Data Spaces Technology Landscape 2023

#dataspaces

Data spaces technology landscape 2023

Antti 'Jogi' Poikola

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Slides: bit.ly/dataspace-tech-landscape

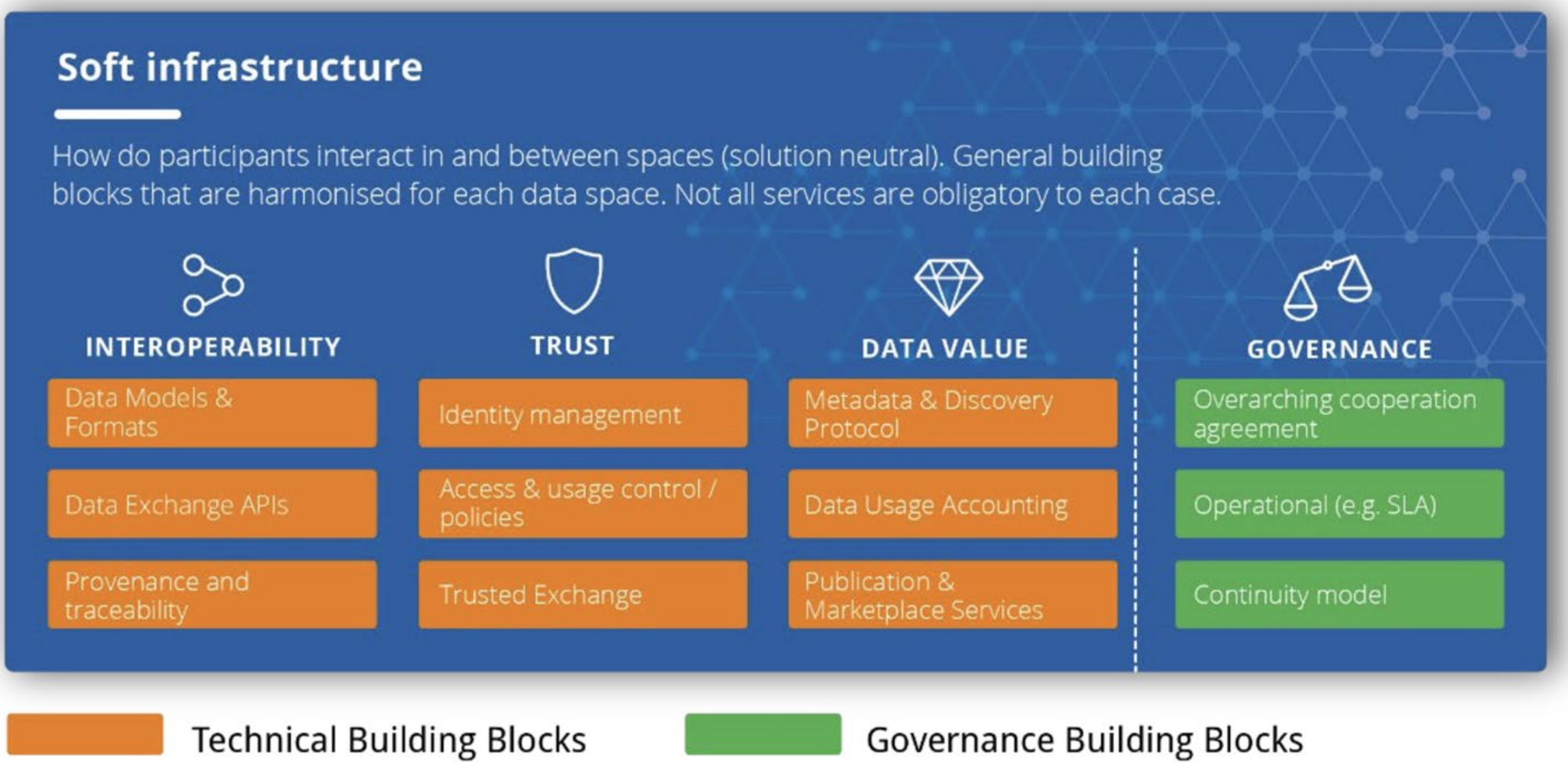
SITRA

Data Space

Decentralised infrastructure for trustworthy data sharing and exchange in data ecosystems based on commonly agreed principles.

THE EUROPEAN DATA STRATEGY

SITRA


Soft infrastructure
How do participants interact in and between spaces (solution neutral). General building blocks that are harmonised for each data space. Not all services are obligatory to each case.
INTEROPERABILITY
Data Models & Formats
Data Exchange APIs
Provenance and traceability
TRUST
Identity management
Access & usage control / policies
Trusted Exchange
DATA VALUE
Metadata & Discovery Protocol
Data Usage Accounting
Publication & Marketplace Services
GOVERNANCE
Overarching cooperation agreement
Operational (e.g. SLA)
Continuity model
Technical Building Blocks
Governance Building Blocks

SITRA

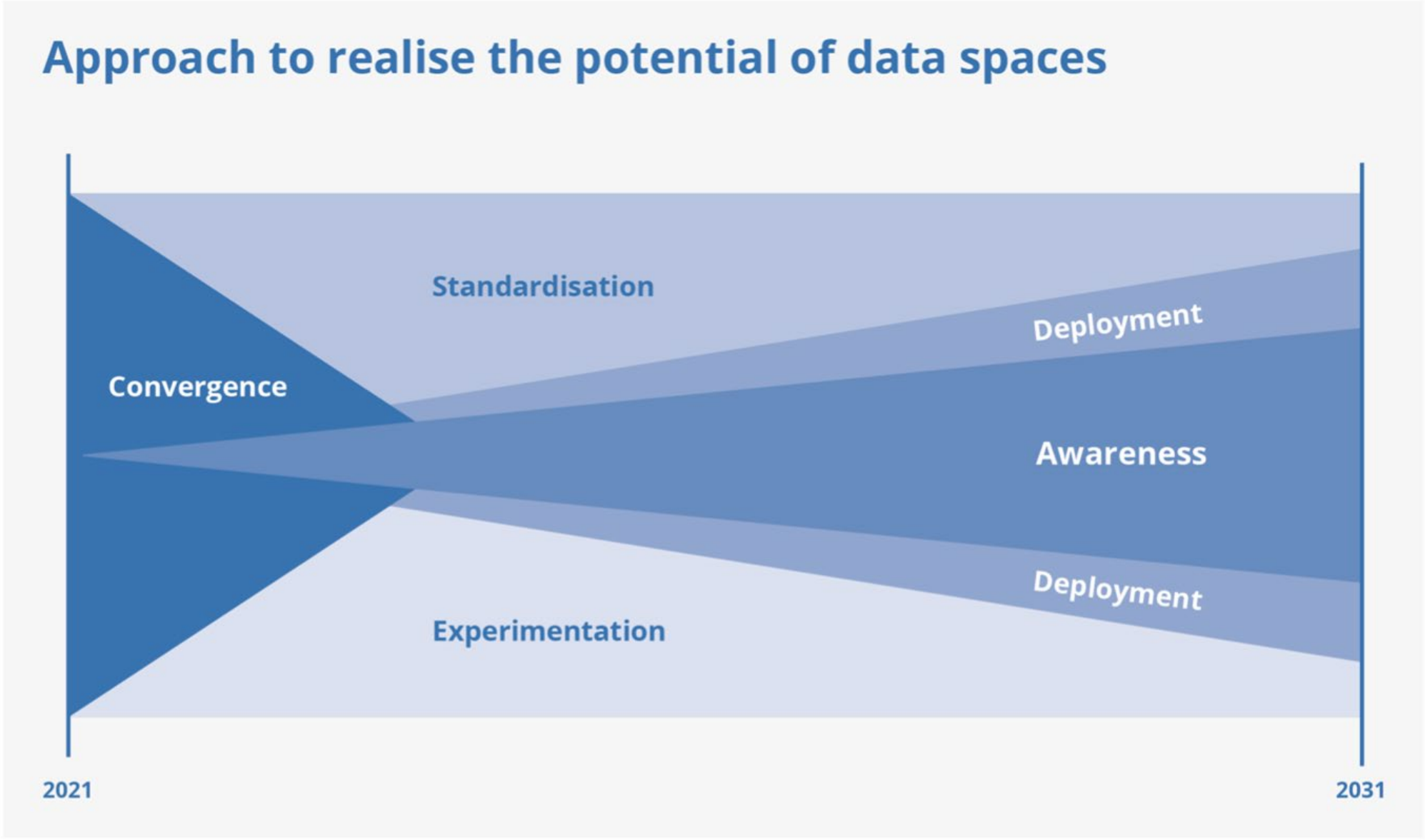
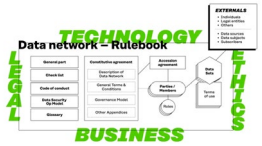


Figure 16 Schematic activity streams for the coming decade towards data spaces and their soft infrastructure (source: BDVA).

Data spaces technology landscape

(some examples)



FIWARE

MyData OPERATORS

iSHARE

Design Principles for Data Spaces – Position Paper

DGA Data Governance Act

DATA SPACES SUPPORT CENTRE

DATA ACT

INTERNATIONAL DATA SPACES ASSOCIATION

eIDAS

Simpl: cloud-to-edge federations and data spaces made simple

ECLIPSE INCUBATION

ECLIPSE DATASPACE COMPONENTS

eDELIVERY connecting europe

gaia-x

X-ROAD

ebsi European Blockchain

GXFS

Minimal Viable Gaia-X powered by Ocean Protocol

ocean

TRUST Over IP FOUNDATION

SITRA

Key roles in data spaces

(Role model work in progress)

	Collective name	Has data rights	Provides data	Receives data	Receives rights to data	Intermediate transactions	Provides services	Provides Governance
Gaia-X	Participant	Data Owner	Provider	Consumer	End User	Federator	–	–
MyData	Actor	Person	Data Source	Data Using Service	–	Operator	–	Ecosystem Governance
Sitra Rulebook	Member	–	Data Provider	–	End User	Operator	Service Provider	–
IDS	Participant	Data Owner	Data Provider	Data Consumer	Data User	Metadata Broker	Identity Provider, Vocabulary Provider...	Data Space Authority (in IDSA rulebook v2)
FIWARE	Participant	Data Owner	Data Provider	Data Consumer	–	Marketplace Provider	Platform Provider	Governance Body
Data Governance Act	–	Data Subject / Data Holder	–	–	Data User	Data Intermediation Service	–	–

Data Spaces Support Centre

DATA SPACES SUPPORT CENTRE

Consortium members

BDV BIG DATA VALUE ASSOCIATION

Capgemini invent

FIWARE FOUNDATION

Fraunhofer

gaia-x

INTERNATIONAL DATA SPACES ASSOCIATION

KU LEUVEN

MyData

OLLSCOIL NA GAILLIMHE UNIVERSITY OF GALWAY

SITRA

TNO innovation for life

VTT

Associated and collaboration partners

acatech DEUTSCHE AKADEMIE DER TECHNIKWISSENSCHAFTEN

Alliance for Internet of Things Innovation

cea

Cefriel POLITECNICO DI MILANO

DATA SHARING COALITION

DIGITALEUROPE

egi

ILVO

INNOPAY

innovalia ASSOCIATION

iSHARE

ITI INVESTIGATE TO INNOVATE

meditech COMPETENCE CENTER

OPEN & AGILE SMART CITIES

GATE

aNG aNewGovernance

Thanks!

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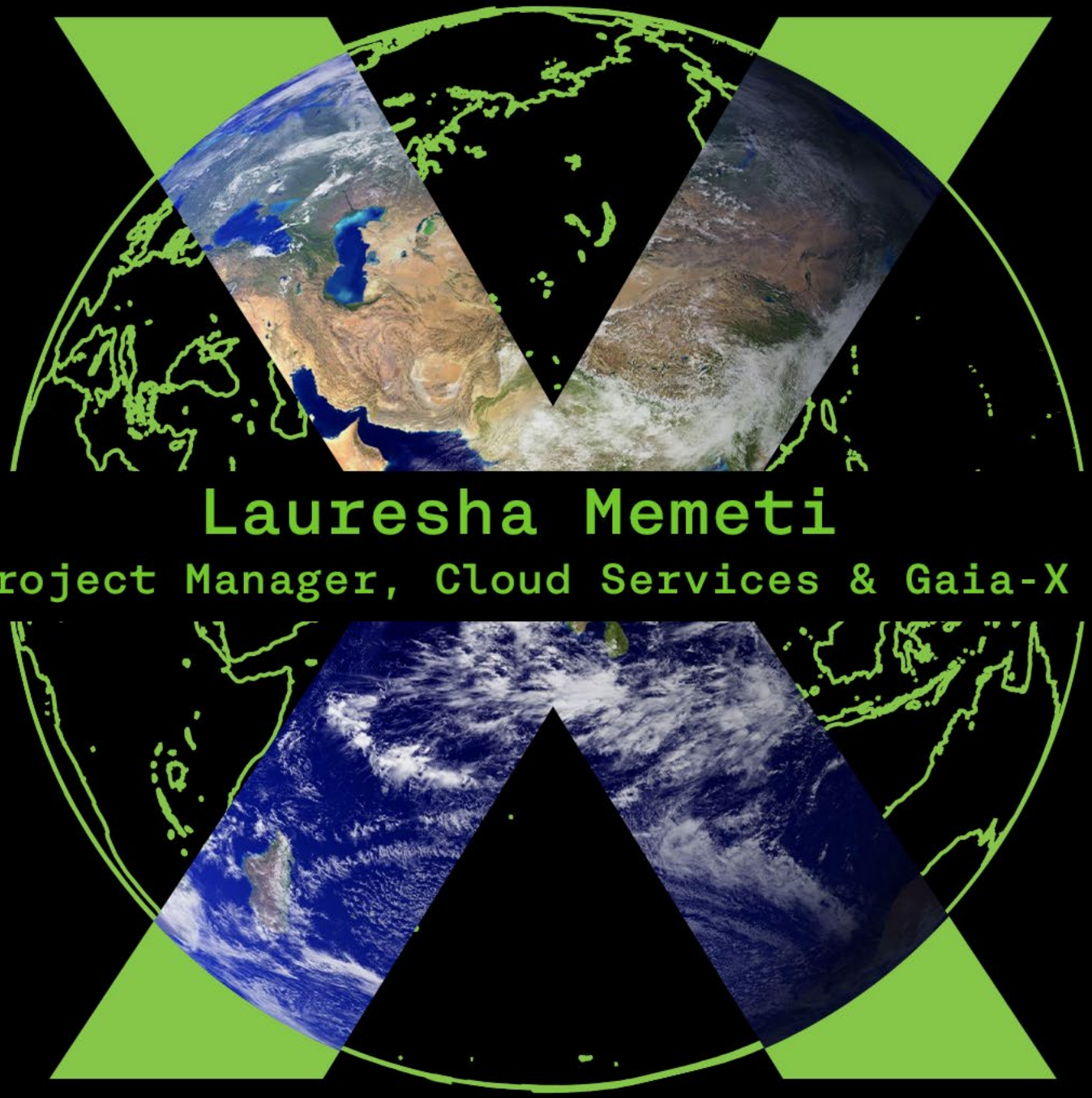
SITRA



Lauresha Memeti

Project Manager, Cloud Services & Gaia-X

Supported by:

Federal Ministry
for Economic Affairs
and Climate Action

on the basis of a decision
by the German Bundestag

Gaia-X
FEDERATION SERVICES
GXFS

Gaia-X Federation Services (GXFS)

Lauresha Memeti
eco – Association of the Internet Industry

13.12.2022

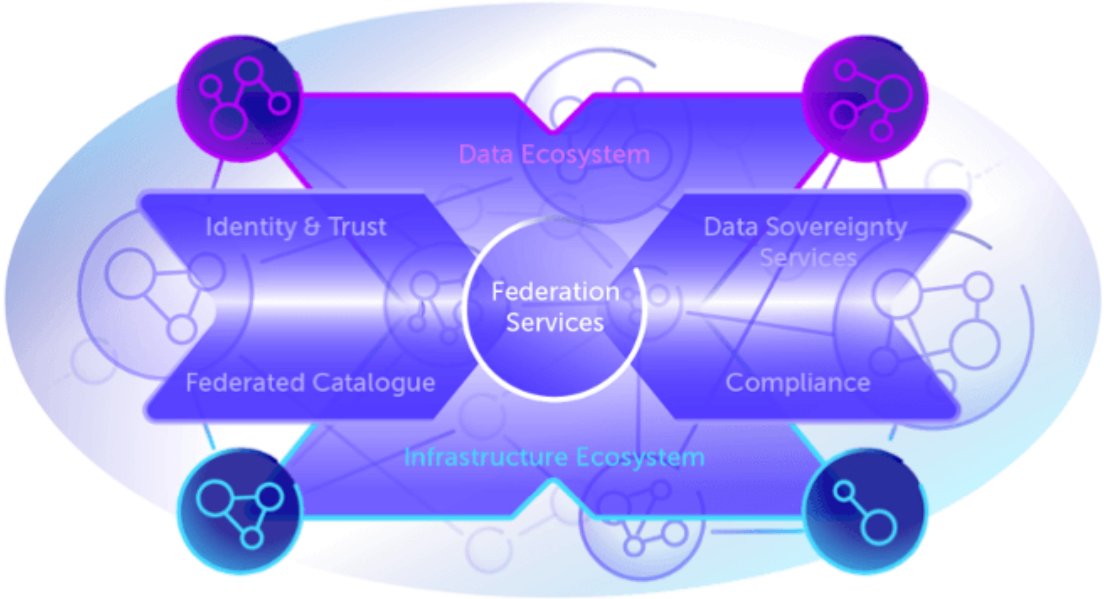
Shaping the future of federated data infrastructure together – secure, open and transparent

Gaia-X & GXFS

- **What is Gaia-X?**
  - **Gaia-X** is a Framework for a Federated and Secure Data Infrastructure

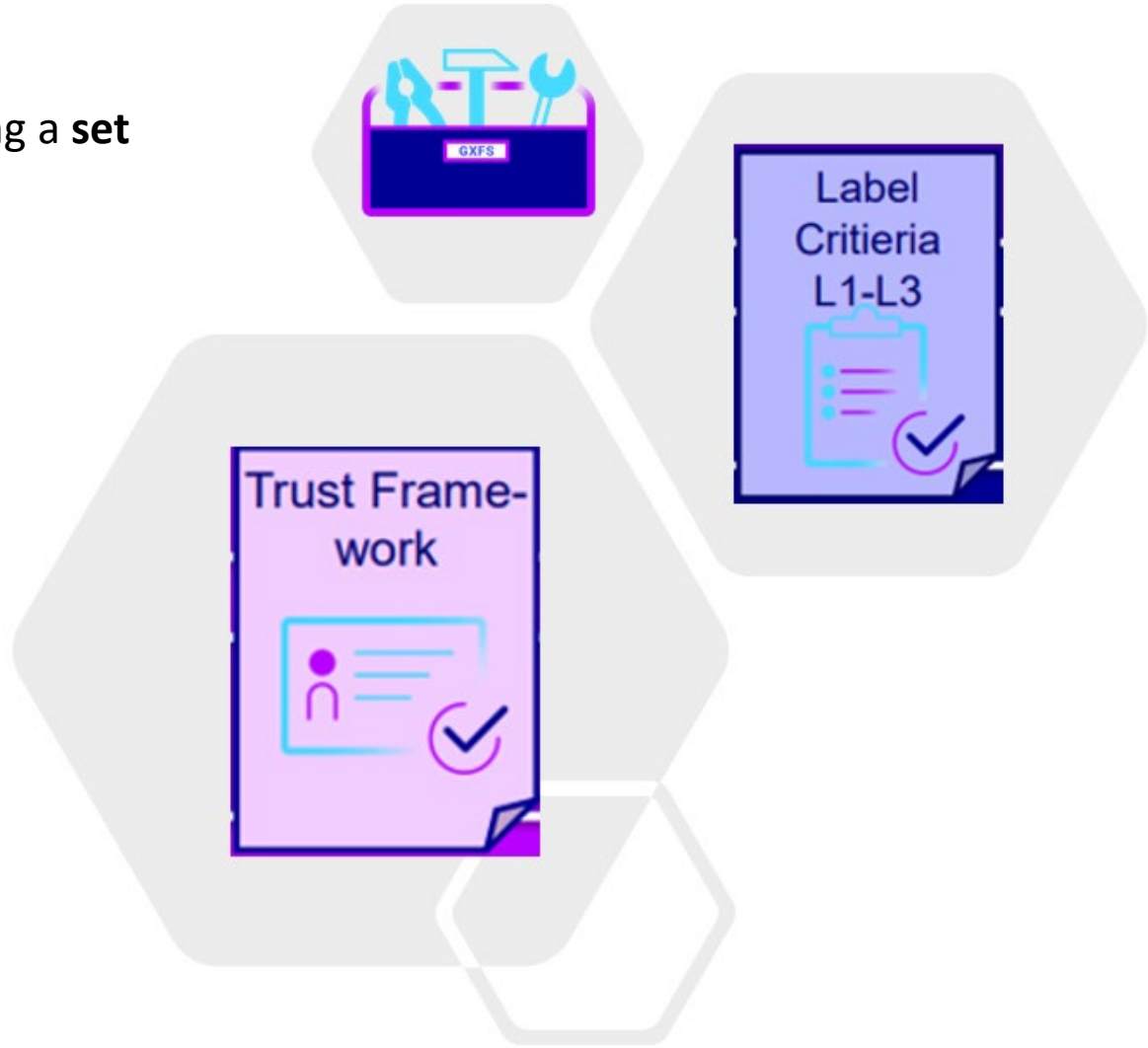
- **What is the goal?**
  - The goal of Gaia-X is innovation through digital sovereignty
  - This is achieved by **establishing a decentralised ecosystem** in which data is made available, collated and shared in a trustworthy environment where users always retain sovereignty over their data

- **Who leads Gaia-X?**
  - Led by Gaia-X European Association for Data and Cloud AISBL https://gaia-x.eu/



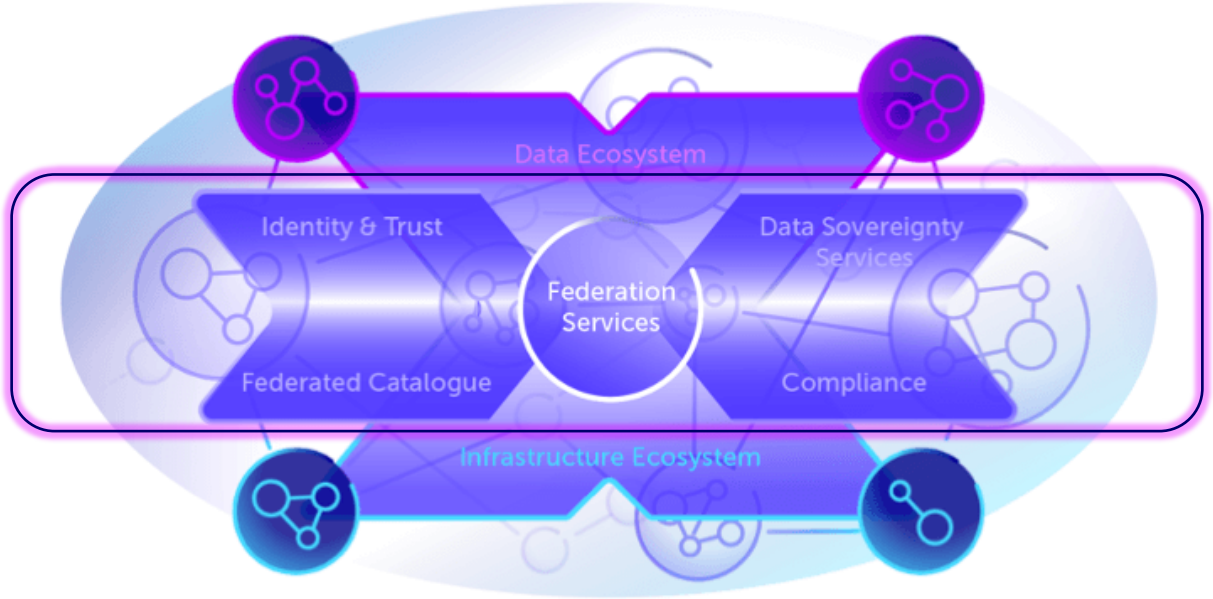
What is Gaia-X developing

- The Gaia-X community consist of multiple stakeholders who are specifying and developing a **set of functional and interoperable components consisting of:**
  - Federation Services and other technical components
  - Governance Framework
  - Trust Framework



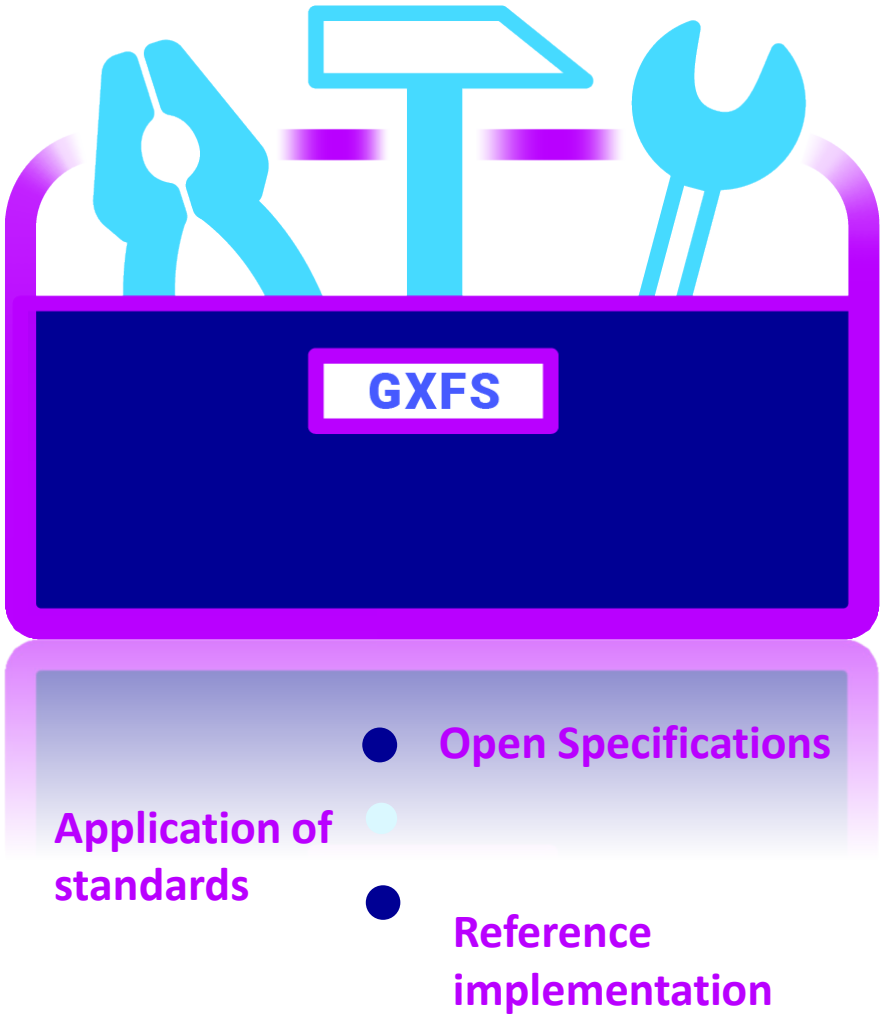
Gaia-X Federation Services - GXFS

- **What is GXFS?**
  - GXFS is the **toolbox** that makes the concept of Gaia-X operational
- **What is the goal?**
  - **Delivering the minimum technical requirements/set of services** needed to build and operate this cloud-based, self-managed data infrastructure ecosystem
- **Who leads GXFS?**
  - Different project teams are working on developing Federation Services
    - **GXFS-DE**– the German project, is led by eco, funded by the German Federal Ministry of Economic Affairs and Climate Action



GXFS – Toolbox

- **What is GXFS Toolbox?**
  - **Minimum set of services**, necessary to operate Gaia-X Federations
  - Output will be **technical specifications and baseline open-source code (APL2)**
  - After initial promotion continuous improvement through community-driven work on the **open-source code via Gitlab**
  - Further **hand over to Eclipse Foundation** as Community Project in Q1 2023



GXFS Important Facts

- It is important to understand that the services:
  - **will not be provided by a central authority,**
  - each Federation will be able to use the **reference open-source code** of the Gaia-X Federation Services toolbox to then build apps and services that match the requirements in their respective Federation

- The Federator of a Federation will be tasked with providing these services
  - This is because requirements towards the specific tools may diverge depending on the industry in question. For instance, an Automotive Federation might have very different requirements than an Insurance Federation
  - Through the development of open-source code, the Participants of a Federation are enabled to develop Gaia-X conformant services, and can flexibly design the user interface in a way that's best suited to serve a Federation's needs

The Role of Federations

Gaia-X
FEDERATION SERVICES
GXFS

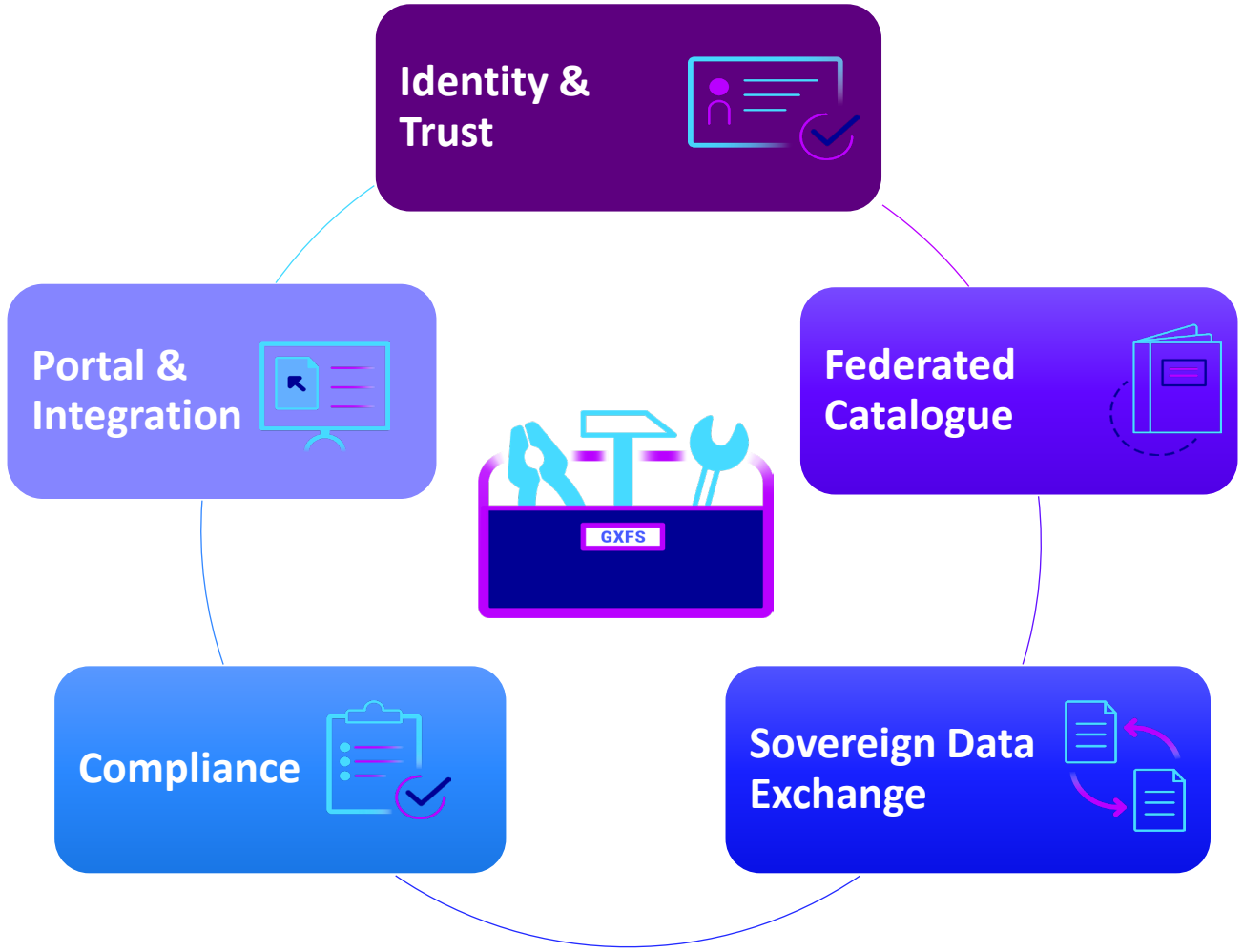
Cooperation of organizations based on topics, domains, industries, etc.

Participants work together at eye level for common goals - agree on joined rules, objectives, technology

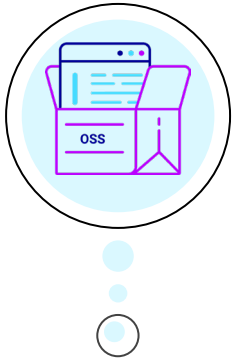
Federators are entities to operate the Federation and are assigned by the Federation

GXFS are basic services that ensure interoperability according to Gaia-X rules

GXFS: Toolbox Components



Find the code in GitLab

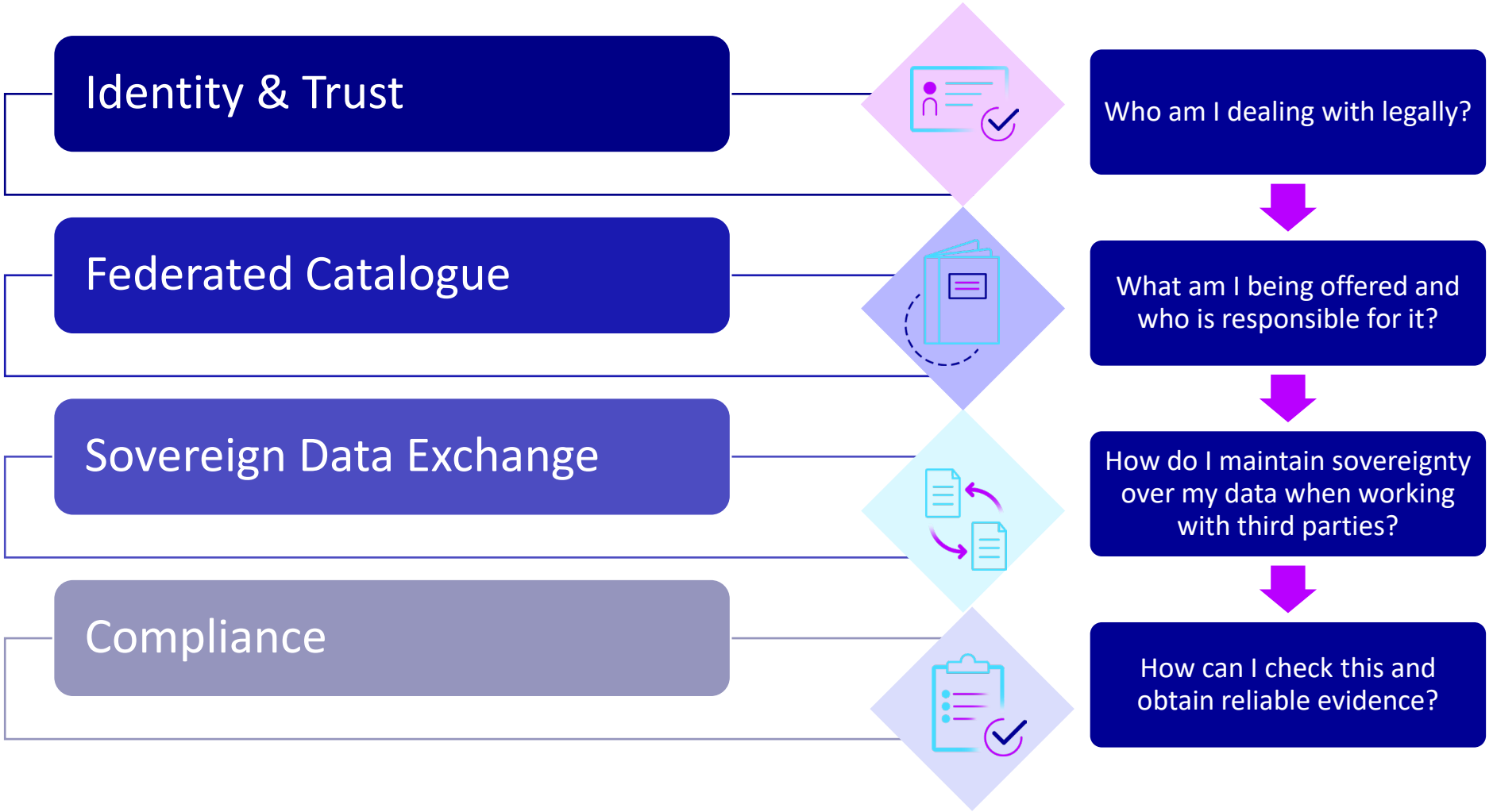


GitLab

GXFS Toolbox

Federation Services Model

Gaia-X
FEDERATION SERVICES
GXFS



GXFS Deliverables by Q3/2022

Gaia-X FEDERATION SERVICES GXFS

Identity & Trust

Based on the Self-Sovereign Identity (SSI) Concept these services provide the ability to handle decentralized identities and digital trust establishments

- **Authentication/Authorization**
- **Organization Credential Manager**
- **Personal Credential Manager**
- **Trust Services**

Compliance

Legal Regulation & Policies framework

- **Onboarding and Accreditation Workflow**
- **Continuous Automated Monitoring**
- **Notarization Service API**

Federated Catalogue

Repository where participants can find other participant's information, service offerings in the shape of self-descriptions

- **Core Catalogue Features**
- **Self-Description of Participants & Services**

Sovereign Data Exchange

These services enable transparency and control over how data is used

- **Data Contract Transaction Service**
- **Data Exchange Logging Service**

Portal & Integration

The Portal serves as a sample integration layer

- **Portal**
- **Orchestration**

Status GXFS

Gaia-X
FEDERATION SERVICES
GXFS

How far are we?

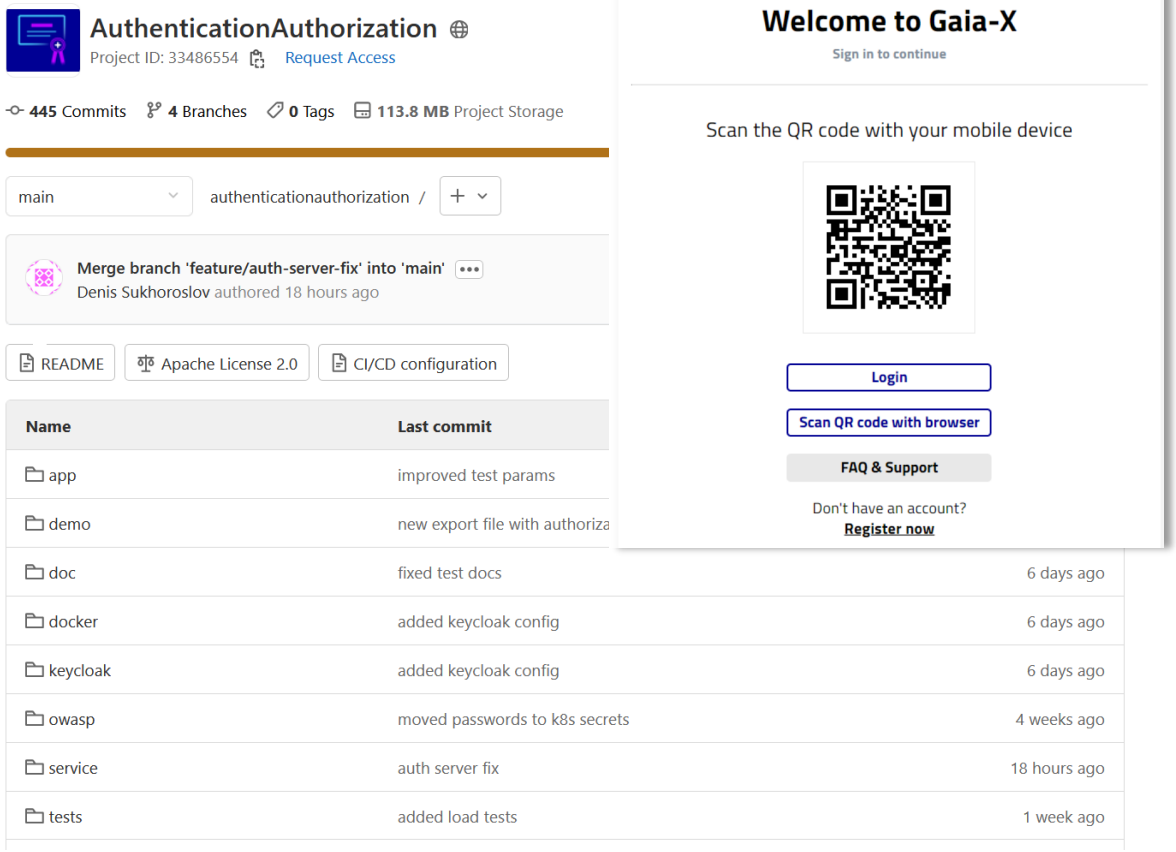
Status:
December.2022

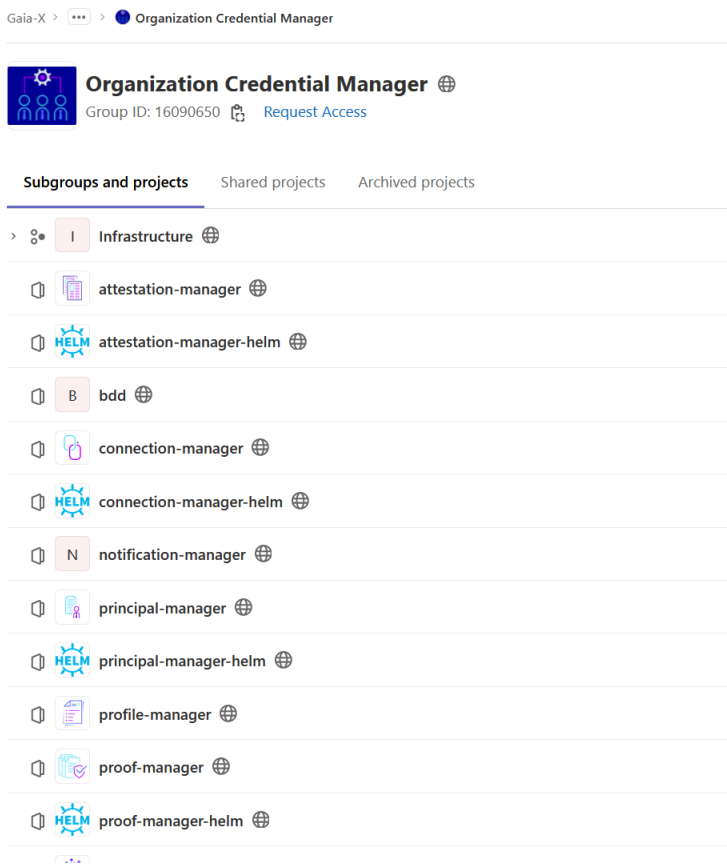
Authenthication- & Authorisation	QA ready	Onboarding and Accreditation Workflow	Started 12.2022
Organisation Credential Manager	QA ready	Continuous Automated Monitoring	QA ready
Personal Credential Manager	QA ready	Notarisation Service	QA ready
Trust Services	QA ready	Catalogue	12/2022
Data Contract Service	QA ready	Portal	QA ready
Data Exchange Logging	QA ready	Orchestration	QA ready

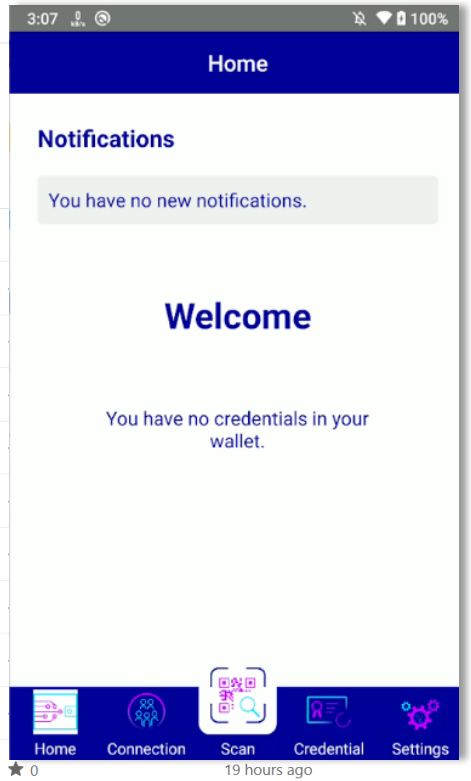
Full Integration of Services end of 2022

GXFS Software Components as OSS @ Gaia-X GitLab

Gaia-X FEDERATION SERVICES GXFS





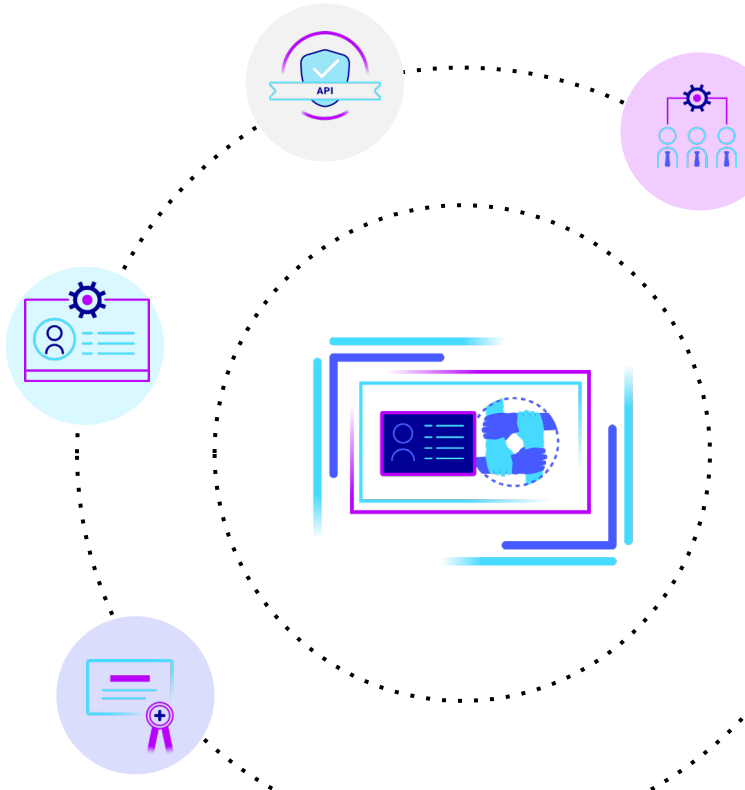


https://gitlab.com/gaia-x/data-infrastructure-federation-services

How can Federation Services help Data Spaces

Gaia-X FEDERATION SERVICES GXFS

- Federation vs Data Spaces
  - “Federations" by default are just organisational/legal constructs
  - Data Spaces are technical/legal constructs
    - *they are linked to each other-*
- Federation Services:
- On the lowest level, can help to organize data spaces and use cases in terms of participants ,service management, compliance assessment etc..
  - Concretely can help to:
    - Manage Participants on SSI concept→ handle decentralized identities
    - Discover Data and Compute Services
    - Contract Data Services
    - Report Data Exchanges
    - …and much more



Lighthouse Projects

Gaia-X FEDERATION SERVICES GXFS

Catena-X Automotive Network

https://catena-x.net/en/
Automotive Supply Chain,
Lead: Germany

agdatahub

https://agdatahub.eu/en/
Agriculture
Lead: France

EuPro Gigant

https://euprogigant.com/en/
Manufacturing, Industry 4.0
Lead: Austria

SC SN smart connected supplier network

https://smart-connected.nl/en
Electronics Supply Chain
Lead: Netherlands

Mobility Data Space
Data Sharing Community

https://mobility-dataspace.eu/
Mobility
Lead: Germany

https://www.gaia-x.eu/news/structura-x-lighthouse-project-european-cloud-infrastructure-launched-concrete-implementation
Provider
Lead: Germany

and more…

https://gaia-x.eu/who-we-are/lighthouse-projects/

GXFS-DE Team

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Emma Wehrwein, Project Lead GXFS-DE, Contact: emma.wehrwein@eco.de

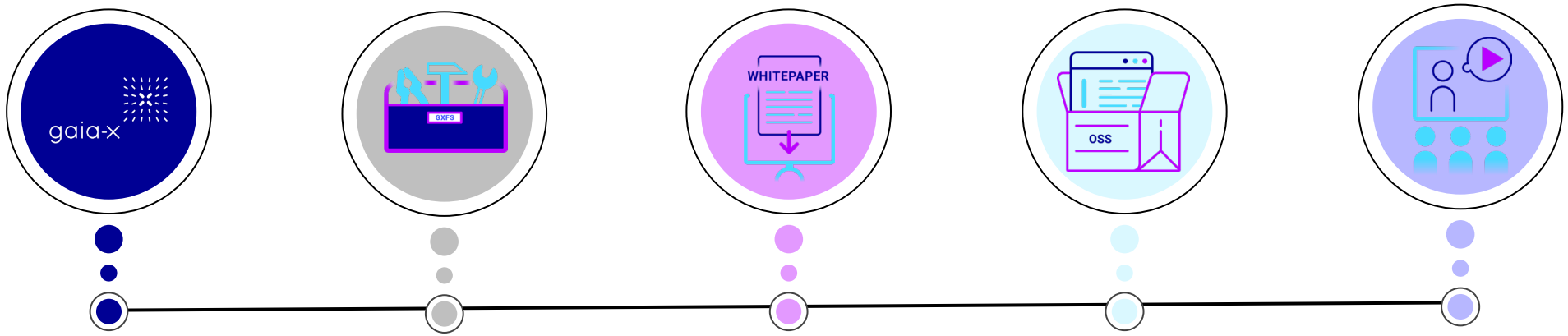
Peter Koller, Project Management Implementation GXFS-DE, Contact: peter.koller@eco.de

Vivien Witt, Project Management Dissemination GXFS-DE, Contact: vivien.witt@eco.de

Lauresha Memeti, Project Management Technical GXFS-DE, Contact: lauresha.memeti@eco.de

Mareike Zeisig, Marketing GXFS-DE, Contact: mareike.zeisig@eco.de

Additional Resources



Gaia-X
Webseite
www.gaia-x.eu

GXFS
Webseite
www.gxfs.eu

Whitepaper
GXFS Whitepaper
www.gxfs.eu/de/downloads

GitLab
GXFS Toolbox
gitlab.com/gaia-x

Videos
GXFS Erklärvideos
www.gxfs.eu/de/videos

Contact Gaia-X AISBL: info@gaia-x.eu

Contact PMO GAIA-X Federation Services: pmo@gxfs.de

Landing page Gaia-X Association www.gaia-x.eu

Landing page GXFS www.gxfs.de

Landing page Gaia-X Germany www.daten-infrastruktur.de

gaia-x

Thank You!

Matthias Buchhorn-Roth

Data Space Architect, Microsoft Deutschland GmbH

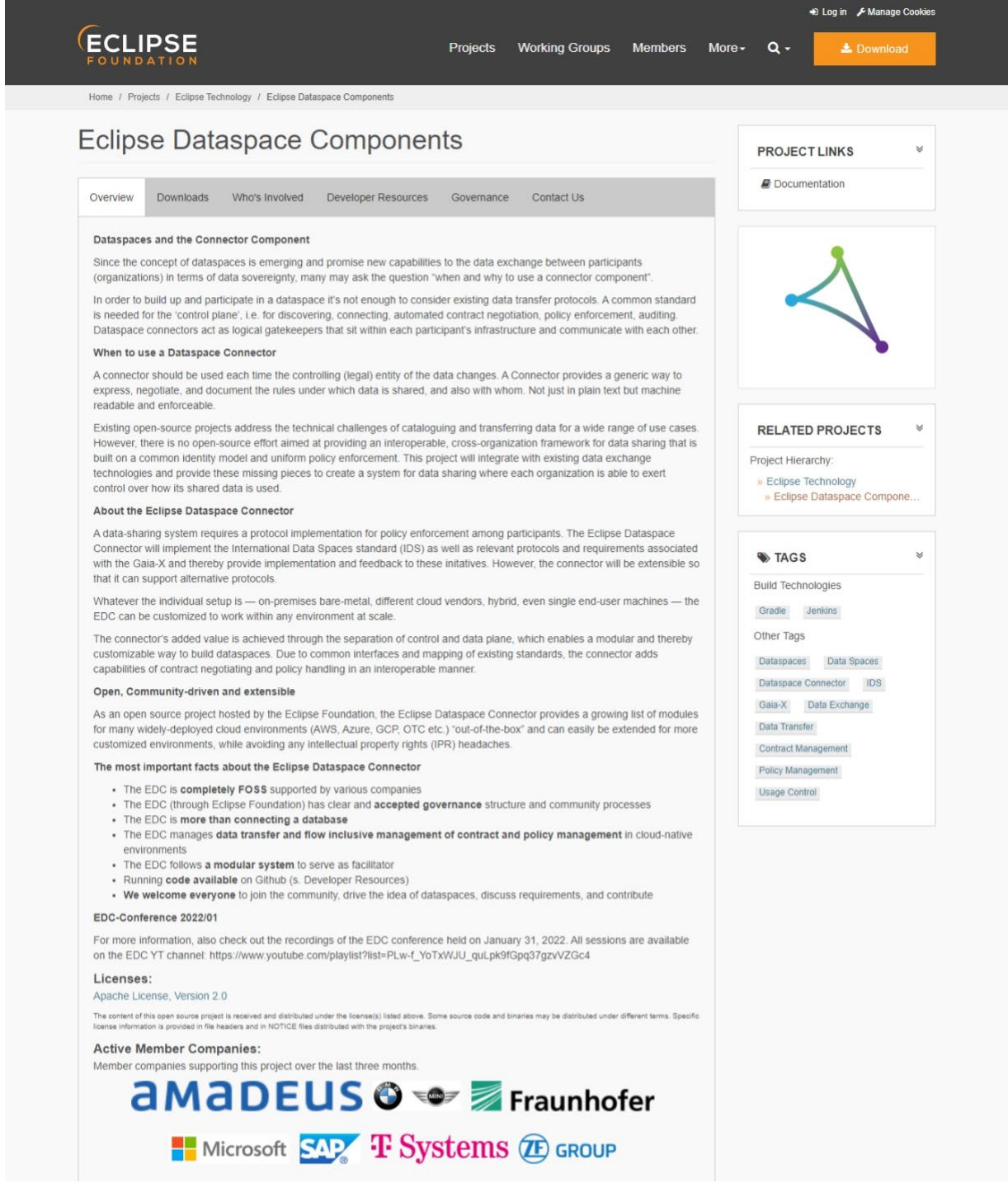
Eclipse Dataspace Components

Matthias Buchhorn-Roth - Dataspace Architect at Microsoft Germany

Eclipse Dataspace Components

- Community driven Open Source project under **Eclipse foundation**
- Free of intellectual property rights under **Apache 2.0** license
- A reference implementation for IDSA RAM 4.0
- Trust Framework Adoption
- Modular / Extendable Based on **Java** and RESTful interfaces
- 50+ contributors, 120+ forks
- Contributing companies: SAP, BMW, ZF Group, Fraunhofer, Daimler, Amadeus, GCP, AWS, IONOS, Microsoft

Eclipse Foundation: projects.eclipse.org/projects/technology.edc
Code Repo: github.com/eclipse-edc/
Documentation: eclipse-edc.github.io/docs/



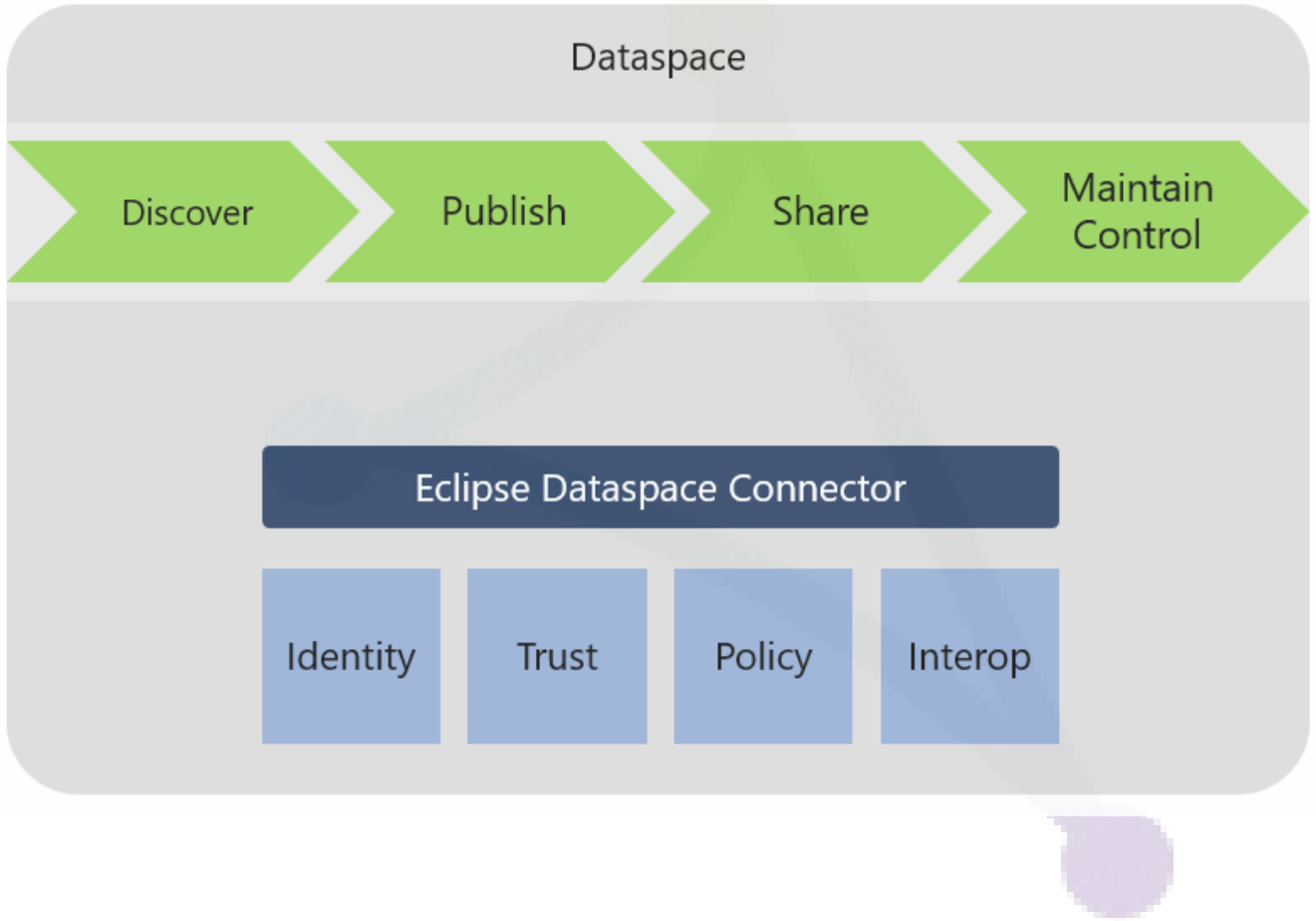
The characteristics of a gaia-x federated dataspace

Main Functionalities of a gaia-x Dataspace

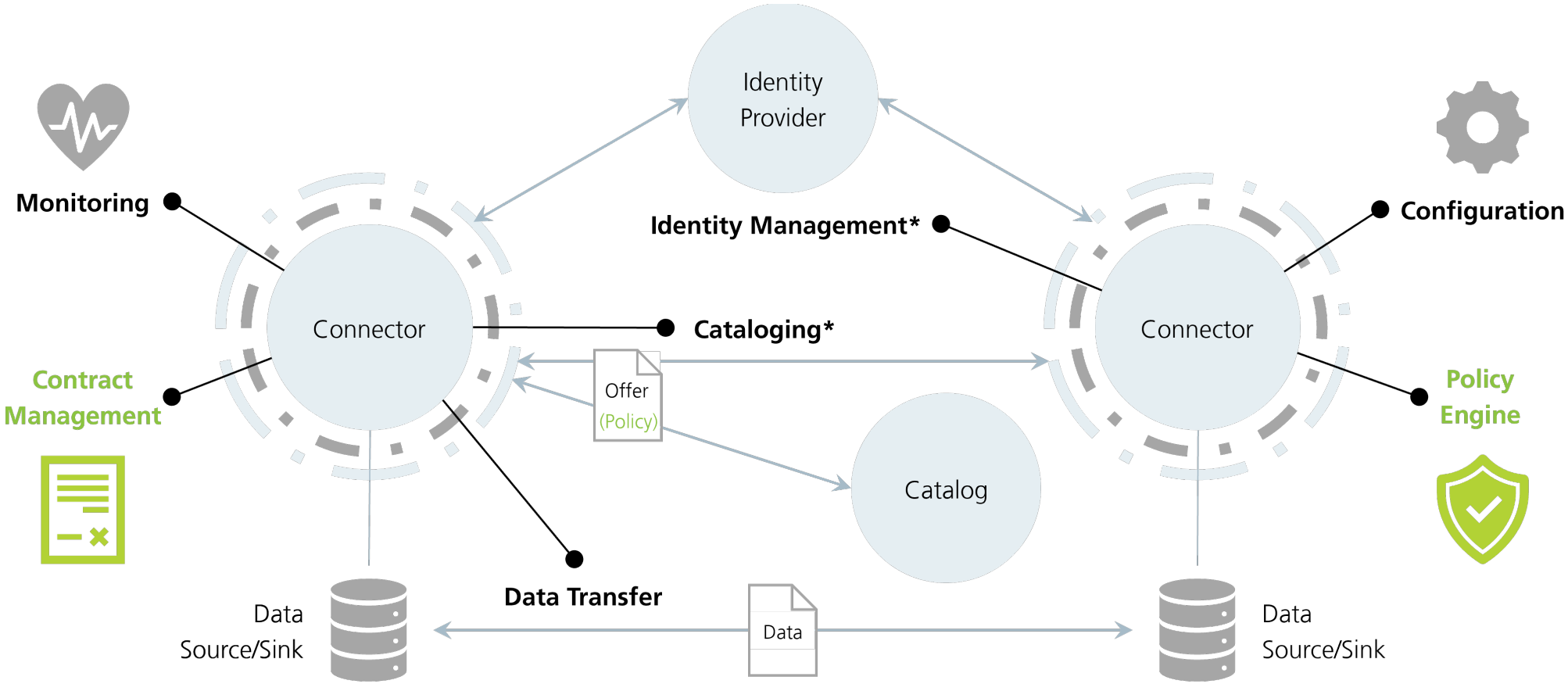
- Catalogue (Discoverability)
- Sovereign Data Exchange
- Identity & Trust
- Compliance

enable data cooperation in a multi-cloud federation by focusing on:

- **Identity**: Each participant remains in control of their identity.
- **Trust**: Each participant decides who to trust.
- **Sovereignty**: Each participant decides under what policies their data is shared.
- **Interoperability**: Each participant remains in control of their deployment.



What are the core features of a dataspace connector?

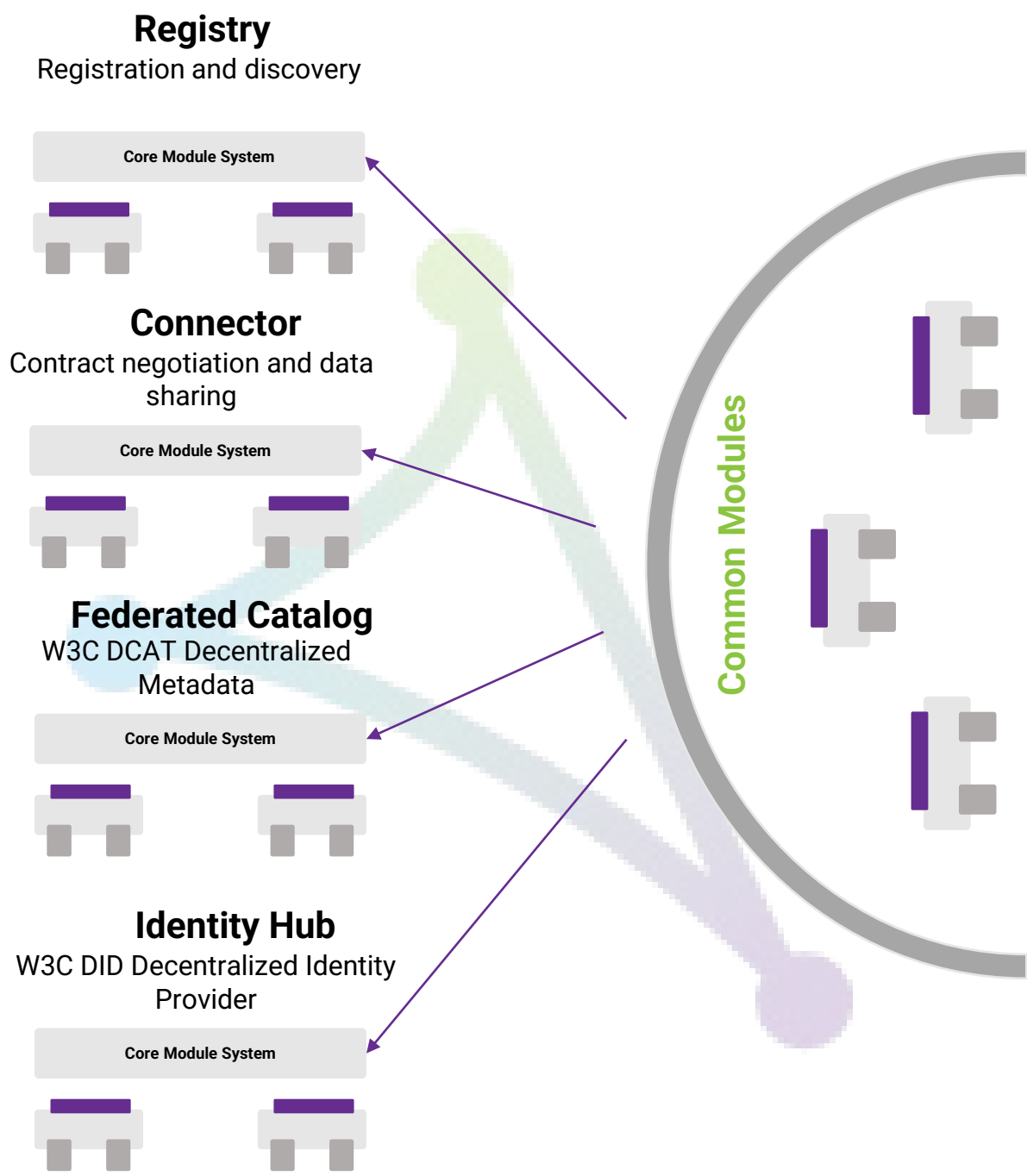


*either centralized or decentralized

https://eclipse-dataspaceconnector.github.io/docs

How that can fit together?

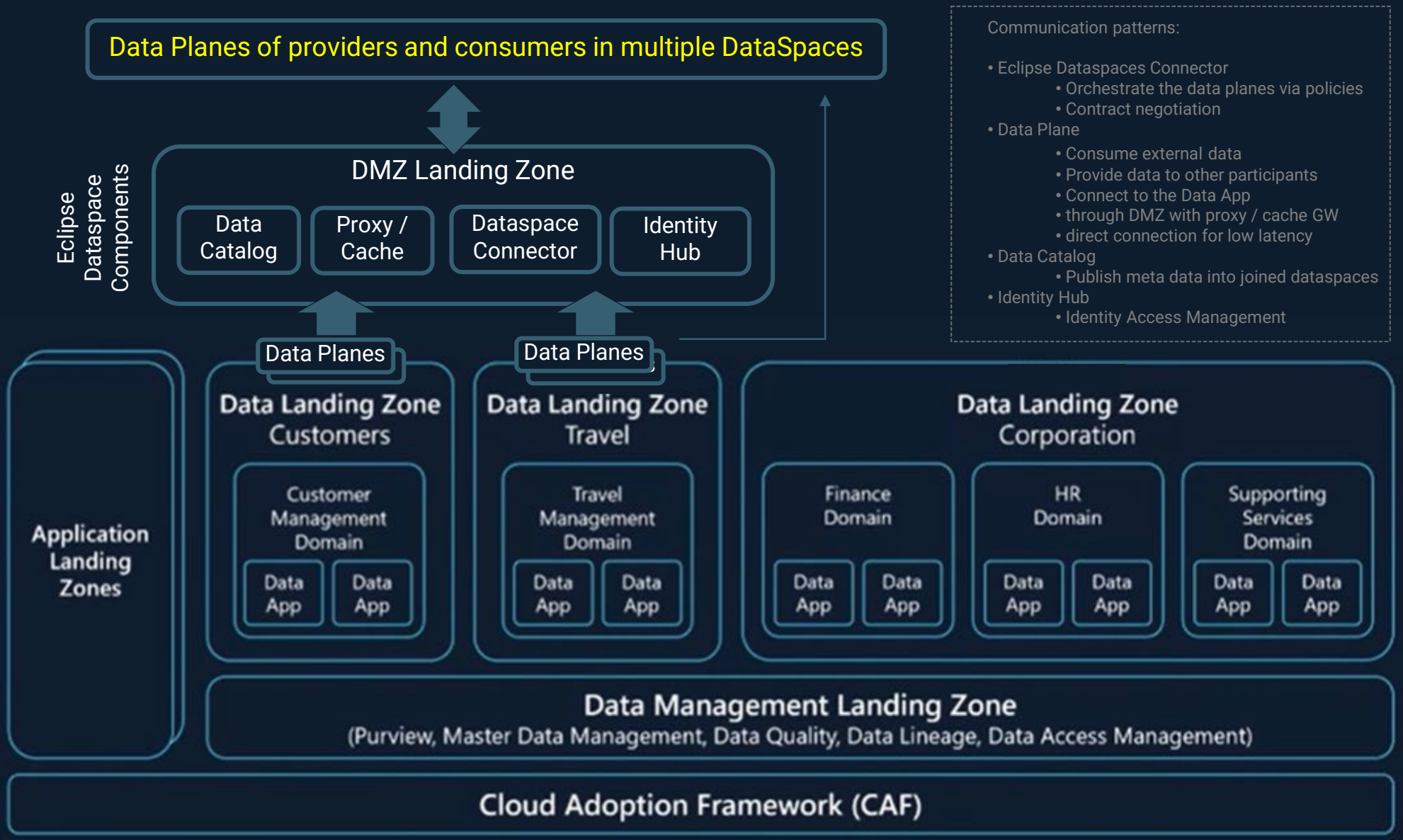
- EDC has a flexible, modular system (Java, Gradle, Rest-API)
- Modules can be exchanged
- Custom modules can be created
- Existing modules can be extended
- Can be fully decentralized or partially centralized



Prepare for data collaboration

Setup an secure and scaleable data architecture in your company

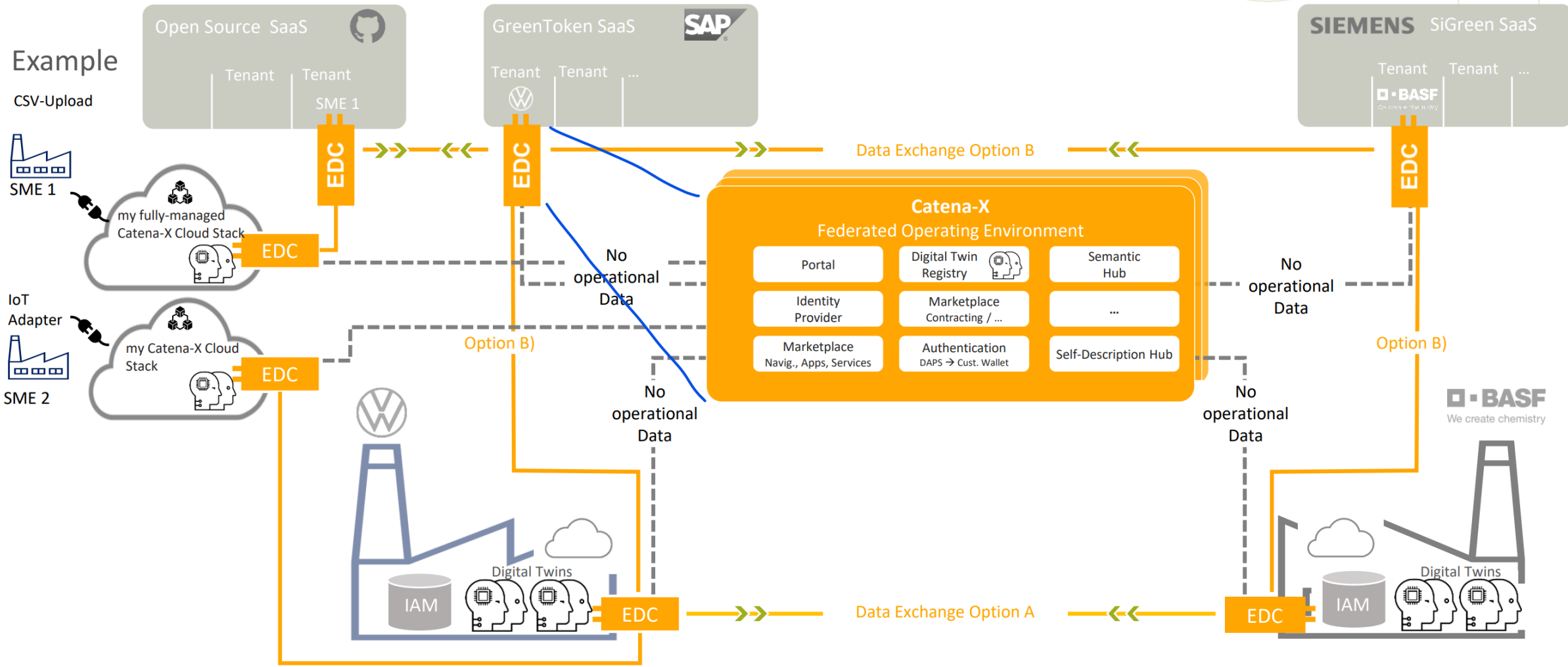
Implement data landing zones with Data Mesh and Data Spaces



2. Define Use Cases

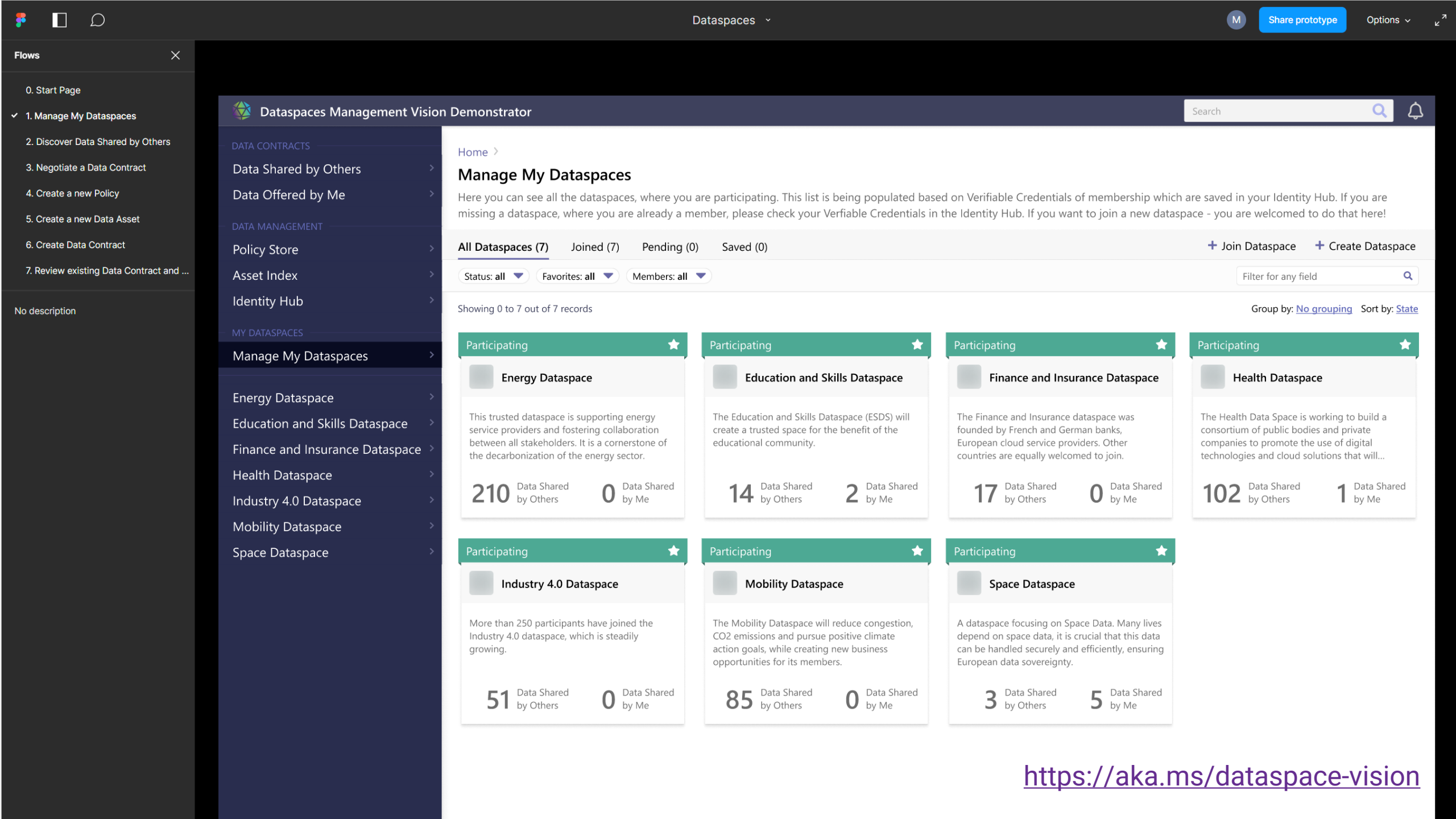
Start the user journey into Dataspaces

How Catena-X Works – GAIA-X Ready Architecture



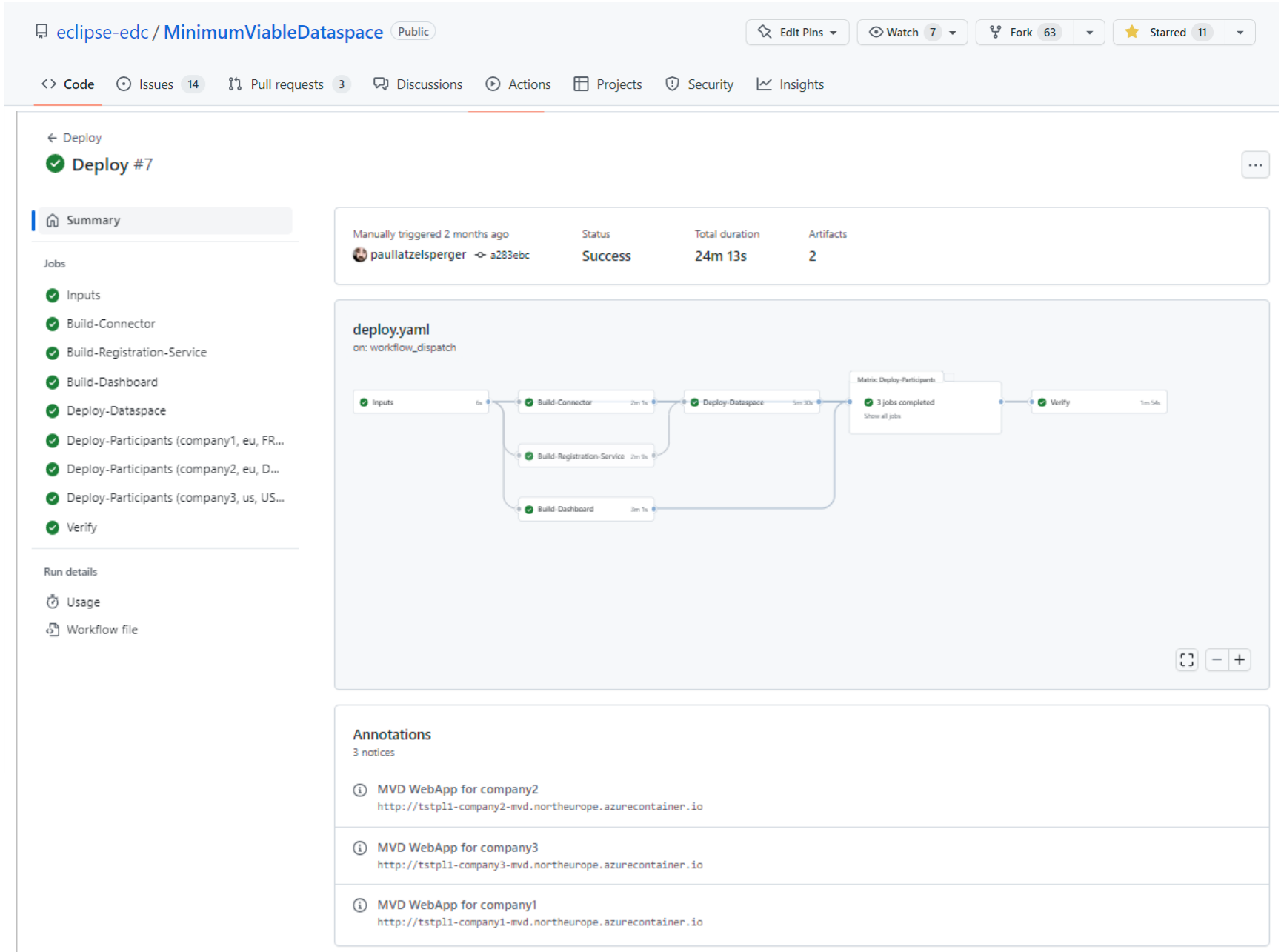
3. Business discussion

Use the Dataspace Management Vision Demonstrator


Dataspaces
Share prototype
Options
Flows
0. Start Page
1. Manage My Dataspaces
2. Discover Data Shared by Others
3. Negotiate a Data Contract
4. Create a new Policy
5. Create a new Data Asset
6. Create Data Contract
7. Review existing Data Contract and ...
No description
Dataspaces Management Vision Demonstrator
Search
DATA CONTRACTS
Data Shared by Others
Data Offered by Me
DATA MANAGEMENT
Policy Store
Asset Index
Identity Hub
MY DATASPACES
Manage My Dataspaces
Energy Dataspace
Education and Skills Dataspace
Finance and Insurance Dataspace
Health Dataspace
Industry 4.0 Dataspace
Mobility Dataspace
Space Dataspace
Home
Manage My Dataspaces
Here you can see all the dataspaces, where you are participating. This list is being populated based on Verifiable Credentials of membership which are saved in your Identity Hub. If you are missing a dataspace, where you are already a member, please check your Verfiable Credentials in the Identity Hub. If you want to join a new dataspace - you are welcomed to do that here!
All Dataspaces (7)
Joined (7)
Pending (0)
Saved (0)
+ Join Dataspace
+ Create Dataspace
Status: all
Favorites: all
Members: all
Filter for any field
Showing 0 to 7 out of 7 records
Group by: No grouping
Sort by: State
Participating
Energy Dataspace
This trusted dataspace is supporting energy service providers and fostering collaboration between all stakeholders. It is a cornerstone of the decarbonization of the energy sector.
210 Data Shared by Others
0 Data Shared by Me
Participating
Education and Skills Dataspace
The Education and Skills Dataspace (ESDS) will create a trusted space for the benefit of the educational community.
14 Data Shared by Others
2 Data Shared by Me
Participating
Finance and Insurance Dataspace
The Finance and Insurance dataspace was founded by French and German banks, European cloud service providers. Other countries are equally welcomed to join.
17 Data Shared by Others
0 Data Shared by Me
Participating
Health Dataspace
The Health Data Space is working to build a consortium of public bodies and private companies to promote the use of digital technologies and cloud solutions that will...
102 Data Shared by Others
1 Data Shared by Me
Participating
Industry 4.0 Dataspace
More than 250 participants have joined the Industry 4.0 dataspace, which is steadily growing.
51 Data Shared by Others
0 Data Shared by Me
Participating
Mobility Dataspace
The Mobility Dataspace will reduce congestion, CO2 emissions and pursue positive climate action goals, while creating new business opportunities for its members.
85 Data Shared by Others
0 Data Shared by Me
Participating
Space Dataspace
A dataspace focusing on Space Data. Many lives depend on space data, it is crucial that this data can be handled securely and efficiently, ensuring European data sovereignty.
3 Data Shared by Others
5 Data Shared by Me
https://aka.ms/dataspace-vision

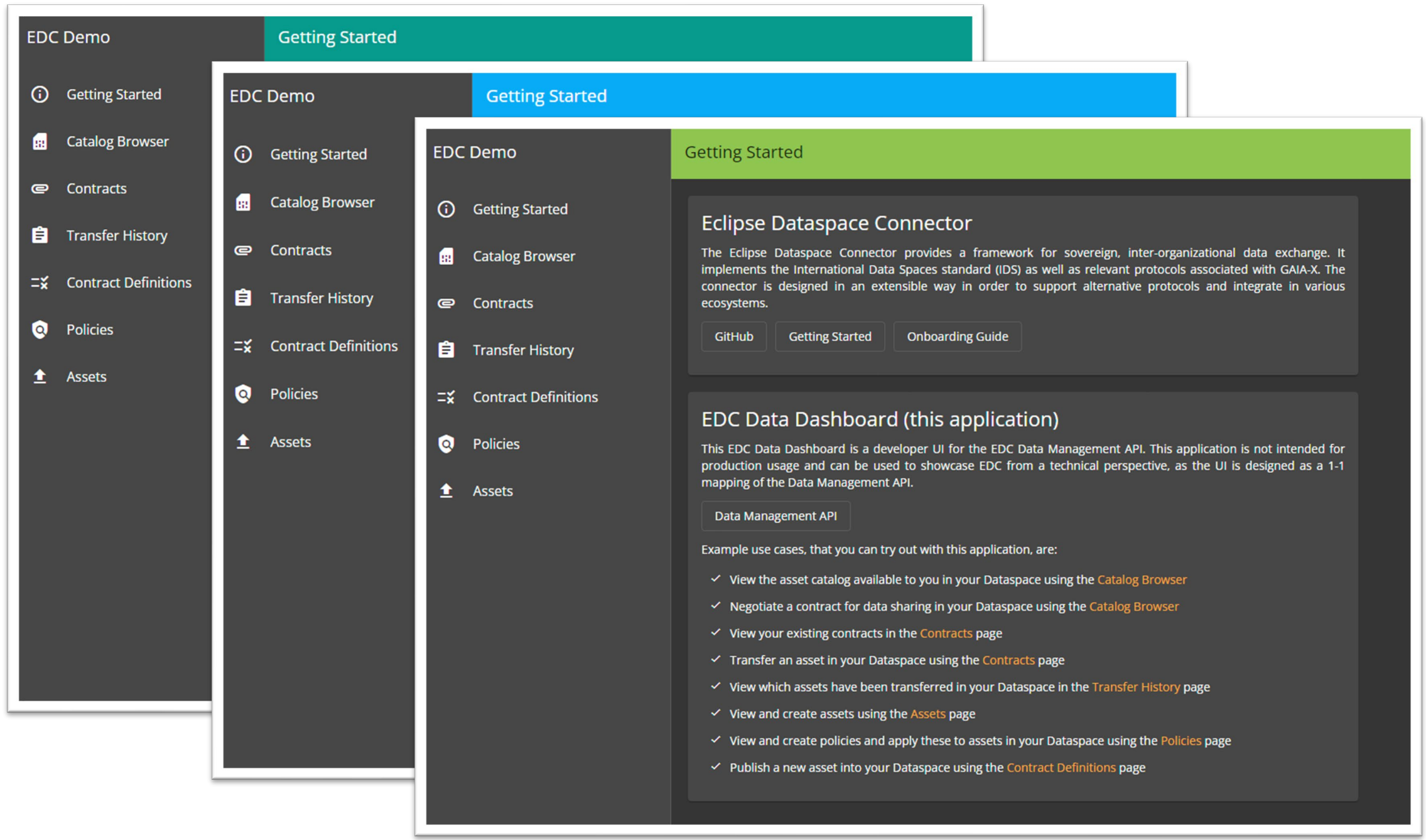
4. Minimum Viable Dataspace

Starting point for developers



- Click on `Run workflow` to trigger the deployment.

[eclipse-edc/MinimumViableDataspace]


EDC Demo
Getting Started
Catalog Browser
Contracts
Transfer History
Contract Definitions
Policies
Assets
EDC Demo
Getting Started
Getting Started
Catalog Browser
Contracts
Transfer History
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EDC Demo
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Assets
Eclipse Dataspace Connector
The Eclipse Dataspace Connector provides a framework for sovereign, inter-organizational data exchange. It implements the International Data Spaces standard (IDS) as well as relevant protocols associated with GAIA-X. The connector is designed in an extensible way in order to support alternative protocols and integrate in various ecosystems.
GitHub
Getting Started
Onboarding Guide
EDC Data Dashboard (this application)
This EDC Data Dashboard is a developer UI for the EDC Data Management API. This application is not intended for production usage and can be used to showcase EDC from a technical perspective, as the UI is designed as a 1-1 mapping of the Data Management API.
Data Management API
Example use cases, that you can try out with this application, are:
View the asset catalog available to you in your Dataspace using the Catalog Browser
Negotiate a contract for data sharing in your Dataspace using the Catalog Browser
View your existing contracts in the Contracts page
Transfer an asset in your Dataspace using the Contracts page
View which assets have been transferred in your Dataspace in the Transfer History page
View and create assets using the Assets page
View and create policies and apply these to assets in your Dataspace using the Policies page
Publish a new asset into your Dataspace using the Contract Definitions page

MinimalViableDataspace

Deployment scipts and CI/CD build pipelines

deploys one dataspace

use a cloud service

deploys 3 dataspace participants

RegistrationService

Central Dataspace Authority

IdentityHub

W3C DID/VC compliance prototype implementation of a DID: web identity provider, GAIA-X Self-description

App Insights

collect OpenTelemetry-based on Java application monitoring.

OpenTelemetry example for Micrometer and Prometheus

Company 1

Company 2

Company 3

DataSpaceConnector (Core)

Contract negotiation, data transfer, authentication protocols, monitor via W3C ODRL policies

DataDashboard

User Interface for each participent

FederatedCatalog

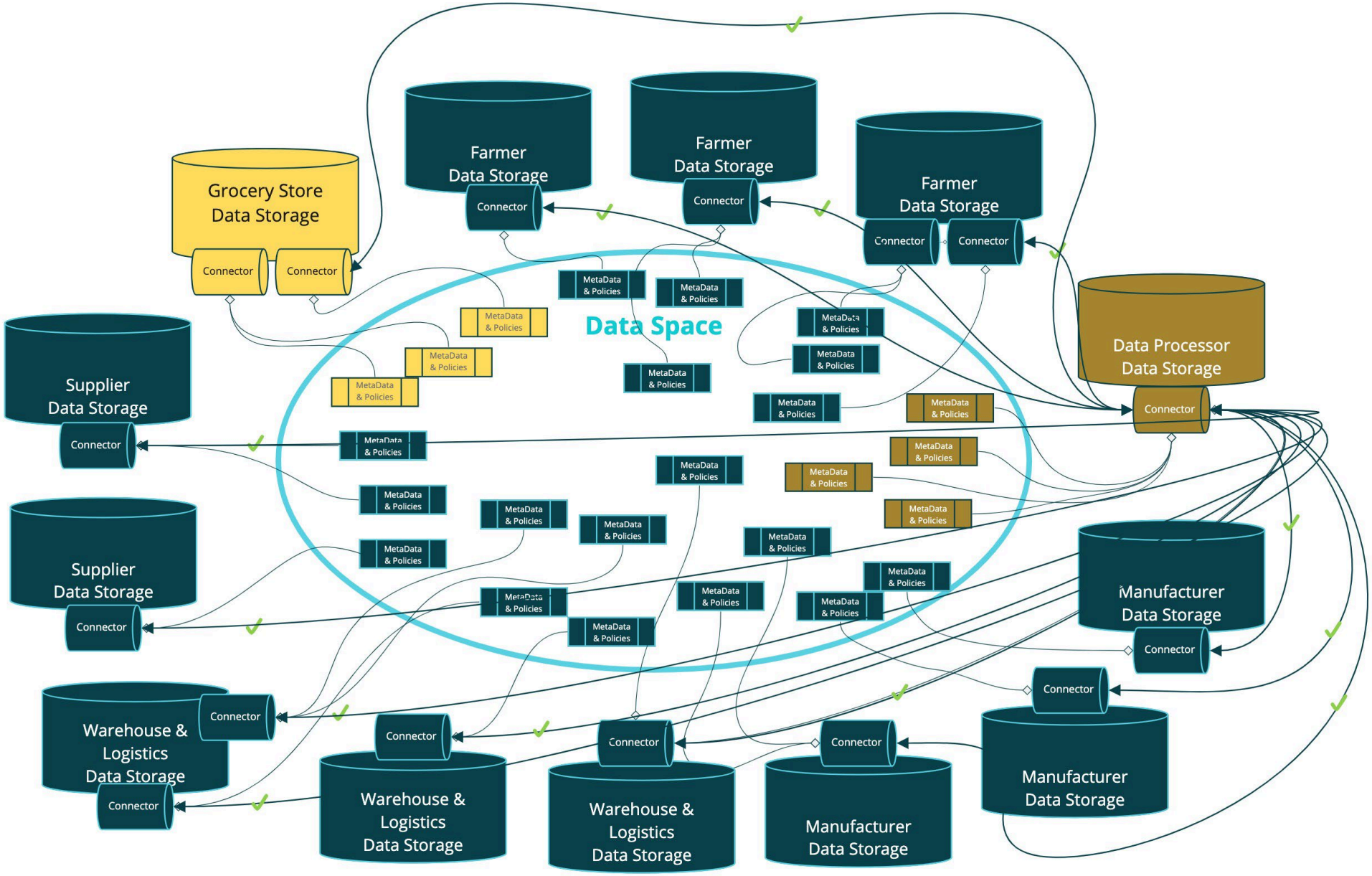
prototype implementation of a W3C DCat based Federated catalog

IdentityHub

W3c DID/VC compliance prototype implementation of a DID: web identity provider, GAIA-X Self-description

linkedin.com/in/mbuchhorn/

Thank you – questions?



Publications/A User Journey to Dataspaces

Catena-X

Open and collaborative data ecosystem for supply chain industry

More information

- Presentation (catena-x.net)
- EDC as core component

Other Open Source contributions

- Eclipse Tractus-X
- Eclipse Digital Twin

Kai Meinke

Co-Founder and Business Lead, deltaDAO AG

gaia-x Hub Finland

presentation

Show me the (running) code

Gaia-X Web3 Ecosystem and GEN-X network

powered by

polygon

ocean

Five steps to your ecosystem

From 0 to 1 in five weeks.

Example Participant SD: https://delta-dao.com/.well-known/participantdeltadao.json

Example X.509 PEM: https://delta-dao.com/.well-known/x509CertificateChain.pem

Example DID: https://delta-dao.com/.well-known/did.json

Learn the Trust Framework

Gaia-X Compliance Service: https://compliance.gaia-x.eu/v2206/docs/

Gaia-X Registry Service: https://registry.gaia-x.eu/v2206/docs/

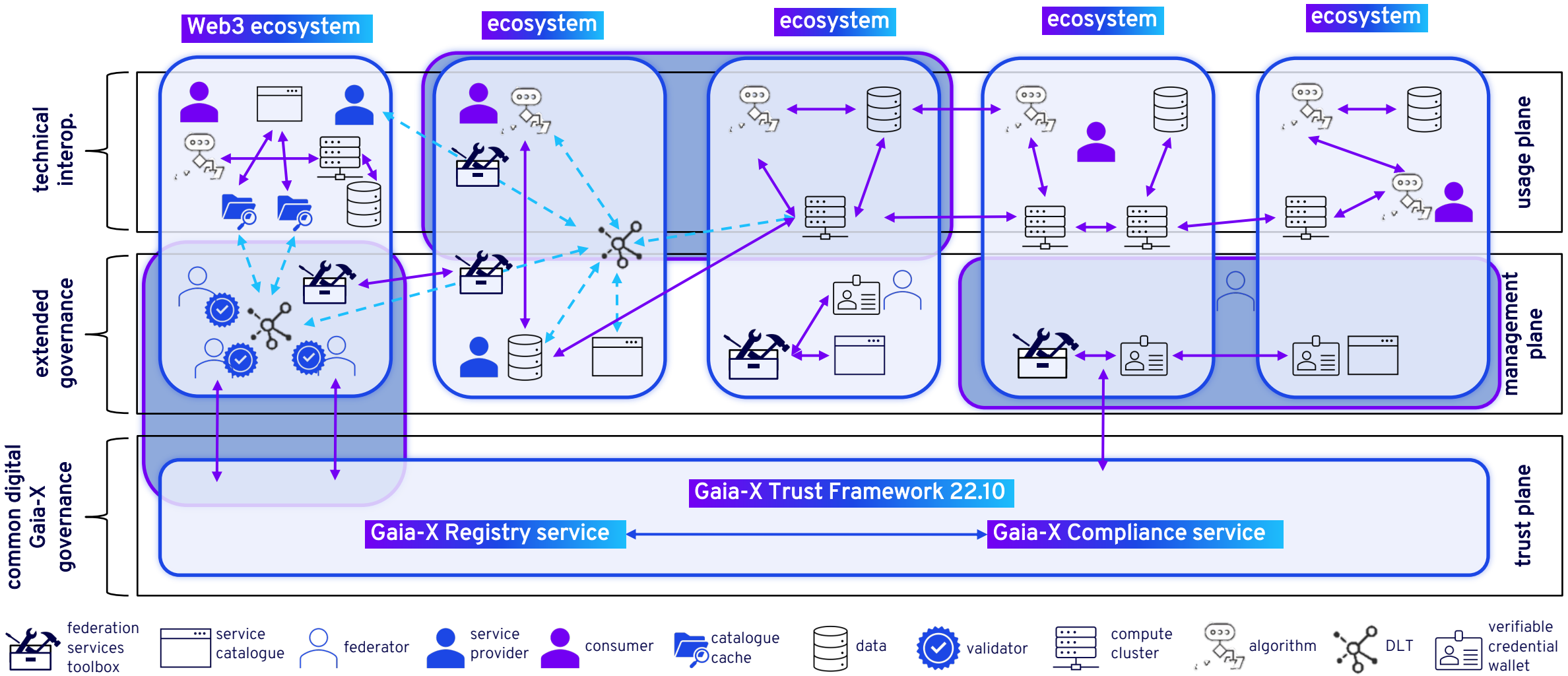
Repository: https://gitlab.com/gaia-x/lab/compliance/gx-compliance

Trust Framework: https://gaia-x.gitlab.io/policy-rules-committee/trust-framework/

SD Signer: https://github.com/deltaDAO/self-description-signing-app

Descriptions: https://gitlab.com/web3-ecosystem/gen-x-network/-/tree/main/static/self-descriptions

trust framework determines Gaia-X compliance & interoperability



Deploy your applications

moveID Road Damage: https://portal.moveid.eu/asset/did:op:78f831361E1c850a16667346068f5fcAFE83F1F5

EuProGigant: https://euprogigant.portal.minimal-gaia-x.eu/asset/did:op:56ef9f727CbdaD148e566BE4B8109d2404224cC8

Highway Data: https://marketplace.future-mobility-alliance.org/asset/did:op:a905d250B00b4CBd483225Bc3cF9E3cf8b02ac39

Text Analysis: https://sbb.portal.minimal-gaia-x.eu/asset/did:op:5A3E99a1d126F2546589bCF5f6cB541ab87Aad83

Real Estate: https://portal.minimal-gaia-x.eu/asset/did:op:F4910E1B433Ad21140683c04D25309f08d6E1946

Guide: https://docs.oceanprotocol.com/building-with-ocean/compute-to-data/compute-to-data-algorithms

use case: mobility data for road damage and risk detection

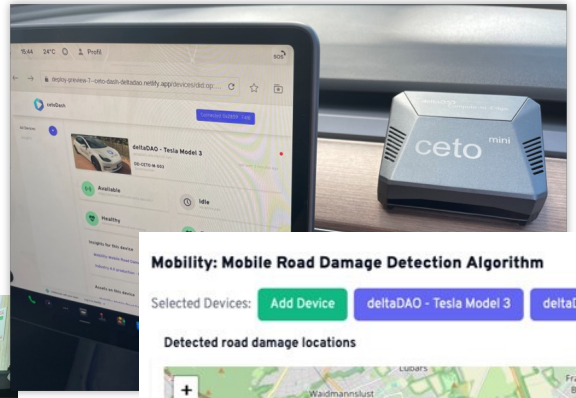
mobility

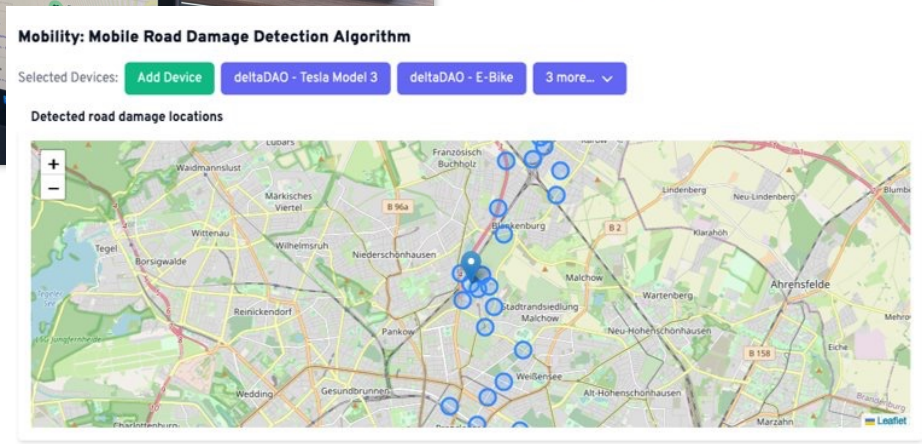
Road Damage Detection

Insurance Risk Scoring

Example use case: Road Damage Detection on the Edge

- Collect image or sensor data on the edge
- Offer data to the market or combine with algorithms from the market
- Analyse via federated learning or descriptive statistics / mapping
- Protect privacy and security related information





DLR Deutsches Zentrum für Luft- und Raumfahrt
German Aerospace Center

moveID

use case: industry 4.0 validation platform

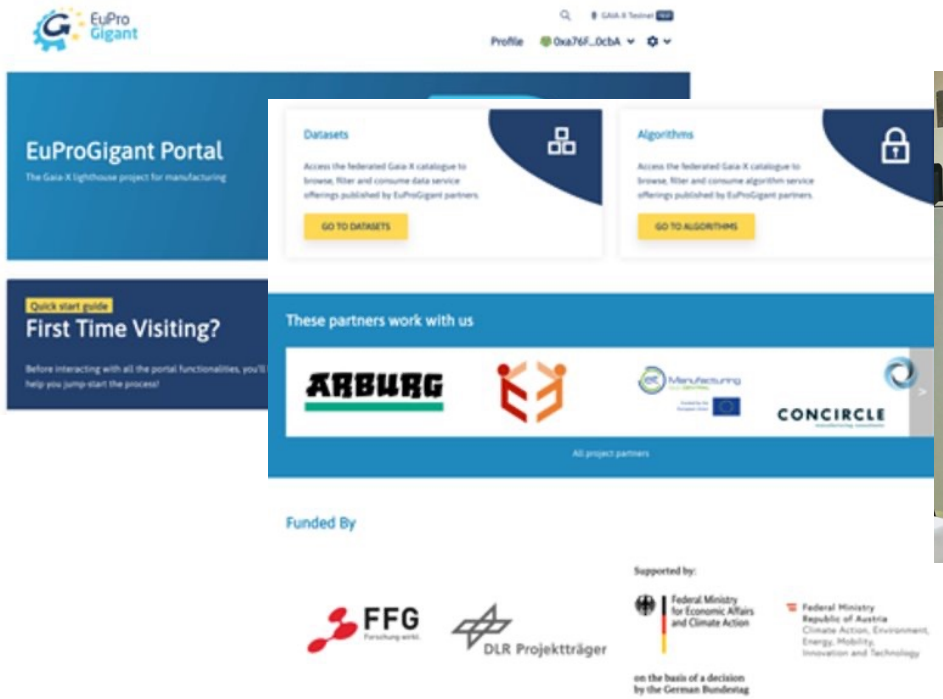
industry 4.0

Predictive maintenance

QA and production optimization

Example use case: EuProGigant Validation Platform

- Collect production data on the edge or on factory cloud level
- Offer data to the market or combine with algorithms from the market
- Predict product and tool quality, match components, andmonetize production data without losing control.
- Protect intellectual property and security related information



Host your own portals

Pontus-X Portal: https://portal.minimal-gaia-x.eu/

Repository: https://github.com/deltaDAO/mvg-portal

EuProGigant: https://euprogigant.portal.minimal-gaia-x.eu

Gaia-X 4 Future Mobility moveID: https://portal.moveid.eu/

Future Mobility Data Marketplace: https://marketplace.future-mobility-alliance.org/

State Library of Berlin: https://sbb.portal.minimal-gaia-x.eu/

University of Lleida: https://udl.portal.minimal-gaia-x.eu/

Acentrik: https://acentrik.io/

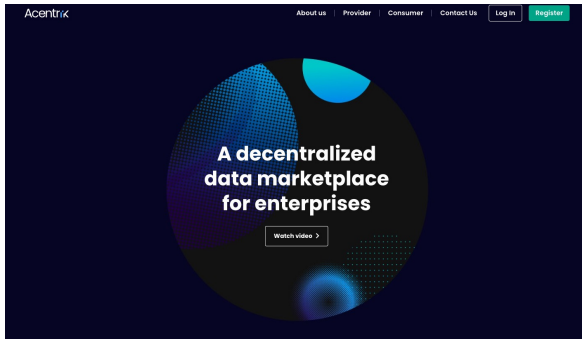
Market Repo: https://github.com/oceanprotocol/market

Catalogue Repo: https://github.com/oceanprotocol/aquarius

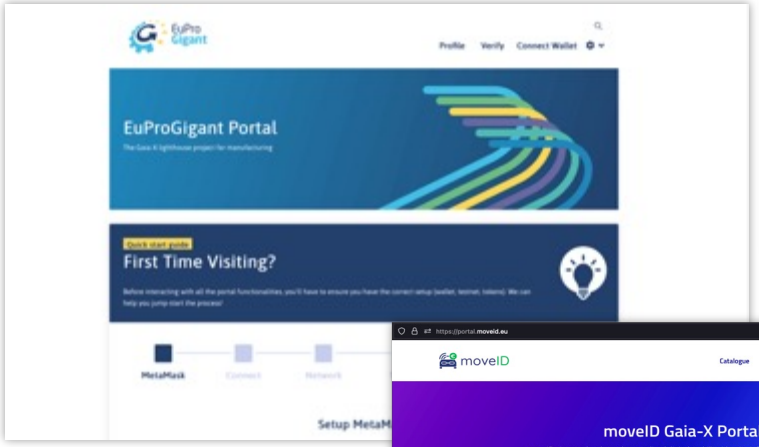
demonstrators

portal overview

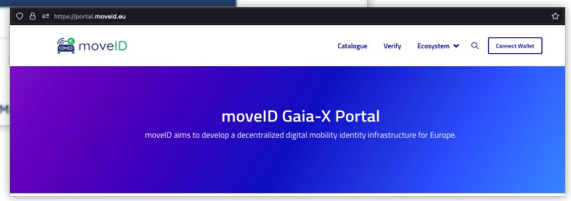
Acentrik



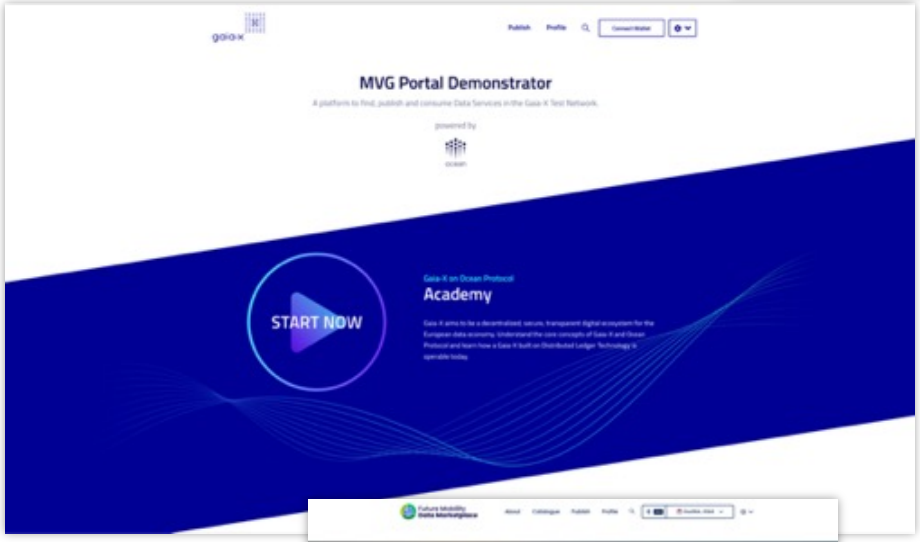
EuProGigant



moveID



Pontus-X Ecosystem Portal

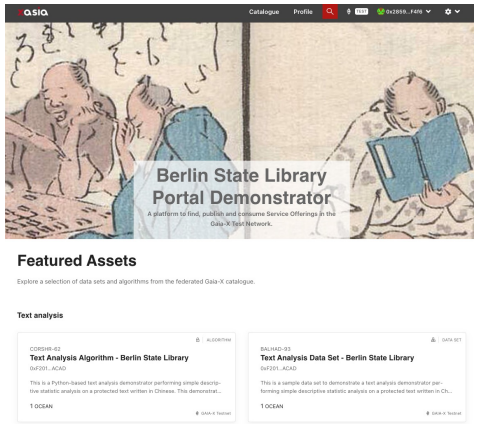


Future Mobility Data Marketplace

University of Lleida

foreverontheblockchain

State Library Berlin



Connect to others & become a Federator

Repository: https://gitlab.com/web3-ecosystem/gen-x-network

Catalogue: https://portal.minimal-gaia-x.eu/search?

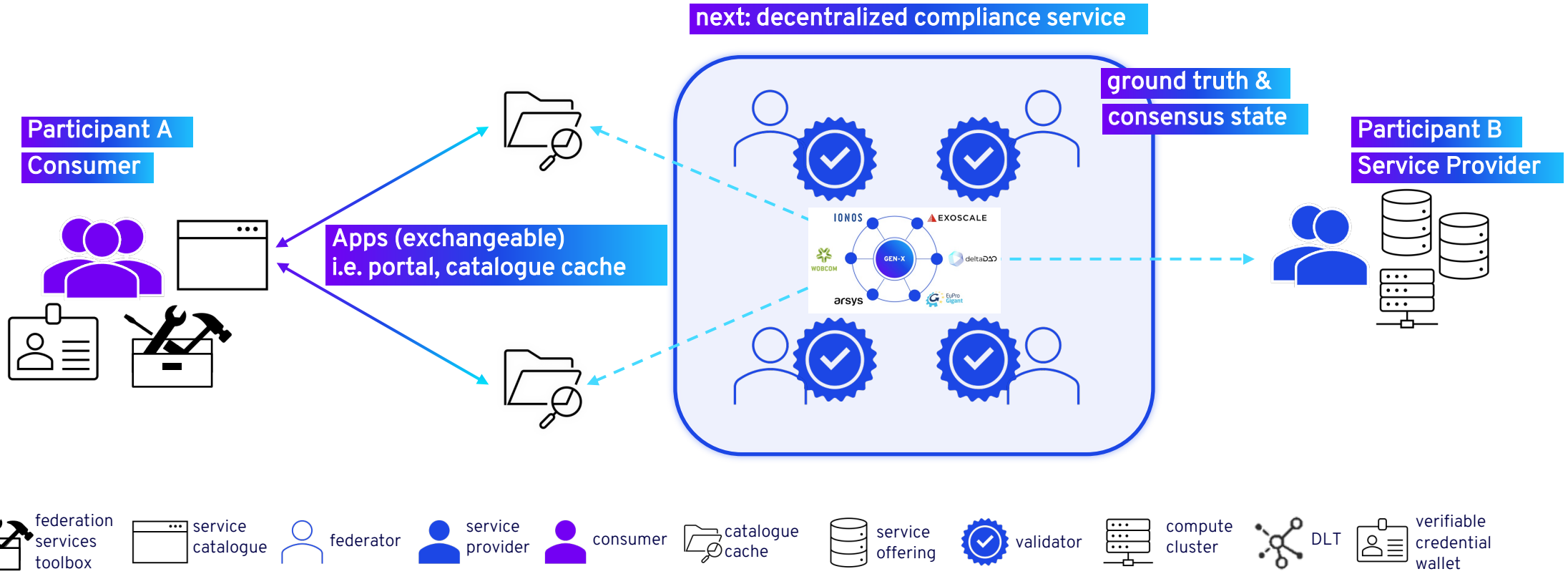
Catalogue Repository: https://github.com/deltaDAO/mvg-catalogue

Logging Service: https://logging.genx.minimal-gaia-x.eu/

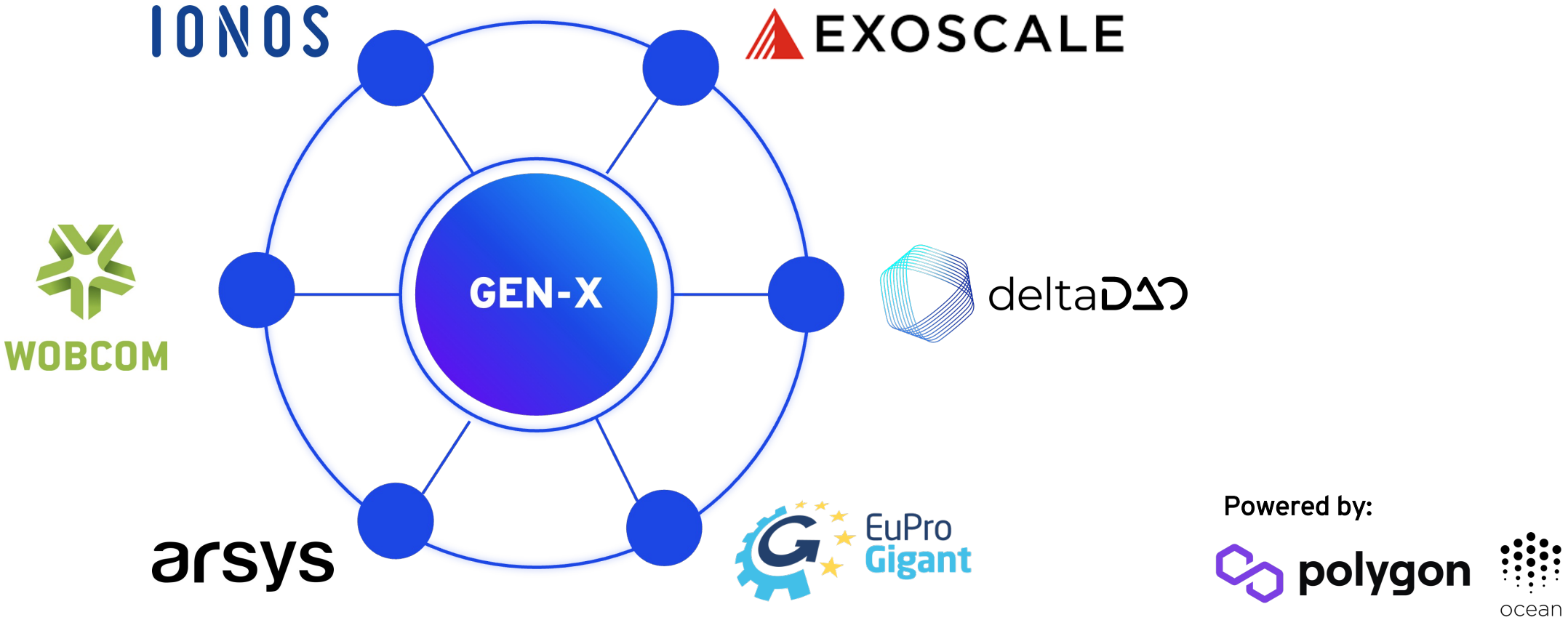
Explorer Repository: https://github.com/deltaDAO/blockscout

Docs Repository: https://docs.genx.minimal-gaia-x.eu/docs/intro

removing single points of failure and control



GEN-X network and current validators, open for everyone



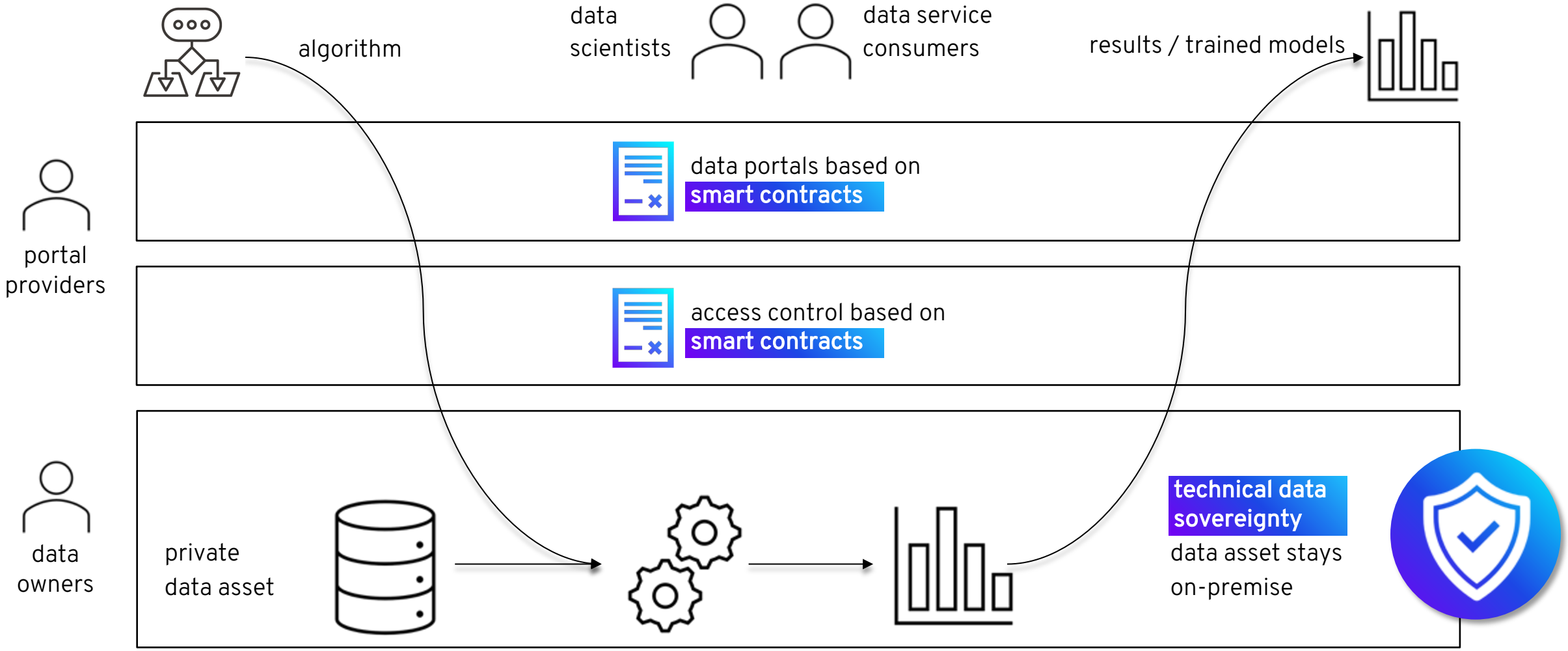
Keep full control

Compute-to-Data & Edge

Compute-to-Data in Mobility: https://youtu.be/W8PuM0lSm4s

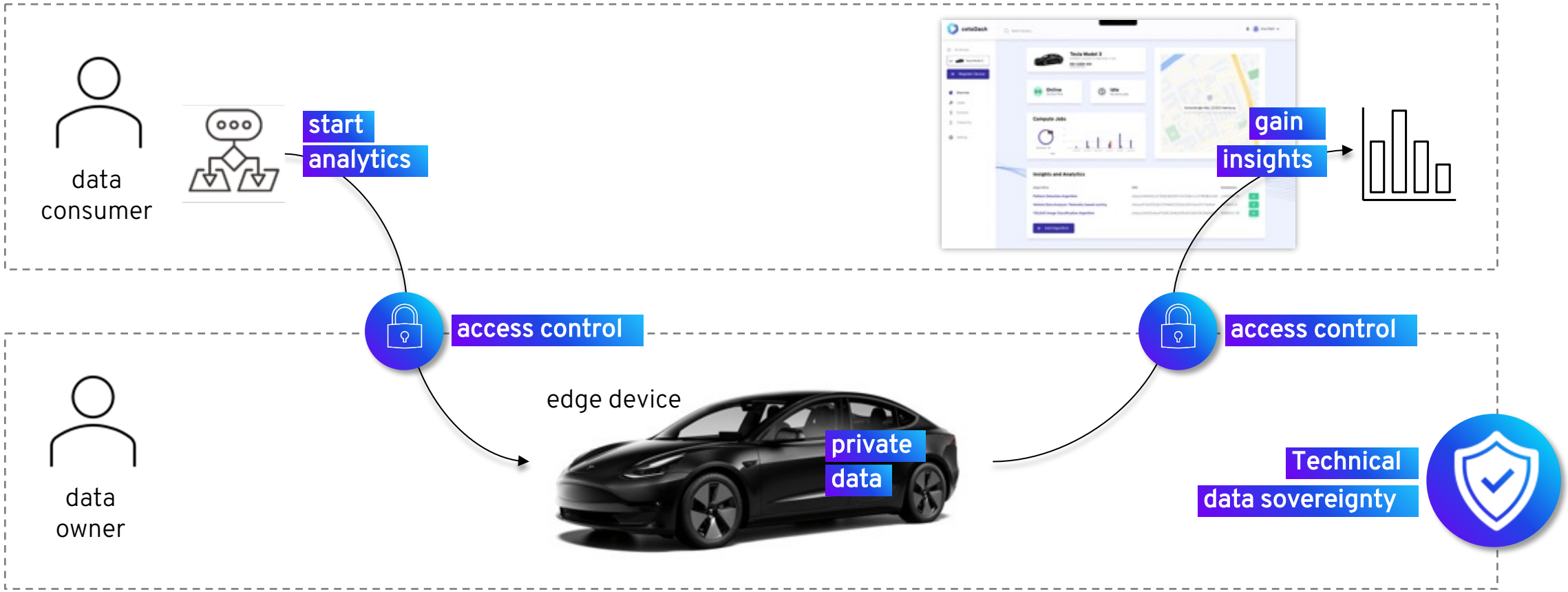
Compute-to-Data in Manufacturing: https://youtu.be/5439iMCof10

compute-to-data enables true technical data sovereignty



compute-to-edge enables technical data sovereignty for machines

Bring compute …

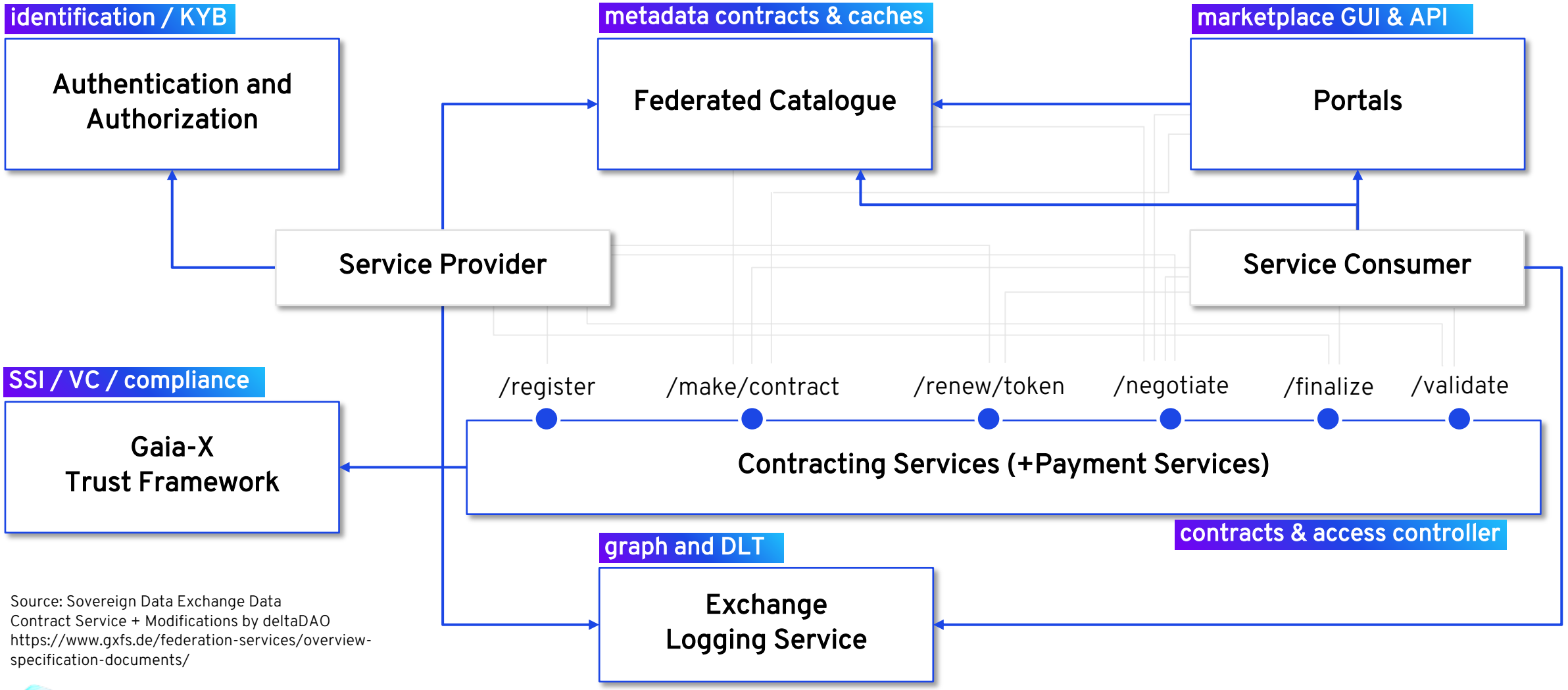


… to where data is.

Gaia-X Web3 Ecosystem Federation Services

Descriptions: https://gitlab.com/web3-ecosystem/gen-x-network/-/tree/main/static/self-descriptions

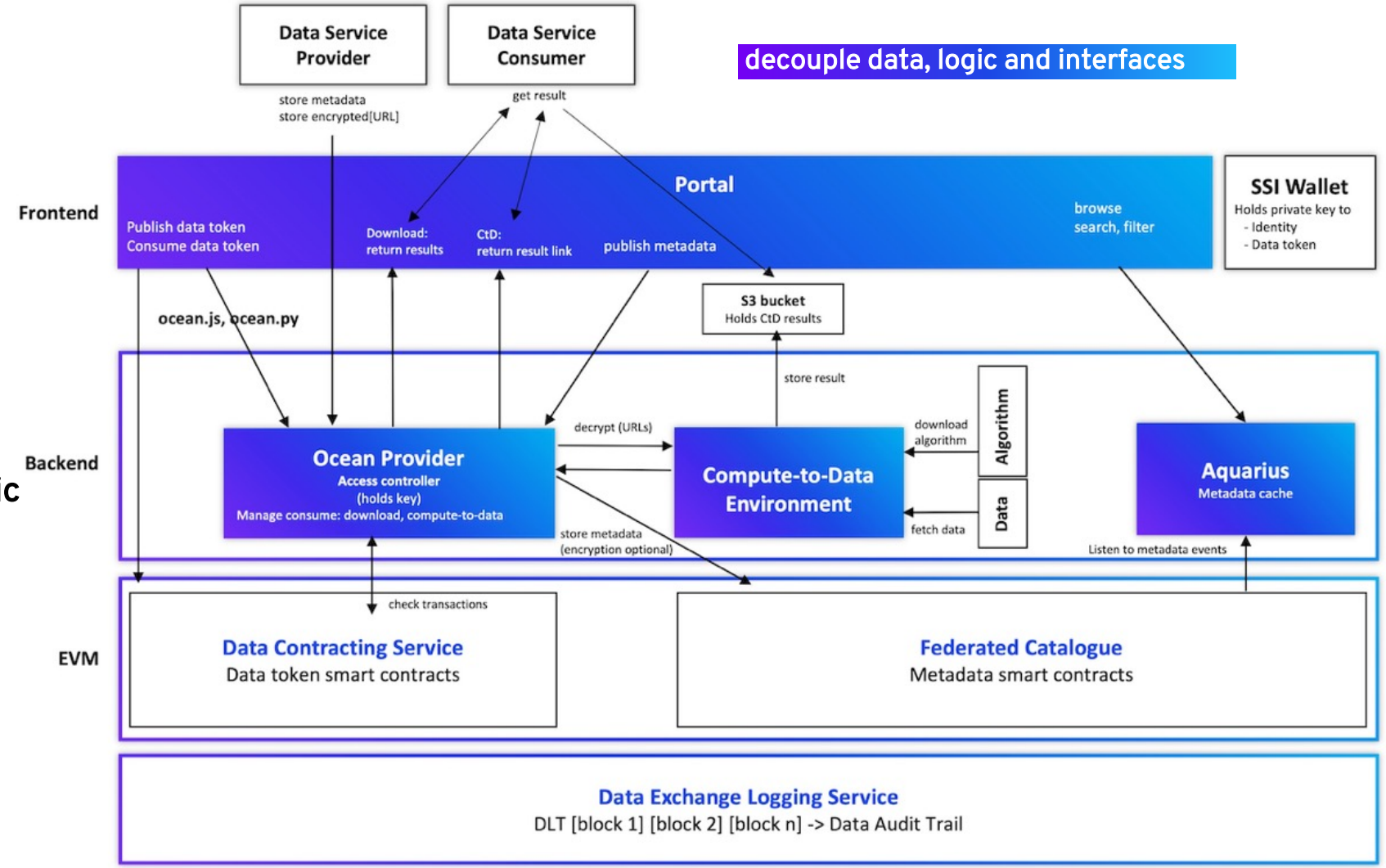
web 3.0 ecosystem & federation services architecture



Source: Sovereign Data Exchange Data Contract Service + Modifications by deltaDAO
https://www.gxfs.de/federation-services/overview-specification-documents/

modular components, based on a DLT core grid, without lock-in

edge
on-Prem
cloud-agnostic



Participants

Portal / API

K8s / local or CSP
Catalogue Cache
Access Controller
Compute-Cluster

DLT Layer
Catalogue
Contracting
Exchange Log

Don’t trust us …

… verify yourself.

learn the Trust Framework

deploy your application

deploy your portal

become a federator

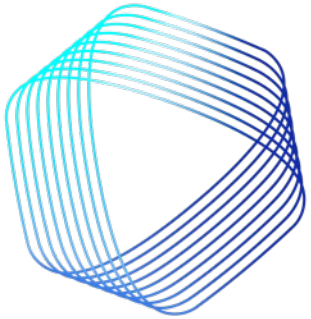
stay in control

Next? Decentralized Compliance, Gaia-X Clearing Houses, SSI, Production

single point of contact

join the Gaia-X OSS community

OSS community: https://gitlab.com/gaia-x/gaia-x-community/open-source-community



deltaDAO

data economy solutions – GDPR compliant

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Twitter	@deltadao
LinkedIn	deltadao
YouTube	deltaDAO

Presented by

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Co-Founder
deltaDAO AG
kai@delta-dao.com
+49 151 1257 9443

Data Spaces Technology Landscape 2023

#dataspaces