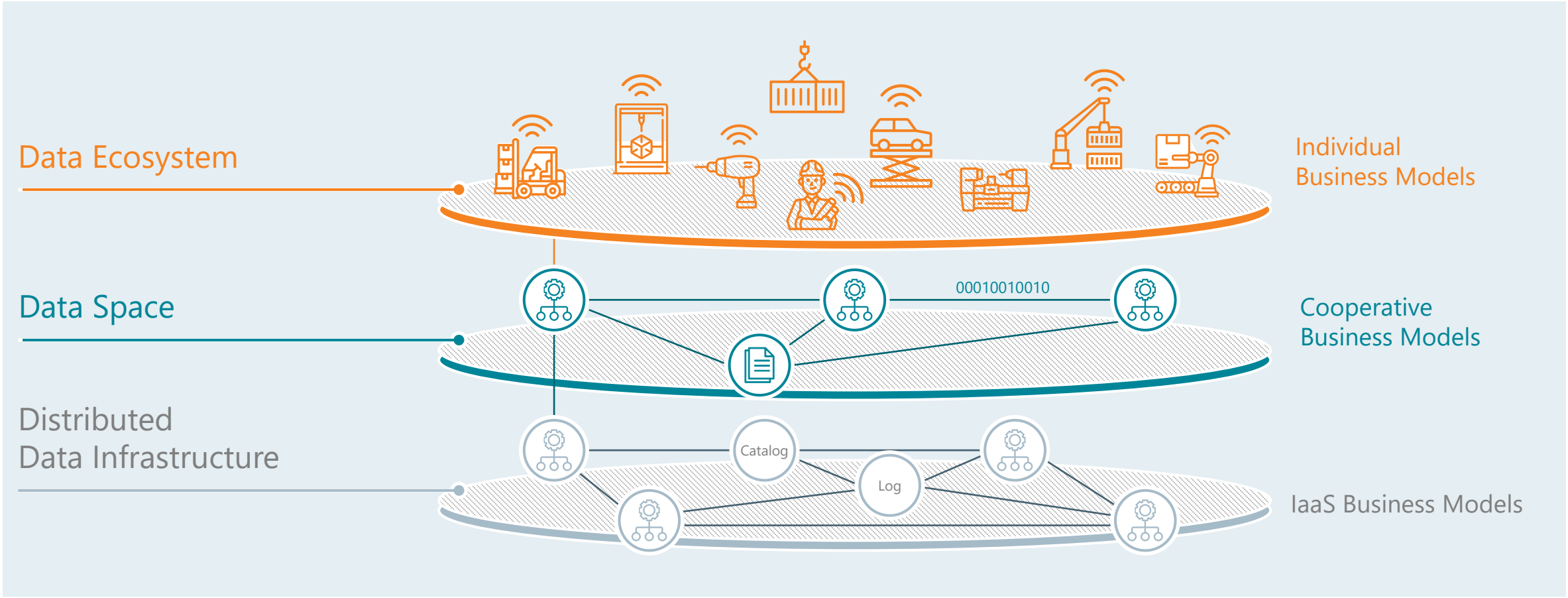

Implementation of the European Data Strategy

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The **European Strategy for data** (2020) aims to make the EU a leader in data-driven society

The **Data Governance Act** (2020) facilitates data sharing across sectors and Member States

The **Data Act** (2022) clarifies who can create value from data

Regulatory Framework

Ten **European common data spaces**, ranging from industry to mobility, from European Green Deal to energy and health

Interoperability for Innovation

Source: adapted from (Cyber Risk GmbH, 2023).

A 30’000 ft View on industrial data ecosystems

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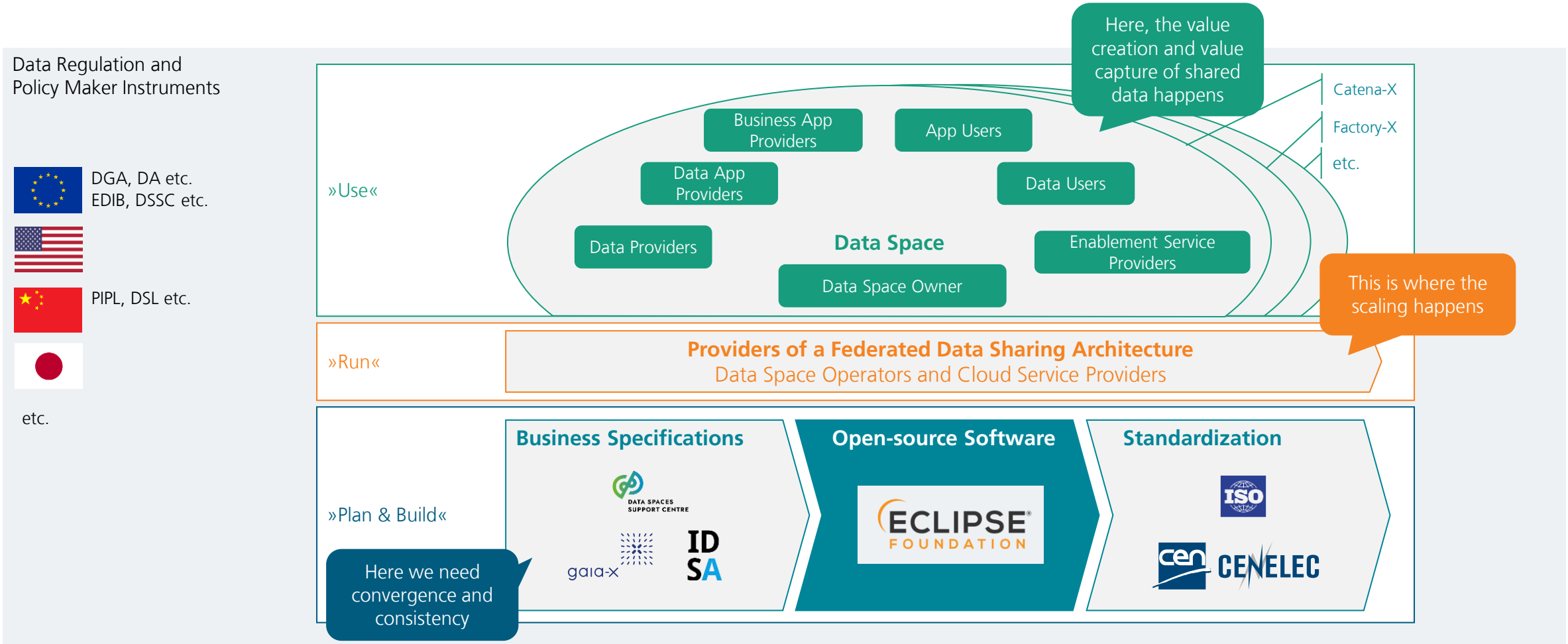

Legend: DGA – Data Governance Act; DA – Data Act; EDIB – European Data Innovation Board; DSSC – Data Spaces Support Centre; PIPL: Personal Information Protection Law, DSL – Data Security Law.

Data Space Governance at the Example of Catena-X

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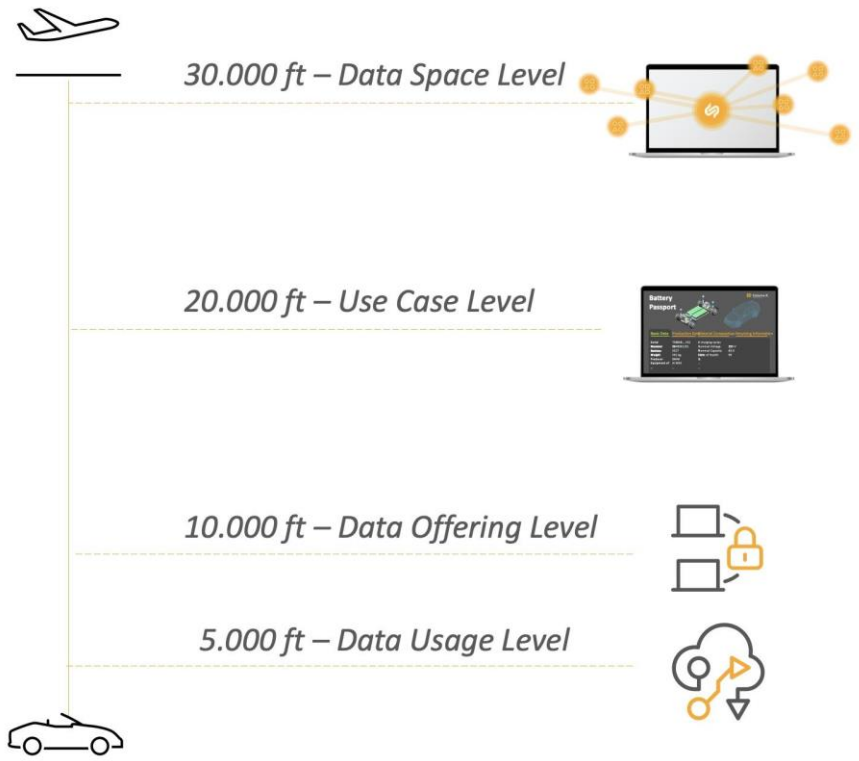
Governance Framework for Data Space Operations



»Flight Level« Model

30,000 ft - Data Space Level
- Governance framework
- Operating model and 10 golden rules

20,000 ft - Use Case Level
- Data exchange governance
- Standards and policies

10,000 ft - Data Offering Level
- Guidance for individual data offerings

5,000ft - Data Usage Level
- Automated negotiations of data usage contracts
- EDC support

Source: Catena-X Automotive Network (2024).

Data Space Use Cases at the Example of Catena-X

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Catena-X
Your Automotive Network

Quick wins and short-term enablers

Traceability

- Trace components and subcomponents along the whole value chain.
- Narrow down quality issues significantly faster.

Quality Management

- Receive quality performance data from the customer.
- Root cause analysis and collaborative data evaluation.

Regulatory must haves within the next 2 years

Product Carbon Footprint

- Enablement of uniform CO2 Reporting
- Compliance with PCF regulations

Circular Economy / Product Passport

- Product information in one place (e.g., material composition & origin)
- Compliance with battery regulations

ESG Monitoring (LkSG)

- Facilitating ESG data reporting transparencey
- Compliance with supply chain due diligence regulations

Process improvement enablers

Business Partner Data Management

- Harmonized, complete & quality-checked data
- Reduction of data maintenance costs & improved data actuality

Demand & Capacity Management

- Improved planning reliability & accuracy
- Early detection of problems & ability to avoid capacity bottlenecks reducing costs

Digital Behavior Twin

- Model-based product design & innovative collaboration
- Access to solutions and evaluation procedures for SMEs

Battery Product Pass

- Centralized repository of information
- Offers insights into the entire product supply chain…

Source: Catena-X Automotive Network (2024).

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Collective Action at the Example of Catena-X

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Catena-X
Your Automotive Network

Catena-X
Automotive Network

Vision About Catena-X

Eclipse Tractus-X Project

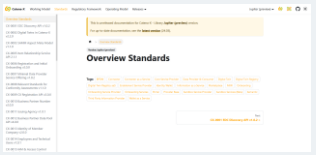
Eclipse Project Repository
Special Interest Groups
SIG-Release, SIG-Security, SIG-Infra, SIG-Testing

Catena-X Association

Webpage
Overview

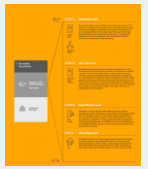
KITs
KITs

Standards
Standard library



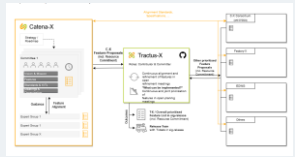
Developer Hub
Release Guidelines Release Notes/ Changelog Tutorials

Operation and Goverance
Operating Model Regulatory Framework



Community
Open Meetings Open Meeting Board

Structural Guide
Working Model



Source: Catena-X Automotive Network (2024).

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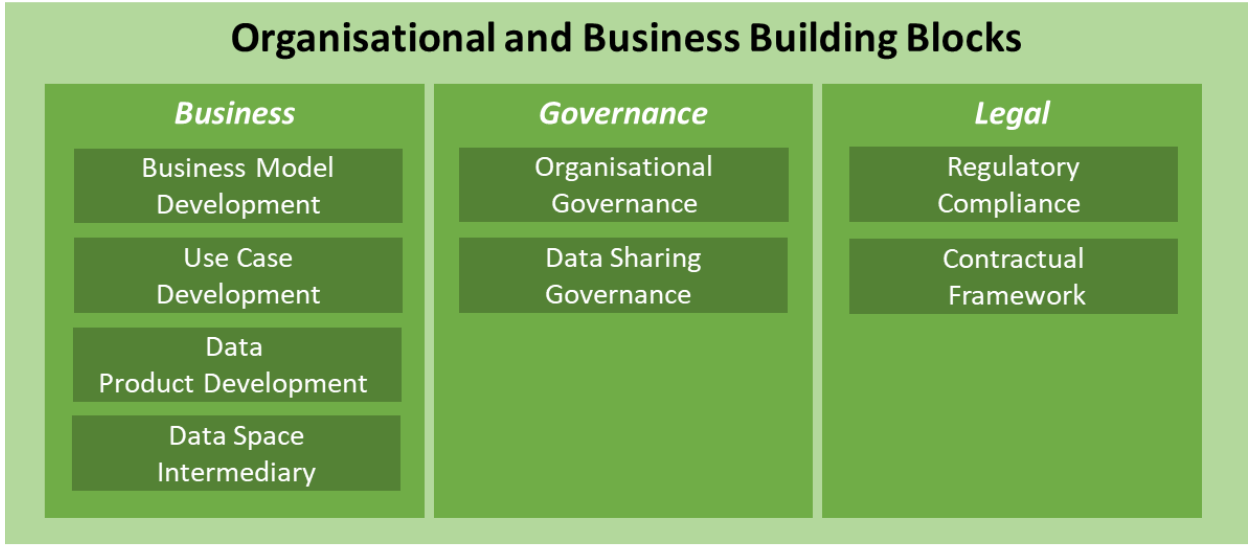
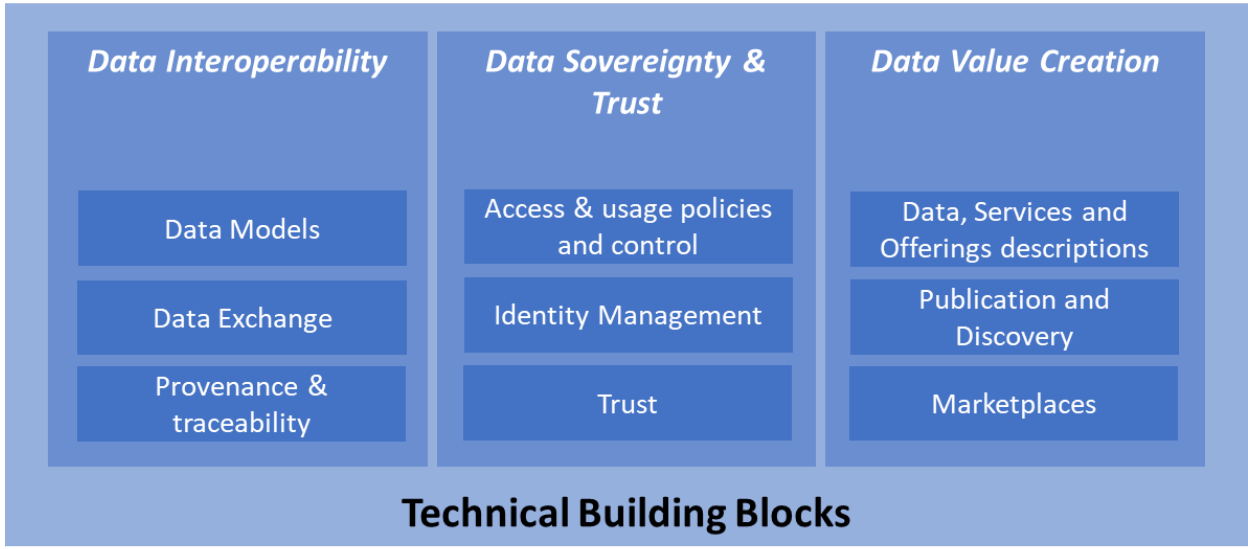
Blueprint for Data Spaces

Data Spaces as a Collective Action

The EU Data Spaces Support Centre helps European data space initiatives:

- Exchange of knowledge and information
- Networking and sharing of »Best Practices«
- Blueprints and building blocks





DATA SPACES SUPPORT CENTRE

Funded by the European Union

NB: The Data Spaces Support Centre receives funding from the European Union Digital Europe Programme under grant agreement n° 101083412.

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Selected Data Space Service Offerings

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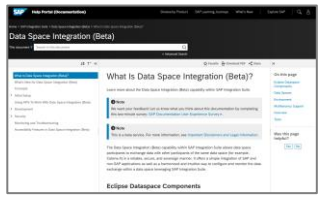
	Cofinity-X	Boot-X	SAP	SOVITY	T-Systems	ZF
Provider	Cofinity-X	Huawei	SAP	Sovity	T-Systems	ZF Friedrichshafen
						
Service offering	Marketplace for Catena-X	Data Space as a service	Data Space Integration	Data Space as a Service	Data Space as a Service	Data Space as a Service
Service model	Catena-X Core Services B	White Label Model	Part of Business Technology Platform	SaaS	Part of Data Intelligence Hub	ZF DOS
EDC implementation	X	X	X	X	X	X
DSP support	X	X	X	X	X	X

NB: Logos and thumbnails from company websites (2024); Data from April 2024.
Legend: EDC – Eclipse Dataspace Components; DSP – Dataspace Protocol.

Standardization for Data Space Interoperability

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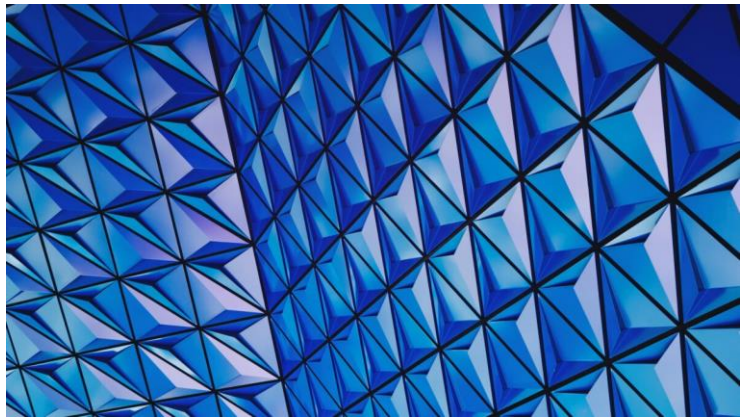
Specification



IDS Association publishes stable version of Dataspace Protocol

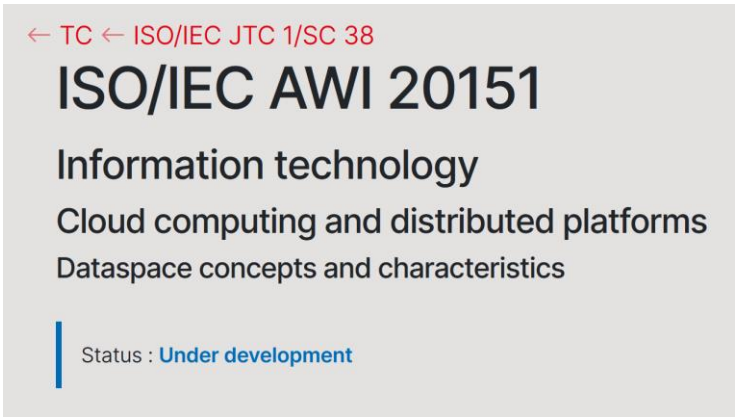
- Foundation for intra- and inter-data space interoperability
- Specification on GitHub
- See https://tinyurl.com/4a5ebfeh

Open-Source Software

Eclipse Dataspace Working starts on 3 November 2023

- Coordination of the various data space projects (EDC etc.)
- Members, amongst others, amadeus, Catena-X, Fraunhofer, Gaia-X, IDS Association, Microsoft, T-Systems
- See https://tinyurl.com/4md4c9c5

Standardization



ISO/IEC AWI 20151 registered as new project on 23 December 2023

- Basic data space characteristics
- Foundation for further standards
- See https://tinyurl.com/9jhdvzux

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Benefits of Open-Source Software for Data Infrastructures

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Trust

- Open-Source Software is a **trust anchor**
- »Black box« strategies hinder acceptance and community trust
- For **data infrastructures**, data sovereignty and trust are key and non-negotiable

Standardization

- Open-Source Software enables faster and more **efficient standardization processes** for de-facto, but also de-jure/formal standards
- ISO/IEC AWI 20151 on dataspace concepts and characteristics as a good example

Power of the Many

- Europe and Germany are characterized by a heterogeneous market for cloud services and platforms and many small- and medium-sized user companies
- Collaboration helps **bundling of resources** and making an impact

Interoperability

- Interoperability is a key prerequisite for **cross-company collaboration**
- Interoperable solutions help seizing **shared innovation potentials** and tackling common challenges

If you want to go fast, go alone; if you want to go far, go together

Source: African proverb.

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Contact

Prof. Dr.-Ing. Boris Otto
Director
Tel. +49 171 2927194
Boris.Otto@isst.fraunhofer.de