Selvitys data-avaruuksien kehityksen tilanteesta

Datatalousfoorumi
8.11.2021

Marko Turpeinen
1001 Lakes

State of Data Spaces

October 2021

MINISTRY OF TRANSPORT AND COMMUNICATIONS

1. Introduction

Background, goals, methods

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Goals of this study

- Provide a snapshot of the state of data spaces in 2021

- Clarify concepts and principles behind data spaces

- Analyse objectives of data space initiatives, programmes, implementers

- Summarise key messages regarding data space developments

Methods

- Literary review: EU and Finnish regulation, funding programmes, reports, specifications, articles, websites, presentations.

- Two workshops: total of 30 invited participants from public sector, industry, research institutes and NGOs representing various types of deep expertise and interests.

- Six in-depth interviews: experts from Sitra, Technology Industries of Finland, Taival Advisory, Vastuu Group, Forum Virium Helsinki, International Data Spaces Association.

- Selection of initiatives for analysis in four categories: key initiatives and organisations, soft infrastructure, data spaces as commons, data spaces as ecosystems. Analysed initiatives are a representative sample in their category selected from of a broad variety of potential activities. Geographical focus has been in the EU.

Data Spaces – Analysis Framework

Regulation

<Contibutions and aims (EU-level and national)>
<Most relevant regulatory initiatives>

Frameworks and standardization

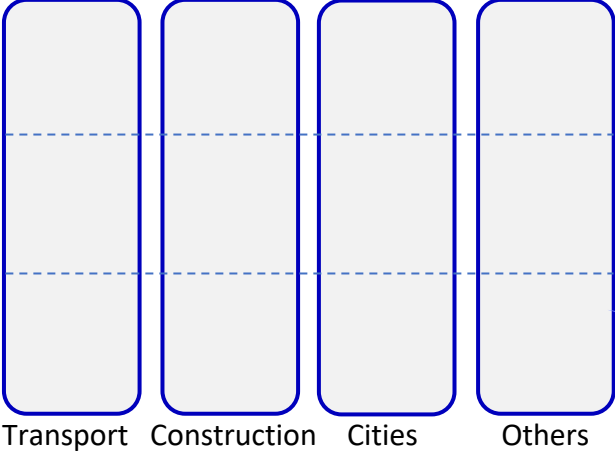<Common bodies>
<Major programmes>
<Standardization efforts>

Generic building blocks

<Technical building blocks>
<Governance building blocks>
<Existing and in development building blocks>

Domain specific

Ecosystems

Data

Platforms and solutions

Transport Construction Cities Others

This framework was created and used to provide a more systemic view of on-going data spaces activities.

<Key facts>
<Core ideas>
<Links with Finland>

The goal was also to analyse the involvement of Finland in data space initiatives.

Data space domains were selected based on the interest areas of the Ministry of Transport and Communications.

2. Fundamentals of Data Spaces

Terminology, design principles, layered structure

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Key terminology (1/2)

Term	Definition	Remarks
Data space	*Decentralized infrastructure for trustworthy data sharing and exchange in data ecosystems based on commonly agreed principles.* [2] --- *Purpose- or sector-specific or cross-sectoral interoperable frameworks of common standards and practices to share or jointly process data for, inter alia, development of new products and services, scientific research or civil society initiatives.* [3]	• "Space" has two meanings in English: "physically bounded space" (e.g. room) and "infinite space" (e.g. outer space); which meaning is more important for data spaces? • The European debate highlights the economic dimension of the concept. • Data space is a **framework and a medium that creates a secure space for data exchange**.
Data sharing	*Act of providing data access for use by others, subject to applicable technical, financial, legal, or organisational use requirements.* [1] --- *Provision by a data holder of data to a data user for the purpose of joint or individual use of the shared data, based on voluntary agreements, directly or through an intermediary.* [3]	• There is a need to emphasize that data sharing may include limitations on the users authorised to access the data, conditions for data use including the purposes for which the data can be used, and requirements on data access control mechanisms through which data access is granted. • Phrases like 'Conditioned data access and sharing arrangements' and "Data usage control" have been introduced. • Data sharing requires clarified and balanced terms of use and data interoperability frameworks and standards. • Data sharing is **conditioned exchange of data aiming to create added value**.
Data ecosystem	*Integration of and interaction between different relevant stakeholders including data holders, data producers, data intermediaries and data subjects, that are involved in, or affected by, related data access and sharing arrangements, according to their different roles, responsibilities and rights, technologies, and business models.* [1]	• Data ecosystems include public organizations, private organizations and individuals as stakeholders and actors. • Ecosystems should not be considered only from industrial viewpoint and premises; we need a **human-centric approach to building a fair data economy.**

References:
(1) OECD: Recommendation of the Council on Enhancing Access to and Sharing of Data (October 2021).
(2) OPEN DEI: Design Principles for Data Spaces (May 2021)
(3) EU Data Governance Act (draft by EU Council, October 2021)

Key terminology (2/2)

Term	Definition	Remarks
Data sovereignty	*The capability of a natural person or organisation for exclusive self-determination with regard to its economic data goods.* [2]	• Ownership of data is legally problematic, replacing the concept of ownership with the concept of sovereignty does not resolve these problems. • The concept is intended to have an empowering effect. • Data sovereignty is **self-determination in a digital world**.
Data intermediary	*Service providers that facilitate data access and sharing under commercial or non-commercial agreements between data holders, data producers, and/or users. Data holders and trusted third parties can act as data intermediaries.* [3] --- *Data spaces could require an entity to structure and organise ('orchestrate') such data spaces. Data intermediation services could include inter alia bilateral or multilateral sharing of data or the creation of platforms or databases enabling the sharing or joint use of data, as well as the establishment of a specific infrastructure for the interconnection of data holders and data users.* [3]	• The concept defines **a wide set of data intermediation actors and services**: data marketplace provider, data broker, data clearing house, vocabulary provider, data service catalogue provider, MyData operator, etc. • Data intermediation services can be very different in terms of their functions and potential business models. Can such a diverse set be regulated in a meaningful way? • How important and realistic is it for data intermediaries to be fully independent from other actors in the data ecosystem?
Soft infrastructure	*Neutral building blocks and core services. Provides a level playing field for data sharing and exchange. Made up of technology neutral and sector agnostic agreements and standards specifying how organisations and individuals can participate in the data economy and how they need to act and behave in compliance with commonly agreed rules and directives.* [2]	• Legislation is needed, which should be permissive and promote data sharing and prevent lock-in. Flexibility is also needed; agreements and bilateral practices that serve as examples for legislation. • Data is in bunkers. Building blocks and examples are needed to get data moving. • Soft infrastructure is a **milestone on the way to creating an interoperable digital market**.

References:
(1) OECD: Recommendation of the Council on Enhancing Access to and Sharing of Data (October 2021).
(2) OPEN DEI: Design Principles for Data Spaces (May 2021)
(3) EU Data Governance Act (draft by EU Council, October 2021)

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Design Principles for Data Spaces
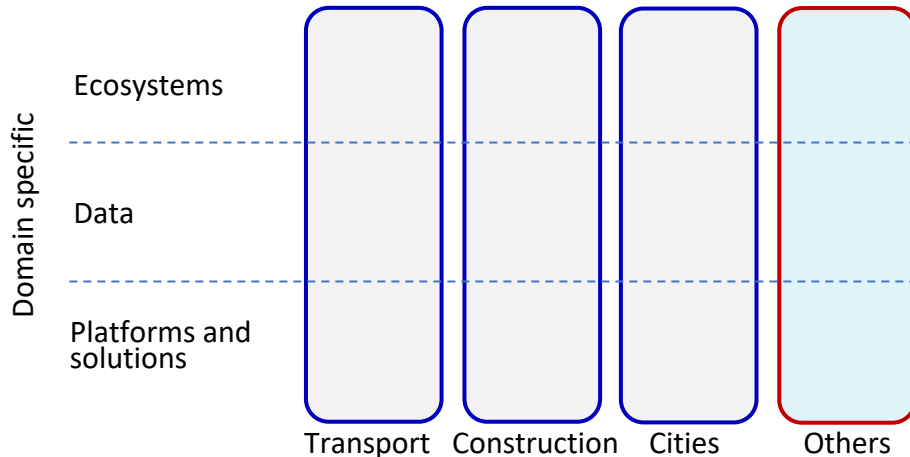
Regulation

Proposes data space governance bodies and novel models, for example Data Exchange Board at the EU-level.

Frameworks and standardization

Framework for soft infrastructure and building ecosystems from generic building blocks.
Aim is to contribute as a design basis to data space programmes and standardization efforts.

Generic building blocks

Introduces building blocks in four categories: interoperability, trust, data value, governance.

Domain specific

Ecosystems

Data

Platforms and solutions

Transport   Construction   Cities   Others

Key facts
- Collaborative effort organised by EU project OPEN DEI. This resulted in **Design Principles for Data Spaces v.1.0** white paper published in May 2021.
- Proposes four design principles for data spaces.
- Sector specific needs analysed for manufacturing, energy, health, agri-food.
- **Framework proposed is used as an underlying structure in this study.**

Data space and industrial domain experts team up to define for the first time cross-sectoral and across initiatives the fundamental design principles to build data spaces.

DESIGN PRINCIPLES FOR DATA SPACES

POSITION PAPER | VERSION 1.0 | APRIL 2021

OPEN DEI

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👉 **https://design-principles-for-data-spaces.org/**

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Four data space design principles

#1. Data sovereignty

The capability of a natural person or organisation for exclusive self-determination with regard to its economic data goods. This is the innovative and transformative concept underlying data spaces.

#2. Data level playing field

New entrants face no insurmountable barriers to entry because of monopolistic situations. When a data level playing exists, players compete on quality of service, and not on the amount of data they control. A data level playing field is a pivotal condition to create a fair data sharing economy.

#3. Decentralised soft infrastructure

The data sharing infrastructure is not a monolithic centralised IT infrastructure. It is a collection of

interoperable implementations of data spaces which comply to a unified set of agreements in all dimensions: functional, technical, operational, legal and economic. Out of the principle of data sovereignty follows functional and non-functional requirements of interoperability, portability, findability, security, privacy and trustworthiness.

#4. Public-private governance

For the design, creation and maintenance of the data level playing field a sound governance is essential. All stakeholders need to feel represented and engaged. These include users (persons, organisations) or provider of data services as well as their technology partners and professionals.
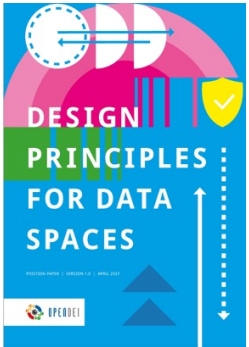
Data Spaces as Ecosystems

Data sharing networks and data marketplaces
- Service and value exchange
- Use case and business driven
- Cross-sectorial ecosystems also made possible
- Rulebooks complement standards and regulation

Data Spaces as Commons

General and sector-specific principles
- Built on common soft infrastructure
- Apply sector-specific standards and regulation
- Domain-specific metadata & vocabularies
- Examples: European Health Data Space, European Mobility Data Space

Soft Infrastructure

Neutral building blocks and core services
- Interoperability
- Trust
- Data Value
- Governance

3. Key Initiatives and Organisations

Data space programmes, architectures, alliances

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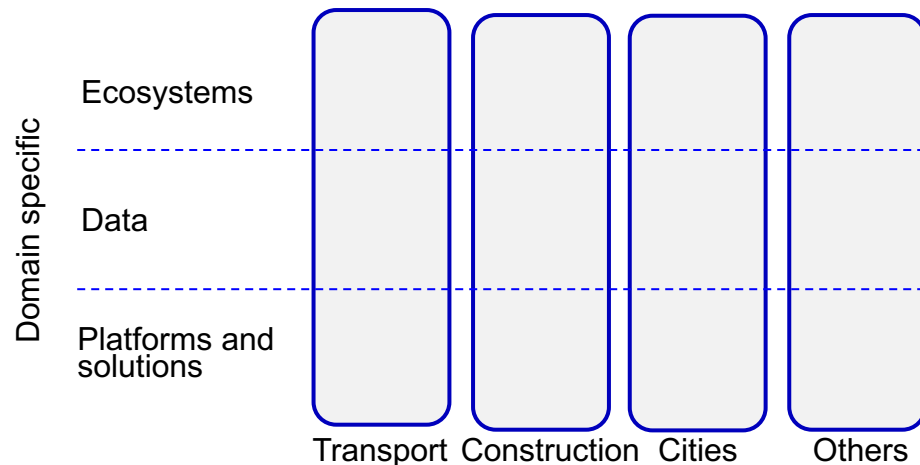# OECD – Recommendation on Data Access and Sharing

Regulation

Recommends that Adherents adopt a **strategic whole-of-government approach** to data access and sharing

Frameworks and standardization

The recommendation aims to influence underlying principles for international data space frameworks and standards, but does not boost or promote any specific initiatives.

Generic building blocks

Ecosystems

Data

Platforms and solutions

Domain specific

Transport Construction Cities Others

Key facts
- First internationally agreed principles and policy guidance on enhancing data access and sharing arrangements while protecting individuals' and organisations' rights and taking into account other legitimate interests and objectives
- **Reinforcing Trust Across the Data Ecosystem**
- **Stimulating Investment in Data and Incentivising Data Access and Sharing**
- **Fostering Effective and Responsible Data Access, Sharing, and Use Across Society**

OECD ➡ Better policies for better lives @OECD

#OECDMinisterial adopted 1st internationally agreed principles & guidance on enhancing access to & sharing of #data, covering all types of data.
👉 oe.cd/42Y #DataAccess #DataSharing

OECD COUNCIL RECOMMENDATION ON ENHANCING ACCESS TO AND SHARING OF DATA

Organisation for Economic Co-operation and Development

C/MIN(2021)20/FINAL

Unclassified

English - Or. English
6 October 2021

COUNCIL

Meeting of the Council at Ministerial Level, 5-6 October 2021

RECOMMENDATION OF THE COUNCIL ON ENHANCING ACCESS TO AND SHARING OF DATA

(Adopted by the Council at Ministerial level on 6 October 2021)

👉 **http://oe.cd/42Y**

The aim of OECD is to "empower and pro-actively engage all relevant stakeholders alongside broader efforts to increase the trustworthiness of the data ecosystem."

International Data Spaces (IDS)

Regulation

Aims to influence EU Data Strategy, Digital Europe Programme, Data Governance Act, Data Act, Data Innovation Board, …
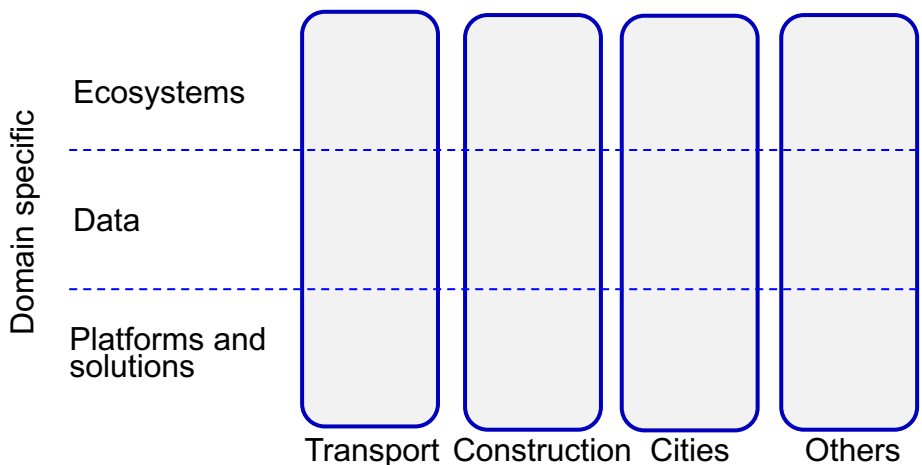
Frameworks and standardization

INTERNATIONAL DATA SPACES ASSOCIATION

IDSA is the organizational body with approximately 200 members behind the IDS framework.

Generic building blocks

IDS Reference Architecture Model (v.3.0)

IDS_G Open Source Core Services

Open Processes (Rulebooks)

Domain specific

Ecosystems

Data

Platforms and solutions

Transport   Construction   Cities   Others

Key facts
- Goals: (1) **Driving Data Spaces in Europe** and **(2) Organizing the initiation and growth of data spaces everywhere**
- Started as a research-driven Industrie 4.0 initiative, currently in broad scale adoption phase
- Initially focused on industrial data, currently includes all data and all domains
- **Strongly linked with Gaia-X**, providing many of the data spaces building blocks

Five core pillars of IDSA offering

Open Standard | 3rd party conformity | Open Processes | Open Source | Business Impact

IDSA Guiding principles

Endless Connectivity
Standard for data flows between all kinds of data endpoints

Trust between different security domains
Comprehensive and audit-proo security functions providing a maximum level of trust

Governance for the data economy
Usage control and enforcement for data flows and assignments of data

IDSA Members from Finland:
- VTT (Finnish hub coordination)
- Aalto
- Dimecc
- Digital Living
- Vastuu Group
- 1001 Lakes

👉 **https://internationaldataspaces.org/**

"As an open standard, IDS guarantees data security for all parties involved in the exchange of sensitive and valuable data sets, ensures a level playing field and enforces data sovereignty with technical measures", Lars Nagel, CEO of IDSA.

Gaia-X

Regulation

Mentioned in the **European Data Strategy**. Exchange between Gaia-X and the **European Commission** to identify synergies between Gaia-X and initiatives and programs such as the **European Cloud Federation**, **CEF 2** and **Digital Europe**.
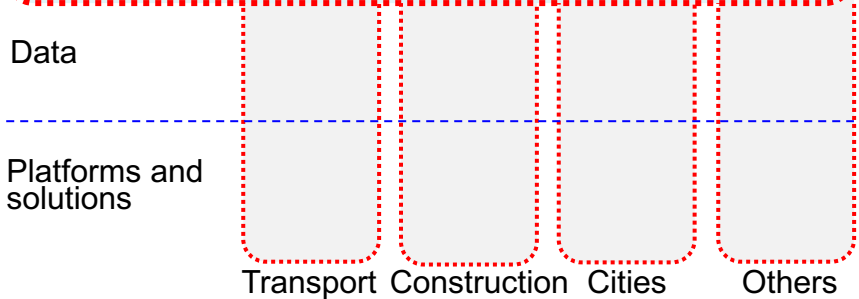
Frameworks and standardization

Gaia-X AIBSL

Generic building blocks
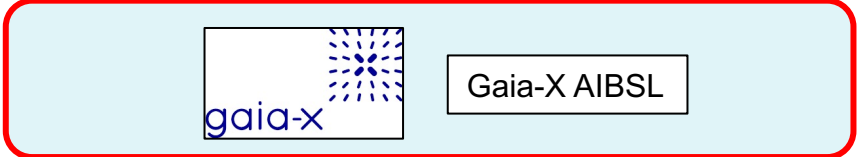
| Gaia-X Architecture | Gaia-X Federation Services | Gaia-X Policy and Rules |

Ecosystems

Gaia-X Data Spaces Business Committee
Gaia-X Domain Working Groups

Domain specific

Data

Platforms and solutions

Transport Construction Cities Others

Key facts
- Core initiative in Europe to implement European Data Strategy
- The Gaia-X project had initially a strong European cloud focus (how and where data is stored, processed and used within the data infrastructure).
- Gaia-X has evolved to include data spaces more broadly and focuses now on secure, provacy-protected and sovereign exchange and use of data.
- Leadership from France and Germany, interest growing globally.
- Main drive from EU commission and European industry (75% of members).
- 1800+ participants from ca. 500 companies and organisations.
- Relation to cloud hyperscalers (Amazon, Microsoft, Google) is evolving and becoming more inclusive instead of Gaia-X being positioned as the European alternative cloud solution.

gaia-x Hub Finland
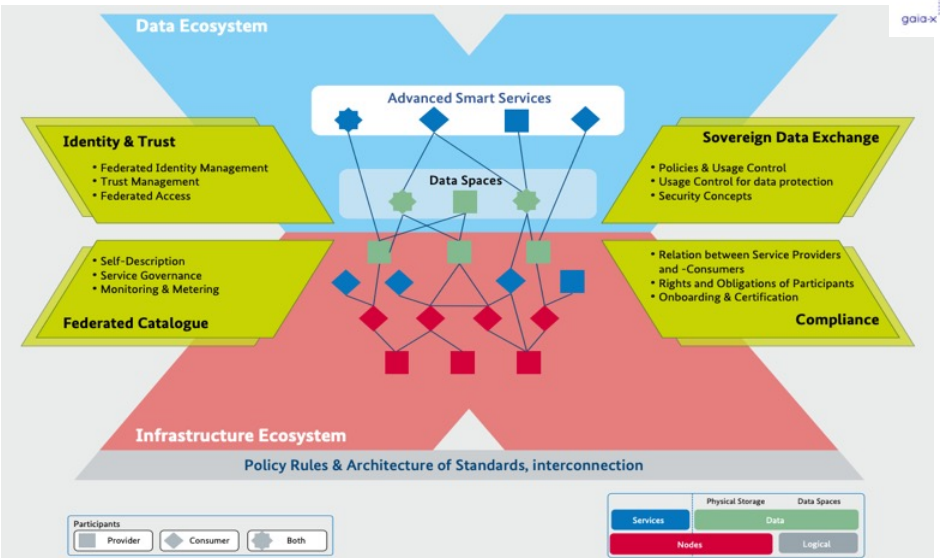
- Finnish members: CSC, Technology Industries of Finland, Vastuu, VTT
- Business and market shaping opportunities for Finnish companies in data sharing
- Coordinated by Sitra.

👉 **https://gaia-x.eu/**

Our objective is to create a digital ecosystem in Europe that will foster innovation and spawn new data-driven services and applications." Federal Minister for Economic Affairs and Energy Peter Altmaier

Data Spaces Business Alliance

Regulation

Aims to infuence data space regulation indirectly by promoting common views on key aspects to be regulated.

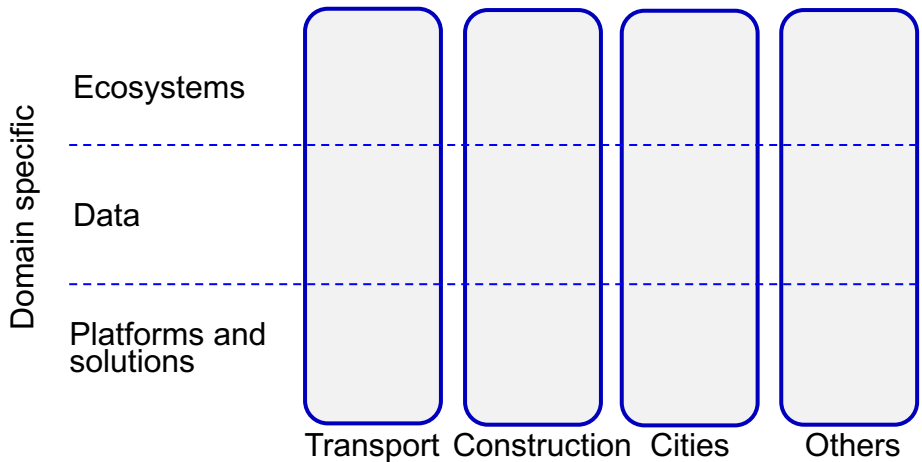## Frameworks and standardization

Generic building blocks

Strong contribution and commitment from all four programmes of the alliance to provide the common building blocks (combining outputs from IDSA, Gaia-X. Fiware).

Domain specific

- Ecosystems
- Data
- Platforms and solutions

Transport Construction Cities Others

Key facts
- Four key European organizations (IDSA, Gaia-X, Fiware, BDVA/DAIRO) have formed an alliance
- Creating a one voice and a common framework to make data spaces happen
- Bringing together data providers, users and intermediaries, data spaces are key to driving businesses to competitively extract value out of data
- Together, the Alliance's founding organisations represent 1,000+ leading key industry players, associations, research organisations, innovators, and policy-makers worldwide
- With its combined cross-industry expertise, resources and know-how, the Alliance drives awareness, evangelises technology, shapes standards and enables integration across industries.
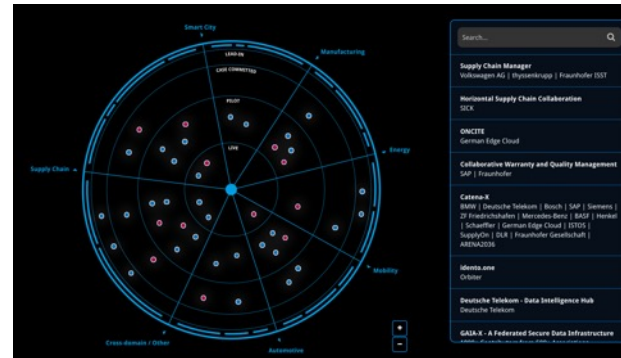
Technology and architecture: Common reference model that drives interoperability by harmonising technology components and other elements.
Support: Pooling tools, resources and expertise: handbooks, roadmaps, individual evolution plans, access to Digital Innovation Hubs, acceleration programmes, go-to-market toolki.
Identification and characterisation: 'Data Spaces Radar' to actively scout potential data spaces. Overview on data spaces evolution on a global level.

👉

https://internationaldataspaces.org/adopt/data-space-radar/

Finnish actors are involved as members in all four initiatives

"We have proven that building data spaces is possible. Now we must do it. The Data Spaces Business Alliance has all the joint capabilities to successfully build and even run data spaces. The next step is large scale adoption to fully realize the economical potential. In this Alliance, we will act now and think big for the digital future that will benefit everyone." Reinhold Achatz, Chairman of IDSA
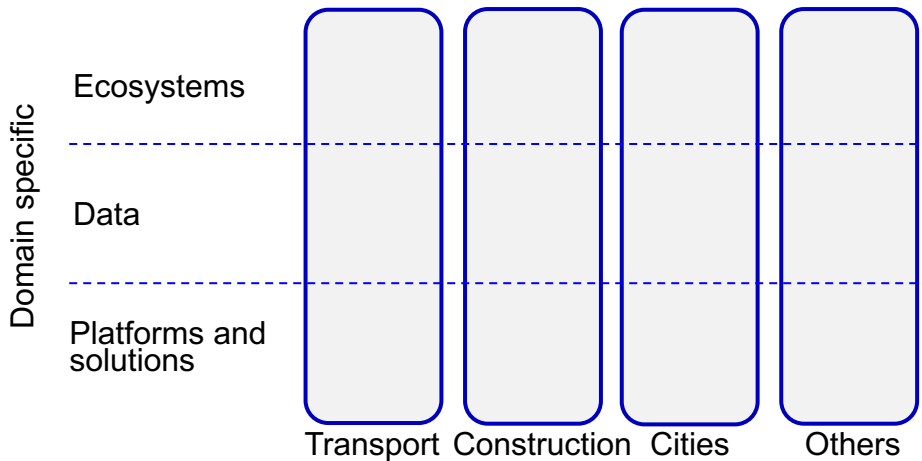
Sitra – Fair Data Economy

Regulation

> Active contributor and commentor to national and European data-related regulation.

Frameworks and standardization

> The **IHAN blueprint** includes the descriptions of the principles and components of IHAN's functional architecture as well as guidelines for building fair data economy services with the aid of existing technology

Generic building blocks

> The programme has built the **IHAN testbed** as an environment for testing data sharing projects.
> **Fair Data Economy Rulebook** model helps organizations to agree on business, legal, technical and ethical rules for data sharing.

Domain specific

Ecosystems

Data

Platforms and solutions

Transport   Construction   Cities   Others

Key facts
- Sitra's IHAN® project (2018-2021), has had its focus on fair data economy, in which successful digital services are based on trust and create value for everyone.
- Sitra continues the focus on Data Economy and has promoted it to be one of Sitra's main themes alongside with circular economy and renewing democracy.
- Emphasizes that a fair digital transition is one of Europe's most important facilitator of sustainable growth and competitiveness.

Main arguments:
- The fair data economy will benefit everyone.
- Data will be shared more freely between different parties.
- Trust in service providers will encourage individuals to share their data when the sharing is based on their consent.
- People will obtain access to more targeted services that improve their well-being and daily lives.
- Companies of all sizes will achieve growth through innovation and well-being will increase.

SITRA

ihan.   Home   Business   Developers   Applications   Standards   FAQ   Join ihan.

the European data economy testbed

Create your own trusted data sharing success case

Provided by the Finnish Innovation Fund Sitra.

test trusted data sharing >

create and try future standards >
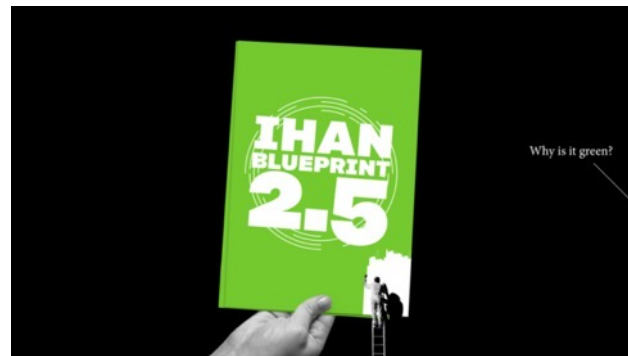
"The data economy should be fair for all stakeholders: the society as a whole, private companies, the public sector and, last but not least, the citizens." Jyrki Katainen, the President of Sitra

MyData Global

Regulation

MyData aims to influence regulation, and has been active in promoting the human-centric view and the data intermediary model, for example in the context of the EU Data Governance Act.
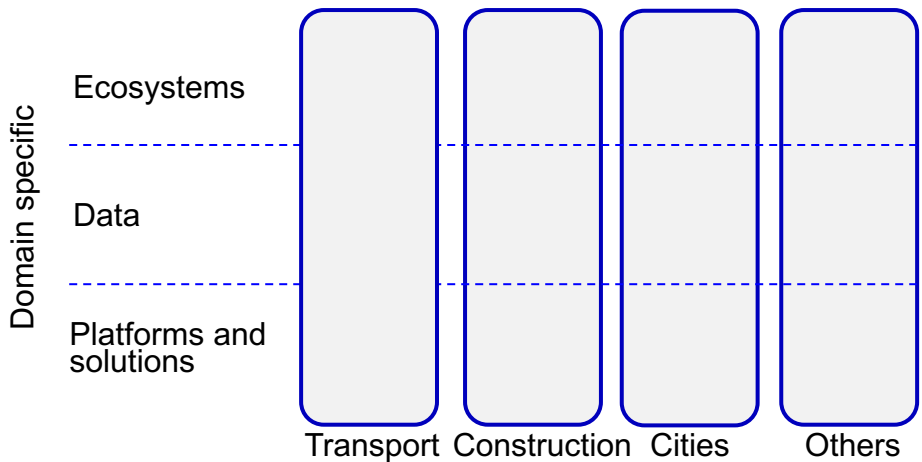
Frameworks and standardization

MyData is both an alternative vision and guiding technical principles. It works together with other initiatives such as IDSA and Gaia-X focusing on aspects of personal data.

Generic building blocks

MyData Global has introduced the MyData Operator model for personal data management intermediaries, consisting of several envisioned building blocks, e.g. consent management and identity management.

Domain specific

Ecosystems

Data

Platforms and solutions

Transport Construction Cities Others

Key facts
- MyData Global is an international non-profit headquartered in Helsinki.
- The purpose of MyData Global is to empower individuals by improving their right to self-determination regarding their personal data.
- MyData Global has over 100 organisation members and close to 400 individual members from over 40 countries, on six continents.
- The **human-centric paradigm** aims at a fair, sustainable, and prosperous digital society, where personal data sharing is based on trust as well as balanced and fair relationship between individuals and organisations.

👉 **https://mydata.org/**
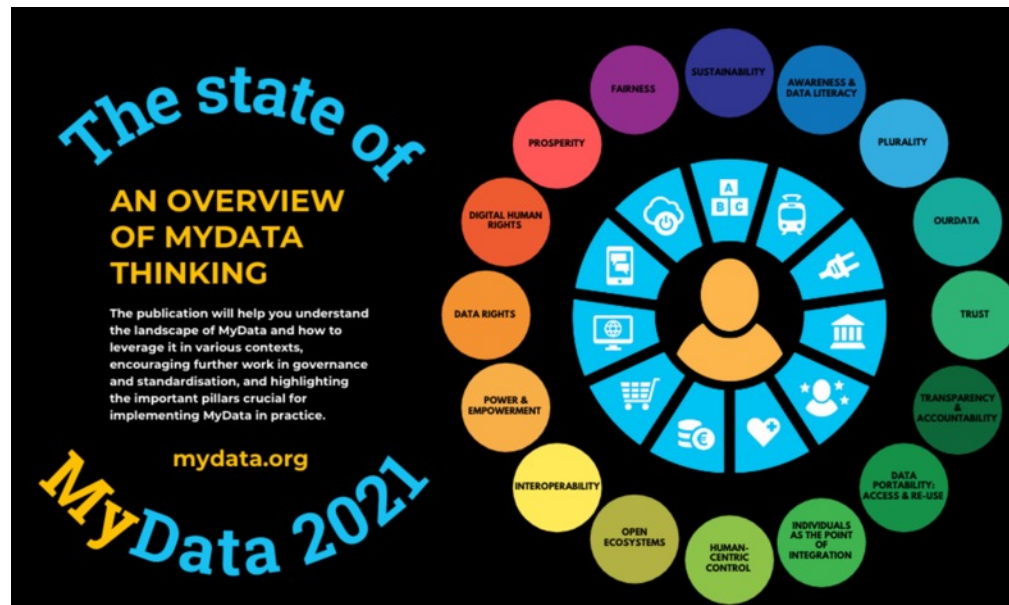
"Data spaces can become a human-centric way to renew our e-identity infrastructure and to foster data sharing." Antti "Jogi" Poikola, Finnish Technology Industries

Team Data Spaces

Regulation

> Aims to become the **Data Spaces Support Center** planned to start in 2022, strong link EU-level Data Innovation Board to be expected

Frameworks and standardization

> **Team Data Spaces**

Generic building blocks

> Focuses on boosting and adoption of common building blocks

Domain specific

- Ecosystems
- Data
- Platforms and solutions

Transport Construction Cities Others
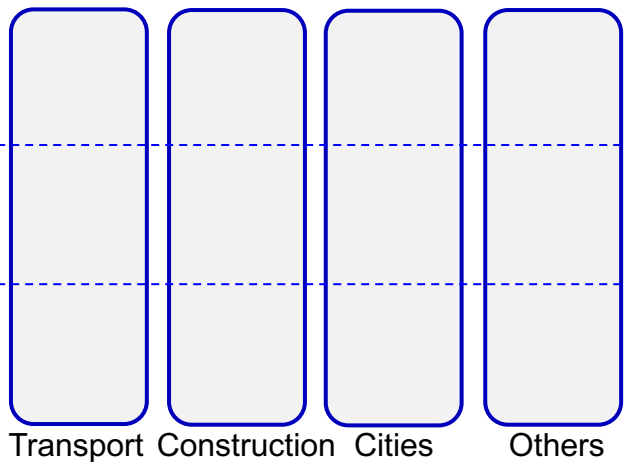
Key facts
- Team Data Spaces brings together the leading European players in data spaces from European associations, industry, and research organisations with a common vision to deliver European data spaces.

Logos: BDV, Capgemini invent, FIWARE FOUNDATION, Fraunhofer, gaia-x, INTERNATIONAL DATA SPACES ASSOCIATION, INNOPAY, Insight, KU LEUVEN, mydata.org, SITRA, TNO innovation for life, VTT

👉 **https://dataspaces4.eu/**
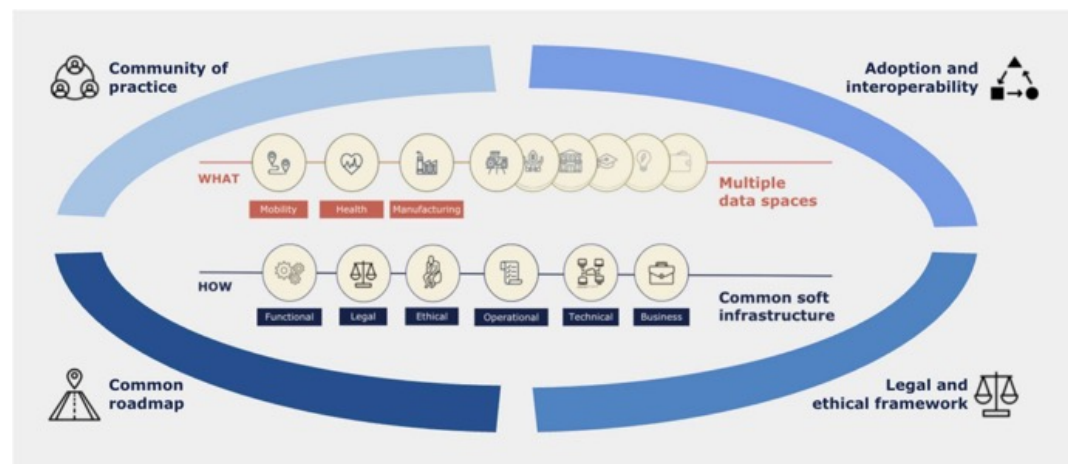
Strong participation from Finland (Sitra, VTT, MyData Global)

> *"Teaming Up to Support the European Data Strategy Is a Must."*
> *Jaana Sinipuro, Sitra*

LVM

4. Soft Infrastructure

Building blocks for interoperability, trust, data value, governance

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Soft Infrastructure Building Blocks

- Four categories of building blocks: **Interoperability, Trust, Data Value, Governance**

- Definition and standardization of building blocks need their **soft infrastructure governance** mechanisms.

- **Decentralised data flows and automated data transactions** building trust and efficiency in data exchange (e.g. data and API automation, smart contracts).

- For example: what does it mean for a building block to be Gaia-X or IDS compliant, and how is this certified?

- The list of individual 12 building blocks is **evolving**, and the building blocks are at **different levels of maturity**

Soft Infrastructure and neutral building blocks

1x

The soft infrastructure provides a level playing field for data sharing and exchange. It is made up of technology-neutral and sector-agno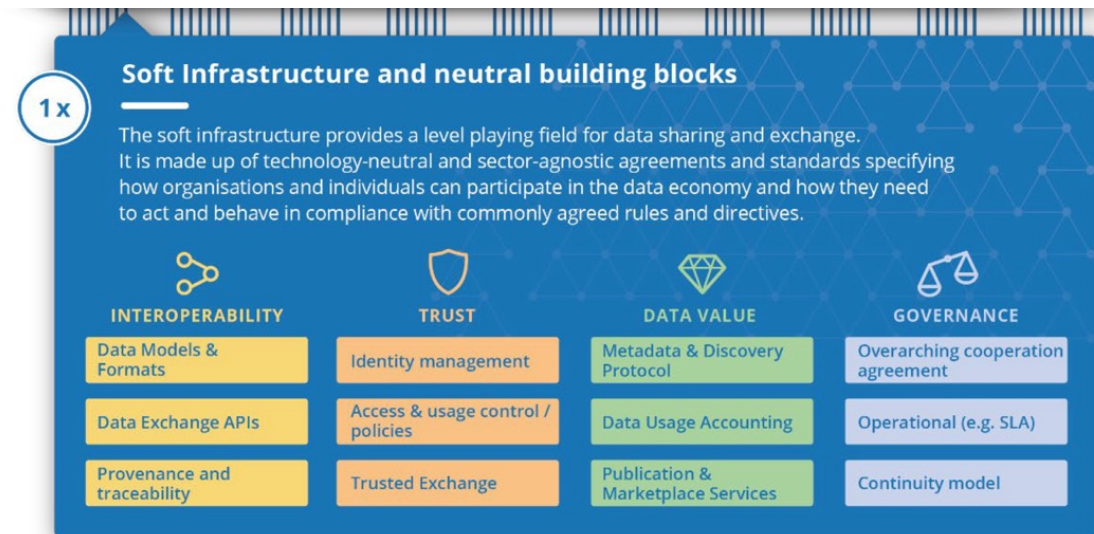stic agreements and standards specifying how organisations and individuals can participate in the data economy and how they need to act and behave in compliance with commonly agreed rules and directives.

INTEROPERABILITY	TRUST	DATA VALUE	GOVERNANCE
Data Models & Formats	Identity management	Metadata & Discovery Protocol	Overarching cooperation agreement
Data Exchange APIs	Access & usage control / policies	Data Usage Accounting	Operational (e.g. SLA)
Provenance and traceability	Trusted Exchange	Publication & Marketplace Services	Continuity model

Self-Sovereign Identity (SSI)

Regulation

Frameworks and standardization

gaia-x

Generic building blocks

SSI

Domain specific
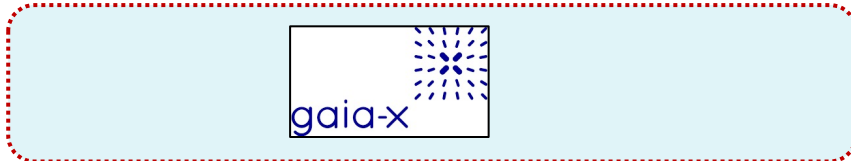
Ecosystems

Data

Platforms and solutions

Transport   Construction   Cities   Others
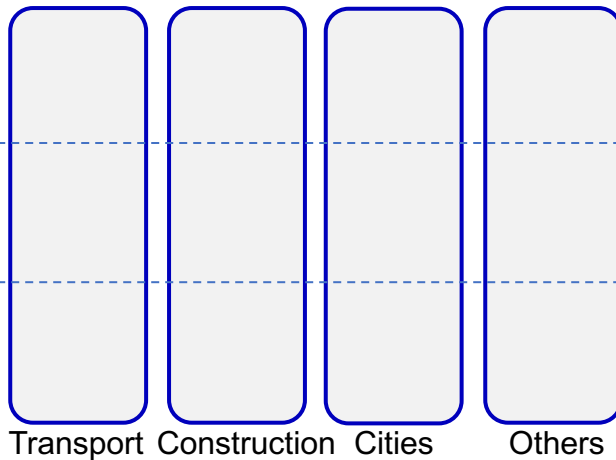
Key facts
- Self-sovereign identity (SSI) is a Decentralised Identity (DID) system for organizations, people, things.
- SSI allows individual or business to control their digital accounts and personal data.
- Individuals with self-sovereign identity can store their data to their devices and provide it for verification and transactions without the need to rely upon a central repository of data.
- **SSI can be seen as a fundamental building block for data spaces.**
- **Gaia-X architecture ios built on the wiode use of SSI.**

DIDs enable digitally signed verifiable claims

Issuer — Signs Claim → Issues Claim → Holder — Wallet — Countersigns Claim → Presents Claim → Verifier — Verifies Signatures

Decentralized Identifiers (DIDs)

Public or Private Blockchain or other Decentralized Network

TRUST Over IP FOUNDATION

iDunion

Findy

👉 **https://trustoverip.org/**   👉 **https://idunion.org/**   👉 **https://findy.fi/**

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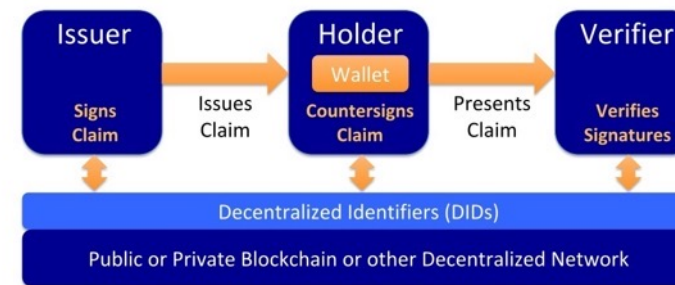
Gaia-X Federation Services

Regulation

Frameworks and standardization

Generic building blocks

SSI based identity management, verifiable credentials, data contract services, service catalogue

Ecosystems

Data

Platforms and solutions
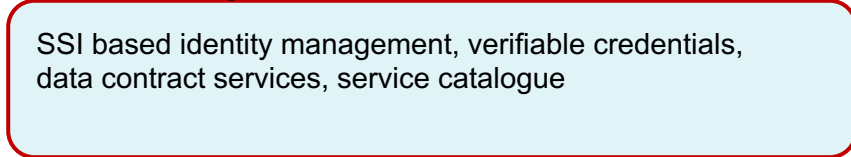
Domain specific

Transport   Construction   Cities   Others
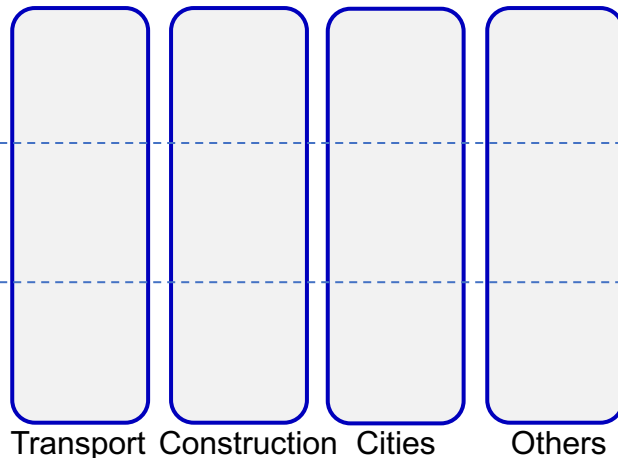
Key facts

- The Gaia-X Federation Services represent the minimum technical requirements and services necessary to operate the federated Gaia-X ecosystem of infrastructure and data.
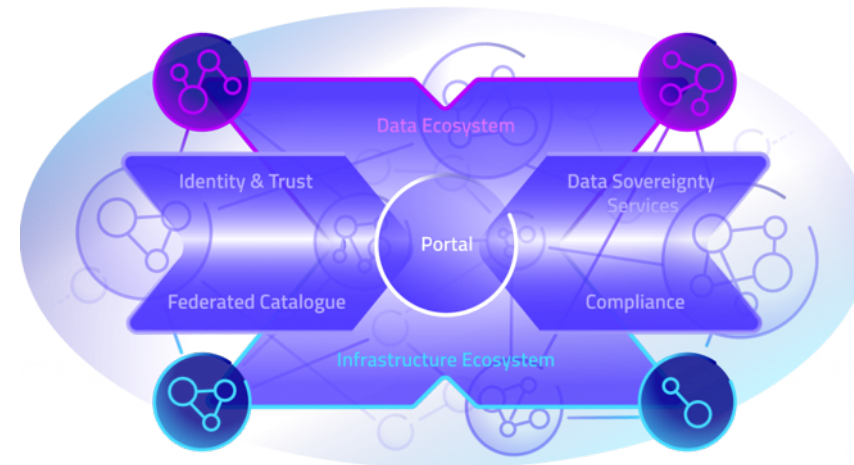
Identity and Trust covers authentication and authorization, credential management and decentral identity management.
Federated Catalogue constitutes the central repository for Gaia-X Self-Descriptions to enable the discovery and selection of Providers and their Service Offerings.
Data Sovereignty Services enable the trustful and sovereign data exchange of Gaia-X Participants utilizing mechanisms such as Usage Control.
Compliance ensures a Participant's adherence to Gaia-X principles in cybersecurity, data protection transparency and interoperability during onboarding and the delivery of Services.

👉 **https://www.gxfs.de/**

5. Data Spaces as Commons

Common governance structures
Domain-specific requirements and resources

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Governance for Data Spaces as Commons

- Provide guidelines on how to implement **common data spaces governance**
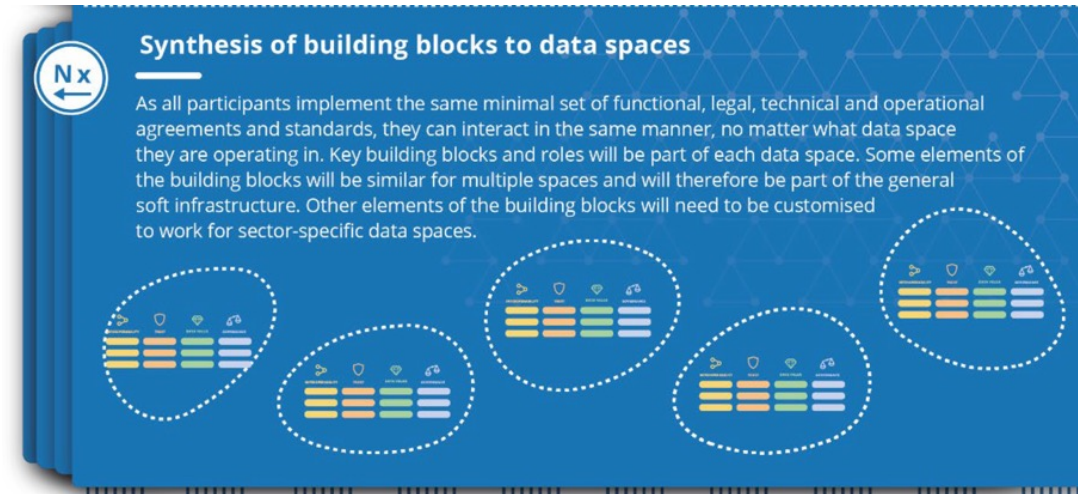
- Definition of **the governance for data spaces interoperability** (inter-data spaces governance)

- **Cross-sectoral data availability by** combining horizontal regulatory approach with scalable sector-specific specifications.

- **Access to data of public interest** for critical use purposes by setting obligations and requirements for data holders.

- A minimum viable set of **metadata** is needed to increase findability and structured data for machine readability.

- For some domains we need a data governance that work at **domain-specific** level such as the European health data spaces governance.

Synthesis of building blocks to data spaces

As all participants implement the same minimal set of functional, legal, technical and operational agreements and standards, they can interact in the same manner, no matter what data space they are operating in. Key building blocks and roles will be part of each data space. Some elements of the building blocks will be similar for multiple spaces and will therefore be part of the general soft infrastructure. Other elements of the building blocks will need to be customised to work for sector-specific data spaces.

Regulation

> Planned to be initiated s part of the DGA, the role of these bodies is primarily to oversee that the regulation is implemented as intended and giving guidance also to national authorities regarding interpretattion of the data related regulation.

Frameworks and standardization

> Board will work towards increasing interoperability and creating common standards to avoid the fragmentation of the internal market, as well as fostering the creation of Common European Data Spaces

Generic building blocks

Domain specific

Ecosystems

Data

Platforms and solutions

Transport   Construction   Cities   Others
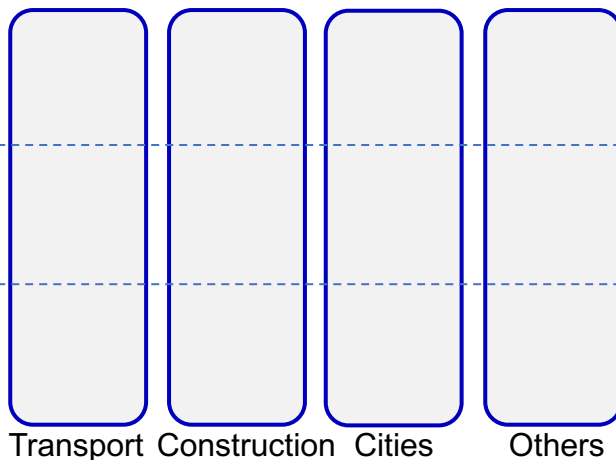
Key facts
- Data Governance Act (DGA) aims to establish the **European Data Innovation Board** to oversee implementation of data regulation.
- EU Parliament has proposed establishment of the **Data Innovation Advisory Council (DAIC)**, as a subgroup of the board.
- The proposal to establish DAIC was inspired by the Data Exchange Board proposal by the Data Sovereignty Now! Initiative, and presented in the OPEN DEI White Paper as below.

Mobility Data Space

Regulation

Frameworks and standardization

INTERNATIONAL DATA SPACES ASSOCIATION

Generic building blocks

INTERNATIONAL DATA SPACES ASSOCIATION

Domain specific

Ecosystems

Data

Platforms and solutions

Transport Construction Cities Others
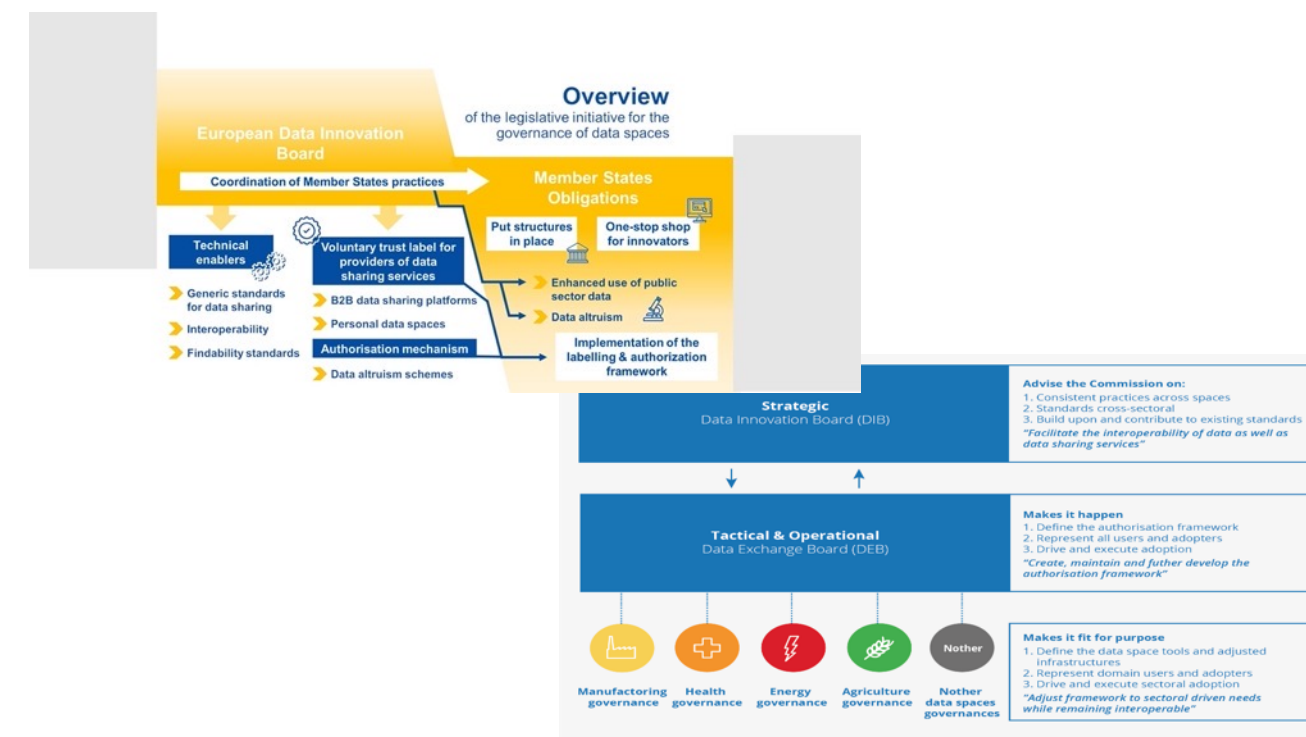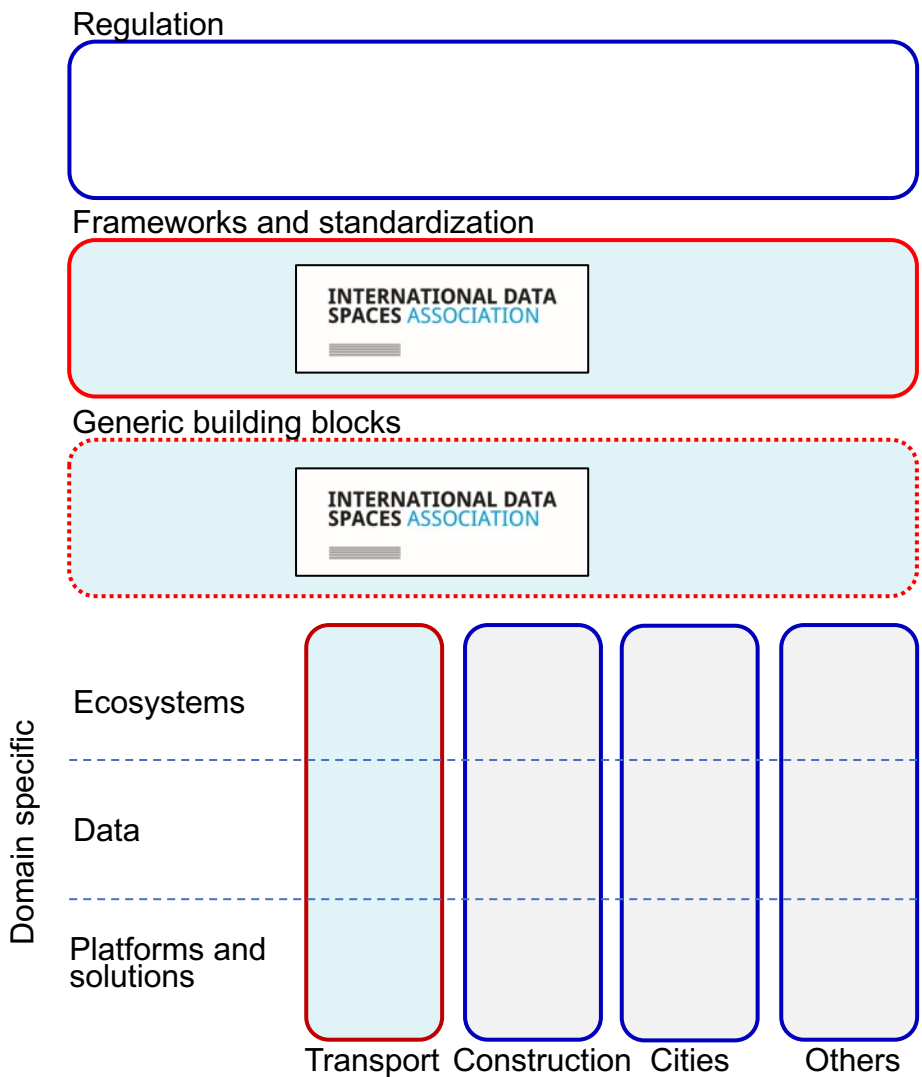
Key facts
- Originally German initiative funded by acatech and BMWi
- Broad participation from public and private sector
- Different forms of mobility involved
- Aims to be a role model for European Mobility Data Space
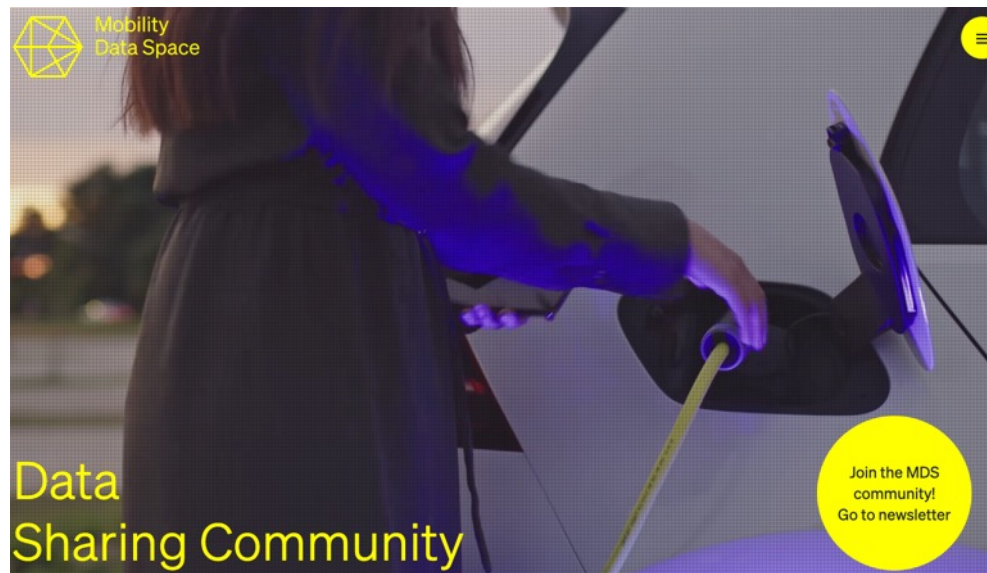
Participants: Municipalities, Deutscher Wetterdienst, Deutsche Telekom, Fraunhofer, HERE, Door2Door, Schenker, DHL, GDV, Deutsche Bahn, Bosch, Continental, BMW, Volkswagen, Daimler, ZF, Kühne + Nagel, etc.

👉 **https://mobility-dataspace.eu/**

"Mobility Data Space is a unique demonstration of how IDS-compliant data sharing across varied markets and sectors can translate into real value for customers." Lars Nagel, CEO, IDSA

6. Data Spaces as Ecosystems

Data space instances, use cases, cross-domain examples

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Governance for Data Spaces as Ecosystems

- Governance for **data space instances.**

- **Ecosystems data governance (industrial ecosystems such as Catena-X).**

- Public-private data governance (example **MyData for Cities).**

- **Data marketplace** governance.

- Implementation of **cross-domain** data governance principles.

- **Data portability by strengthening individual's rights** to re-purpose data and efficient data transfers between systems and services for business users.

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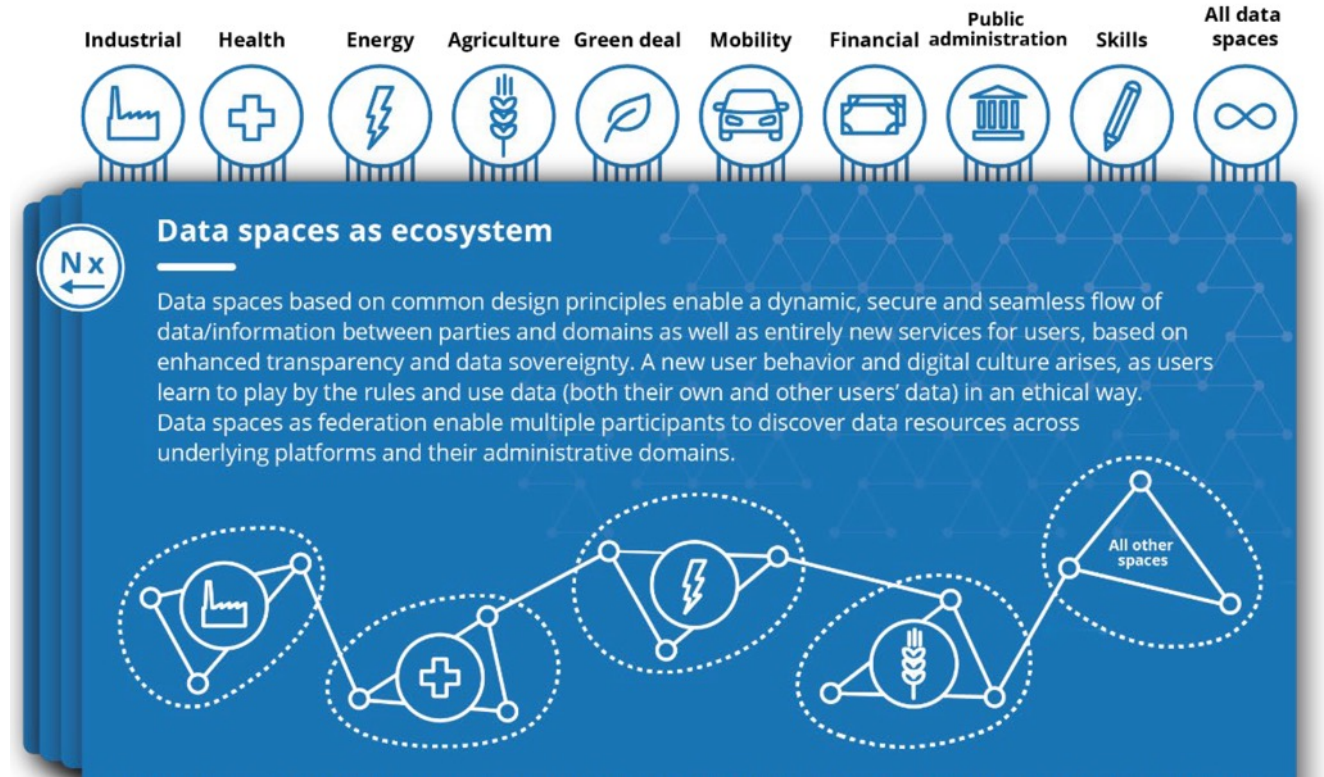
Catena-X

Regulation

Frameworks and standardization

gaia-x

Generic building blocks

INTERNATIONAL DATA SPACES ASSOCIATION

gaia-x

Domain specific

Ecosystems

Data

Platforms and solutions

Transport Construction Cities Others

Key facts
- **Catena-X** is positioned to be the leading data space initiative for the automotive sector.
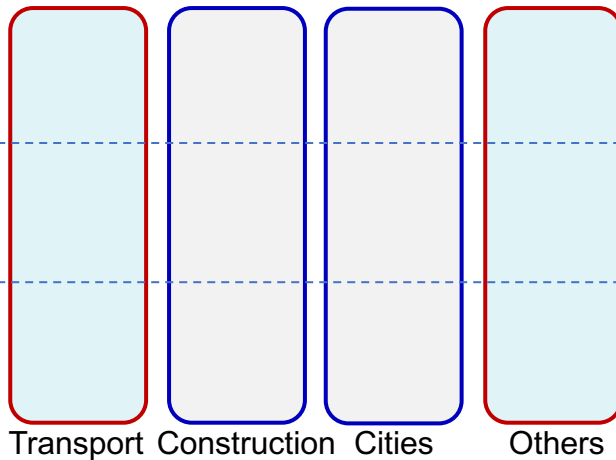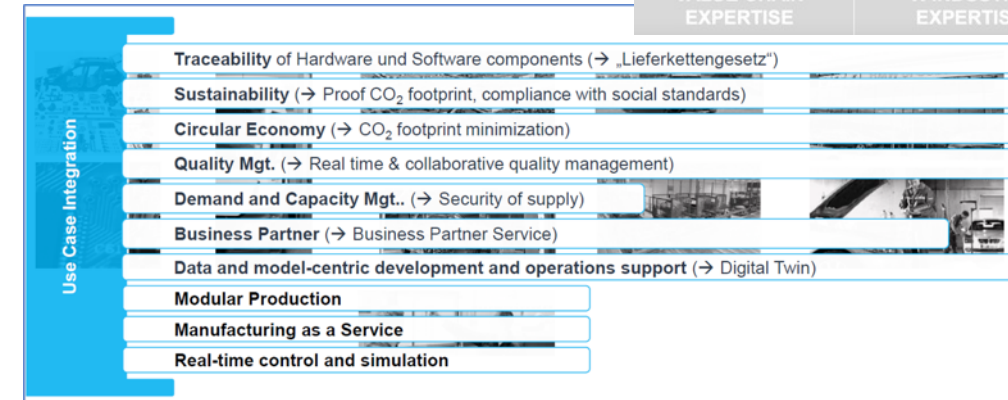- Establishment & use of the first "data driven value chain" for the automotive industry → from intra- to inter-company.
- **Goal:** A uniform standard for continuous data exchange along the entire automotive value chain
- **Breakthrough target**: 1000 Catena-X member organizations in 2022

ONE MINDSET CHANGE NOW

GUIDANCE — Fraunhofer — DLR — ARENA2036 — ADAC

TRANSFER / ASSOCIATIONS

INDUSTRY CORE — BMW — Mercedes-Benz — SCHAEFFLER — VOLKSWAGEN — ZF GROUP — BOSCH — Henkel — BASF

TECHNOLOGY — SIEMENS — BIGCHAINDB — DMG MORI — TRUMPF — K.a.p.u.t.t.

PLATTFORM EXPERTISE — SAP — SUPPLYON — fetch.ai — up2parts — CCT — GRIS — mipart — LRP

VALUE CHAIN EXPERTISE

X-INDUSTRY EXPERTISE

SMALL / MEDIUM ENTERPRISES

Use cases

Use Case Integration
- **Traceability** of Hardware und Software components (→ „Lieferkettengesetz")
- **Sustainability** (→ Proof CO_2 footprint, compliance with social standards)
- **Circular Economy** (→ CO_2 footprint minimization)
- **Quality Mgt.** (→ Real time & collaborative quality management)
- **Demand and Capacity Mgt..** (→ Security of supply)
- **Business Partner** (→ Business Partner Service)
- **Data and model-centric development and operations support** (→ Digital Twin)
- **Modular Production**
- **Manufacturing as a Service**
- **Real-time control and simulation**

👉**https://catena-x.net/en/**

"With Catena-X, the automotive industry is taking another big step in its digital transformation. The aim is to achieve secure data transfer between companies to enhance efficiency, transparency and sustainability along the entire value chain. The integration of SMEs also strengthens innovative power and digitalization of our industry. Together we have the chance to take a leading position in technology and innovation for Germany and Europe. And that's exactly what we do now."
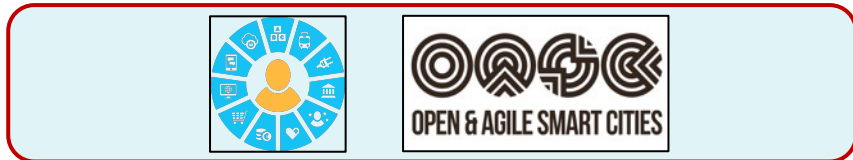*Ola Källenius - Chairman of the Board of Management of Daimler AG and Mercedes-Benz AG*

MyData for Cities

Regulation

Frameworks and standardization
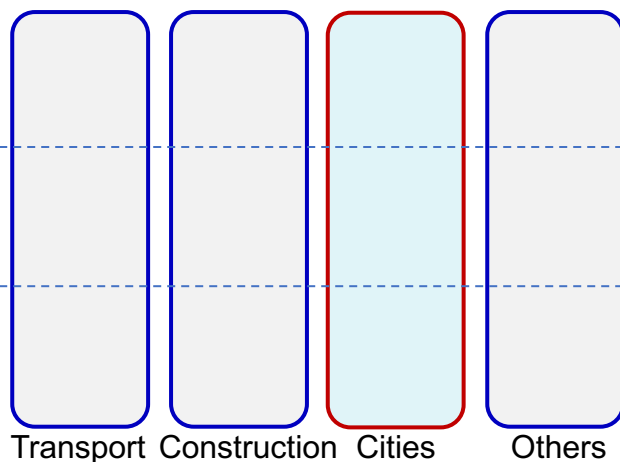
Generic building blocks

Domain specific

Ecosystems

Data

Platforms and solutions

Transport Construction Cities Others

MyData for Cities Model	Example use cases
• Global model for **personal data management** for cities and their service ecosystems • **MyData Operator functionalities:** consent management, personal data wallet, secure data connectors, … • **MyData for Cities Rulebook** • MIM4 Open and Agile Smart Cities (OASC) specification • IDS connectivity planned	• Driving permission authorization • Automated benefits • CO_2-based reduced parking fees • Employment services • Asset check for city-owned rental apartments • Multi-modal mobility services across cities (MaaS roaming)

City of Helsinki

OULU   TURKU   ESPOO ESBO

OPEN & AGILE SMART CITIES

vastuu group
mydata share
LAKES

"Almost all data sharing use cases can be traced back to individuals, and so personal data may be involved." Mika Huhtamäki, Vastuu Group
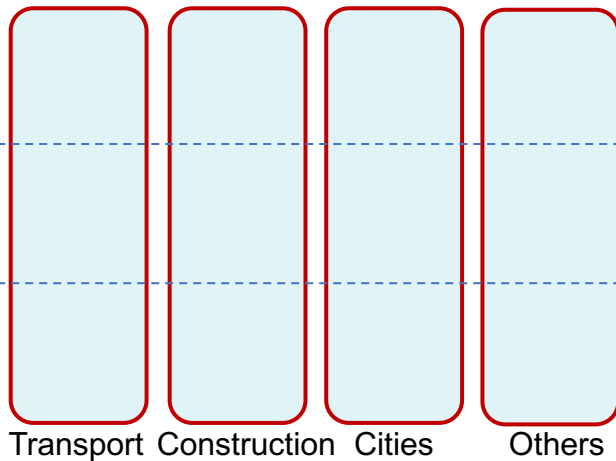
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LVM

Rokkiparkki

Regulation

Frameworks and standardization

Generic building blocks

Domain specific

Ecosystems

Data

Platforms and solutions

Transport Construction Cities Others

Key facts
- Rokkiparkki is a non-profit parking garage in Jätkäsaari, Helsinki. Rokkiparkki has invested in electric car charging services. Rokkiparkki needed a service that meets the demand for faster charging by residents and fits into parking operator's cost model, where residents themselves pay the costs of charging their cars based on the actual cost of electricity.
- Virta is a company specialised in cloud-connected high-capacity electric charging service provider.
- The participants have aimed at conditioned and consented data sharing of residents' electric charging data between the electricity company, residents' associations, car manufacturers, electric car rental companies, Virta and parking operator in accordance with the MyData principles.
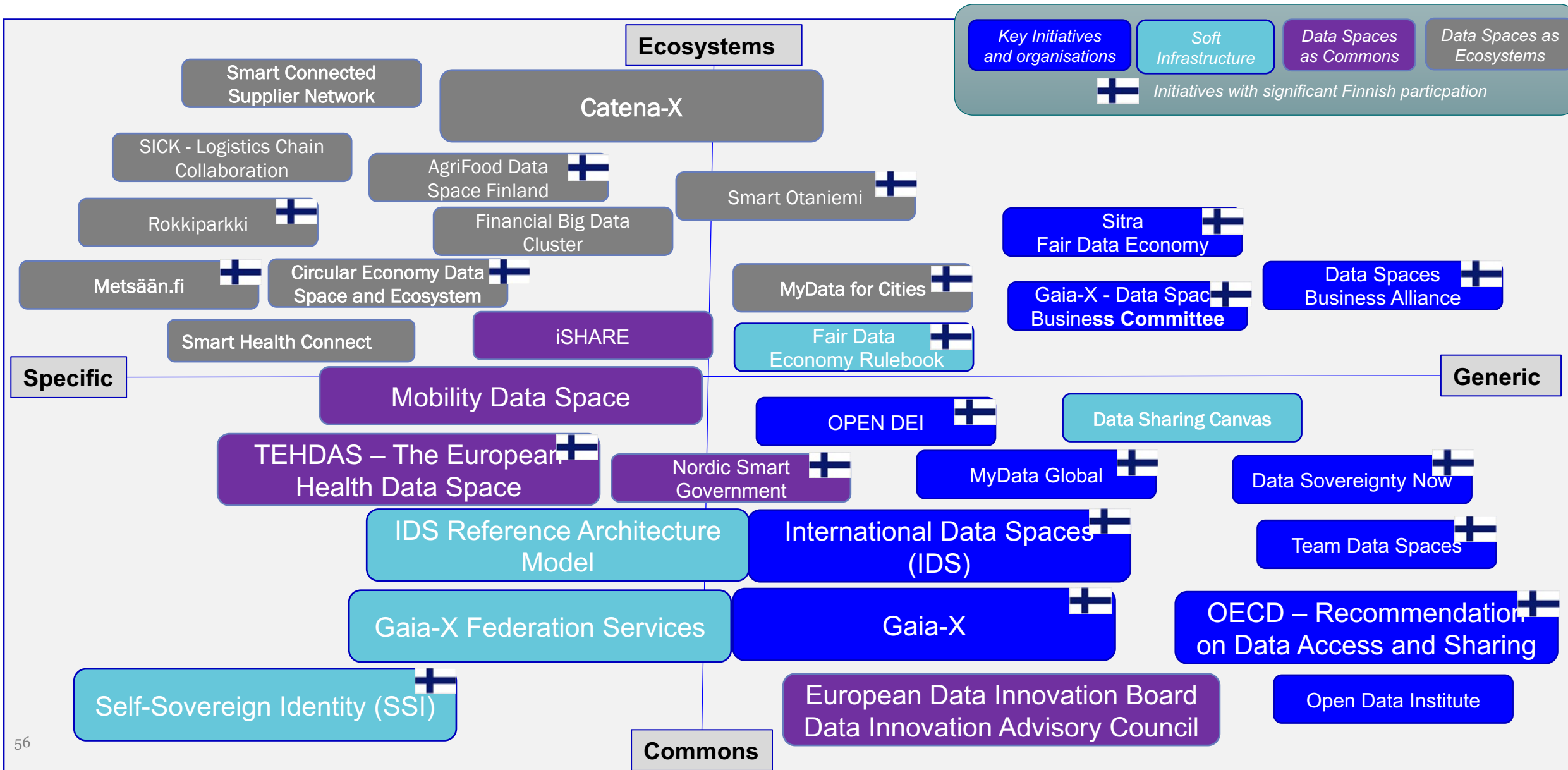
👉 **https://rokkiparkki.fi/**
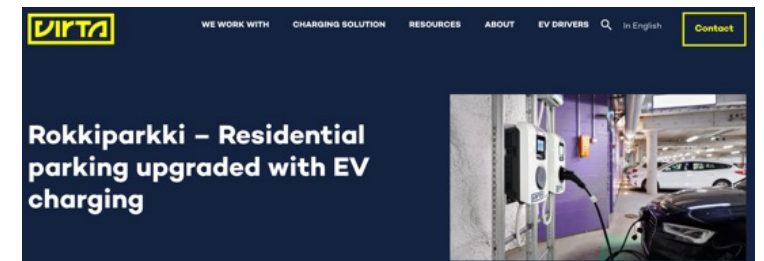
"By providing a more dynamic and interoperable physical and soft infrastructure, we can create more and better services in the local ecosystem." -- Pekka Koponen, Forum Virium Helsinki

7. Summary

Key findings and messages

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Map of Data Space Initiatives

Ecosystems

Key Initiatives and organisations | Soft Infrastructure | Data Spaces as Commons | Data Spaces as Ecosystems

Initiatives with significant Finnish particpation

Smart Connected Supplier Network

Catena-X

SICK - Logistics Chain Collaboration

AgriFood Data Space Finland

Smart Otaniemi

Rokkiparkki

Financial Big Data Cluster

Sitra Fair Data Economy

Metsään.fi

Circular Economy Data Space and Ecosystem

MyData for Cities

Gaia-X - Data Space Business Committee

Data Spaces Business Alliance

Smart Health Connect

iSHARE

Fair Data Economy Rulebook

Specific

Generic

Mobility Data Space

OPEN DEI

Data Sharing Canvas

TEHDAS – The European Health Data Space

Nordic Smart Government

MyData Global

Data Sovereignty Now

IDS Reference Architecture Model

International Data Spaces (IDS)

Team Data Spaces

Gaia-X Federation Services

Gaia-X

OECD – Recommendation on Data Access and Sharing

Self-Sovereign Identity (SSI)

European Data Innovation Board Data Innovation Advisory Council

Open Data Institute

Commons

Evolution of data spaces

- Data spaces implement our common **distributed soft infrastructure**.

- We are in **early stages** of data space evolution moving from defining the generic principles, architecting the frameworks and identifying the potential value in pilots **towards wide scale industrial adoption**.

- There is a broad **international consensus** on the need for fair data access and sharing and this **momentum should be used to accelerate the developments**.

- Although EU-driven data space initiatives have often been presented as an attempt to create a counter-force to hyperscalers (Amazon, Google, Microsoft), a **more balanced collaborative model between European and US-based industry players is more likely to emerge**.

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Data Space Design Guidelines

Fair • Data spaces as commons: adhere to FAIR principles (Findable, Interoperable, Accessible, Reusable). • Data spaces as ecosystems: fair to all participants in terms of value creation (FRAND-like terms and conditions).	**Trust** • Facilitate trusted data exchange among participants, reassure participants identity, and compliance with defined rules/agreements. • Achieved by organisational measures (e.g. certification or verified credentials) or technical measures (e.g. remote attestation).
Human-centric • Include individuals as active subjects in data space development. • Recognize that almost all data space domains and use cases involve data about individuals in one form or another.	**Data value** • Create new data value chains based on data provided by existing participants • Extend existing data value chains, thus bringing about innovation by exploiting value not foreseen initially.
Responsible • Promote ethical business practices related to data sharing. • Contribute to solving the societal and environmental sustainability challenges of our time.	**Real-time** • Build capability to exchange and to act on data as real-time as possible. • Big benefits to be gained, for example in the public sector collaboration.

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Kiitos!

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