Building an open-source ecosystem for Dataspaces

Eclipse Dataspace Components (EDC) & Eclipse Dataspace Working Group (EDWG)

Peter Koen
Principal Cloud Standards Architect
Microsoft

Value proposition

EU Data Strategy

EU Data Act - Article 28 Interoperability of dataspaces, mandating EU harmonized standards, Article 30 specifies requirements for smart contracts for data sharing. EU Data Governance Act

EU Green Deal

Gaia-X, iShare and other Trust Anchors/Frameworks

German Supply Chain Due Dilligence Act

Manufacturing-X - ~150m Euro Funding provided by German BMWK for industrial Dataspace projects

SIMPL

Japan/OECD/G20 DFFT (Data Free Flow with Trust)

EU & Global Digital Sovereignty / Data Sovereignty movement

Global Sustainability Laws

Data provides value when it interacts - not at rest.

Companies are afraid someone else will take advantage of their data and they will miss out on value generation. They lock their data away.

Enterprises want a say what happens to data after it has been shared.

Dataspaces create trust and will enable a new era of data sharing and value generation.
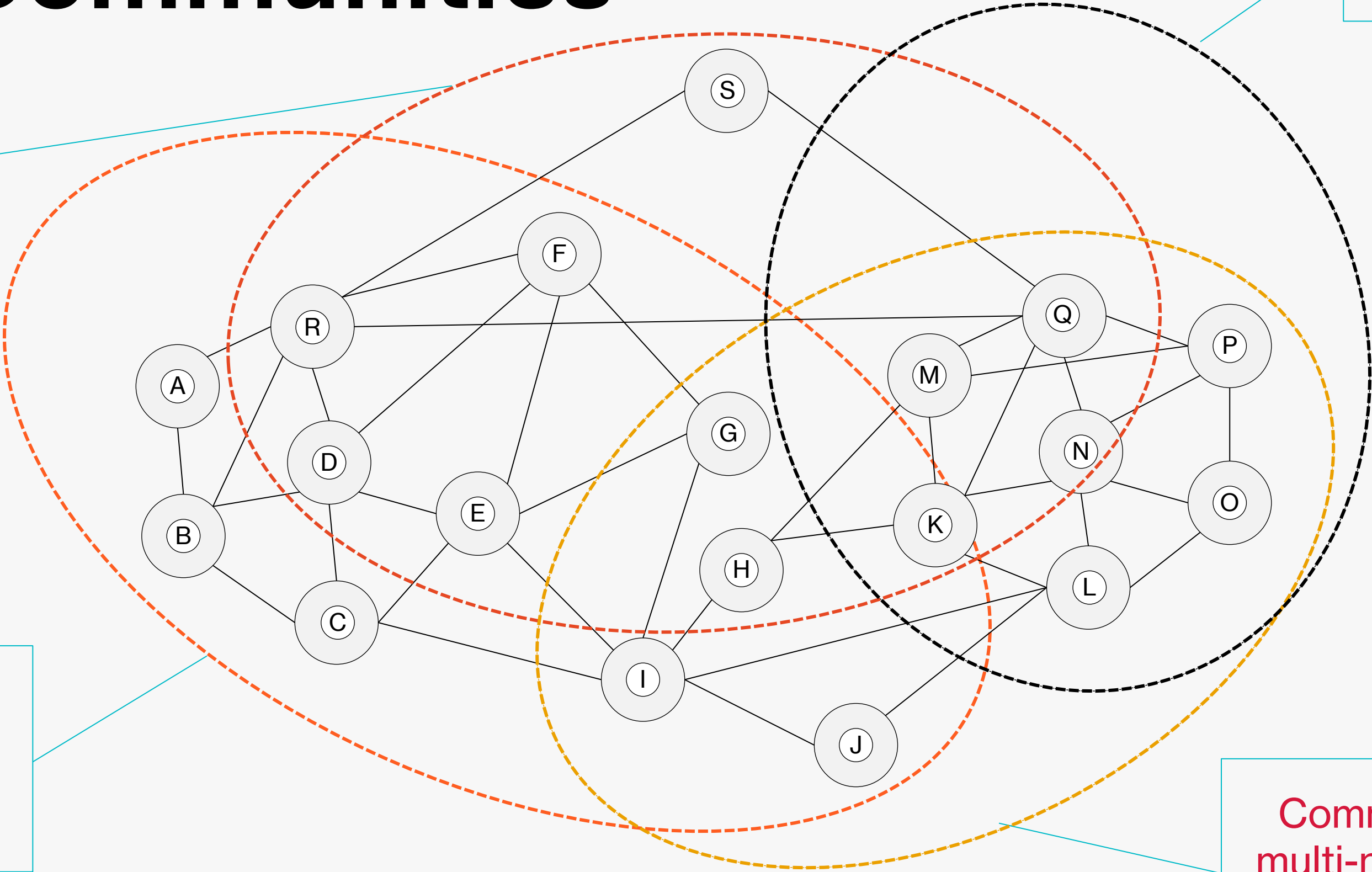
Dataspaces provide data governance over external data such that organizations can appropriately account for data acquisition and data use.

Dataspaces enable monetization strategies for data.

Data Communities

Jurisdictional Community

Private Community

Industry Group

Community around a multi-national company and its supply chain

Dataspace Characteristics

No central infrastructure required, **Dataspace Authority** provides rules of engagements and semantic models

Metadata is shared while **data remains stored at source**

Policies control access to Metadata

Connections in a dataspace are always **peer-to-peer**

Participants in a dataspace negotiate **Data Contracts** which contain **Access Policies, Contract Policies & Usage Policies**

Data Transfer is always **peer-to-peer**

Dataspaces are **infrastructure agnostic** and can exist on different infrastructure (On Premises, Edge, Hyperscale Cloud, Multi-Cloud)

Participants can act in **multiple roles** (Data Owner, Data Holder, Data Processor, Data Recipient, Algorithm Provider, Auditor, Marketplace,...)

Value-added services are participants that enrich Dataspaces (Marketplace, Auditors, Data Escrow, Algorithm Providers, Reference Datasets,...)

# Dataspaces maximize autonomy (sovereignty) of each participant

1. Participants of a dataspace must have **control** over which data they share with whom under what **policies**

2. Autonomy starts by controlling **identity**, if you are not in control of your identity you can't act fully autonomous

3. Participants need to decide who they **trust** on a case-by-case basis

4. Participation in a dataspace must be based on **rules**

5. Dataspace **policies** simplify the creation of trust

6. Transitive trust can be based on common **trust anchors**

7. No central system can make arbitrary **decisions** on individual participation

8. Decentralized systems are **resilient** and provide higher **availability**

9. No system holds the keys to the entire dataspace - improved **security**

10. **Interoperability** of heterogeneous environments

Model
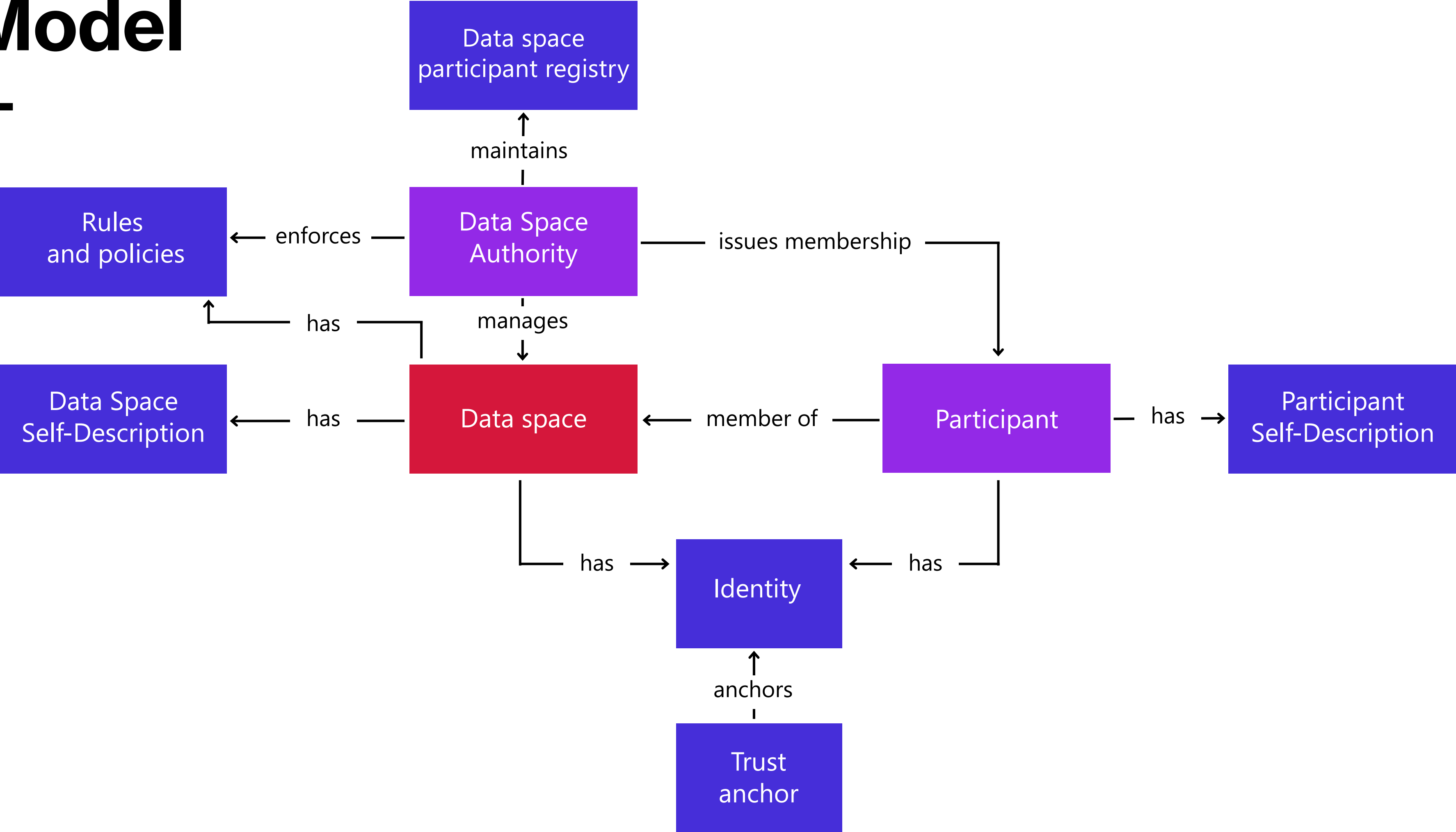
Operations of Data Spaces

- A centralized authority manages a Data Space as a an Operating Company

- In a decentralized network, the authority is created by the agreements of the members to the rules in a data space, no operator is required

- A federation of data spaces acknowledges the rules of other data spaces and manages (a subset of) common rules

Centralized
data space authority

Decentralized
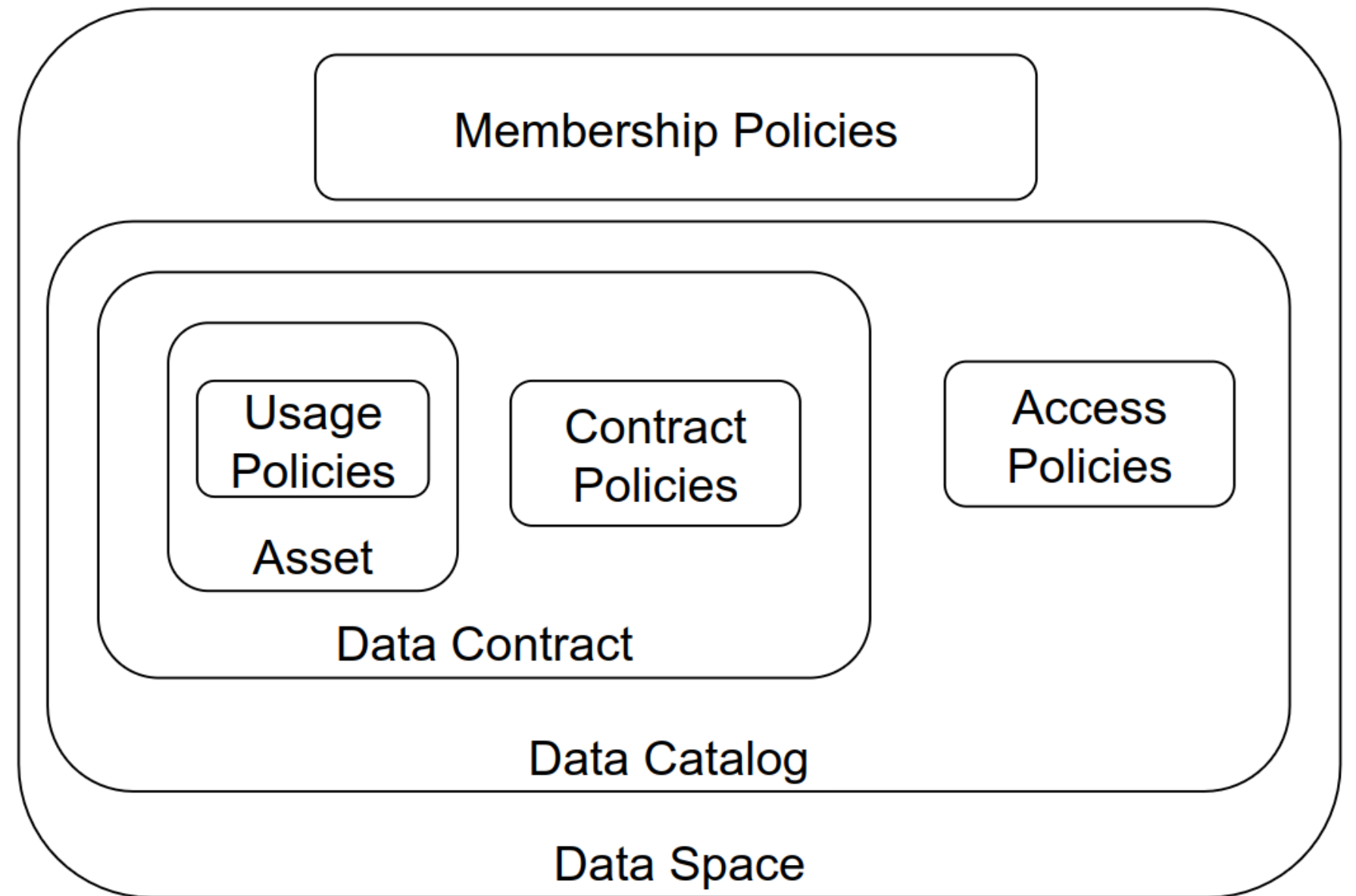data space authority

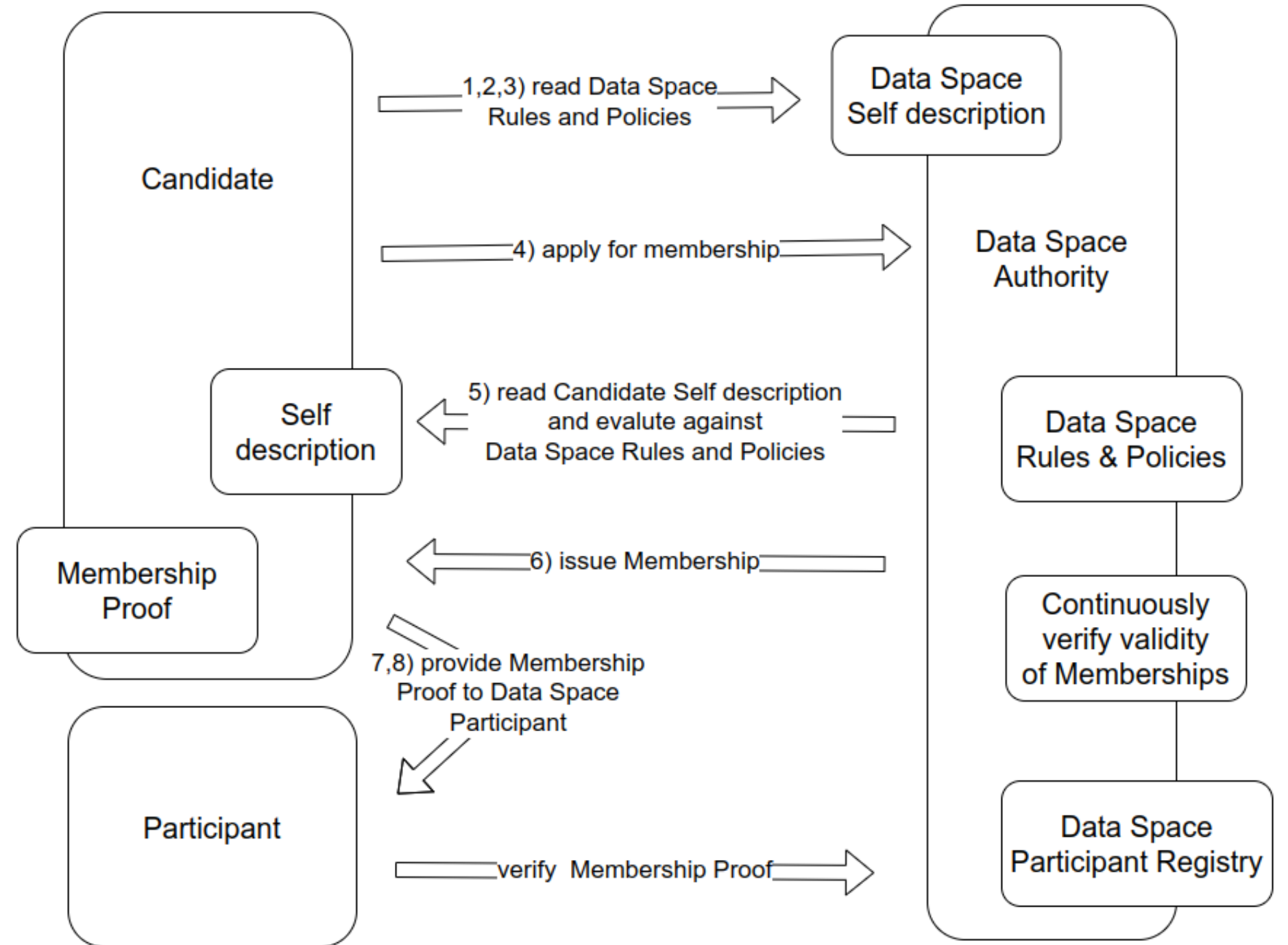Federated/distributed
data space authority
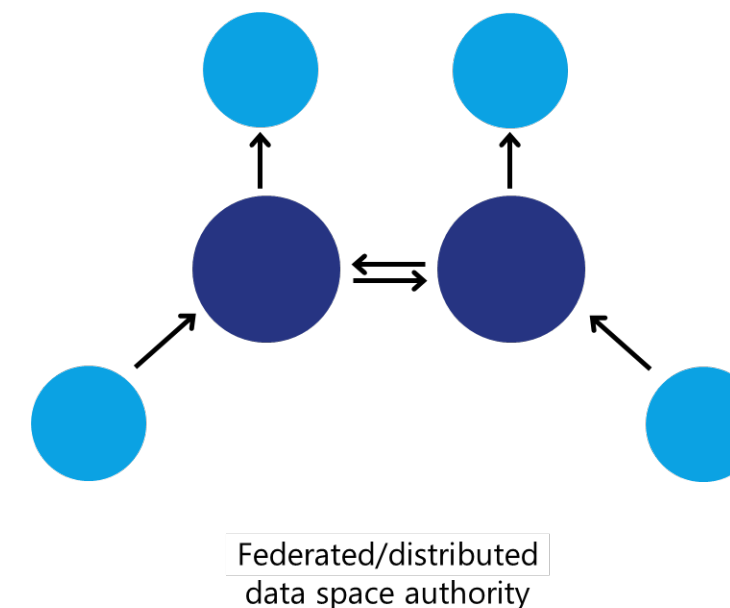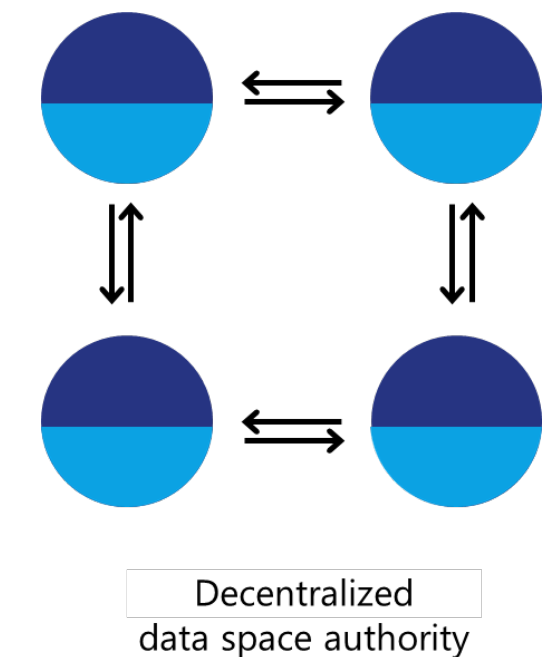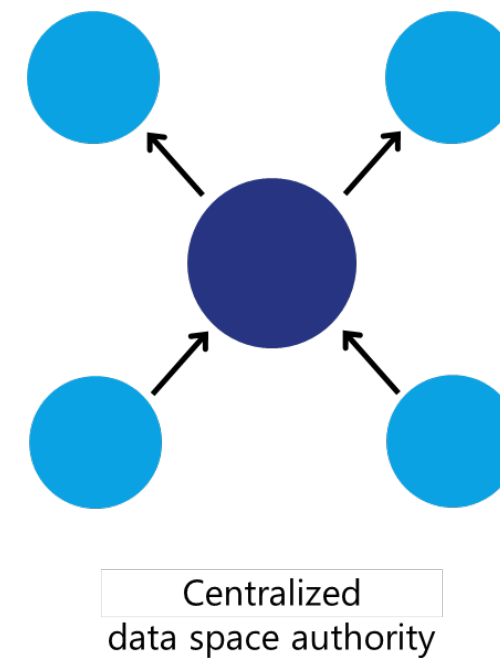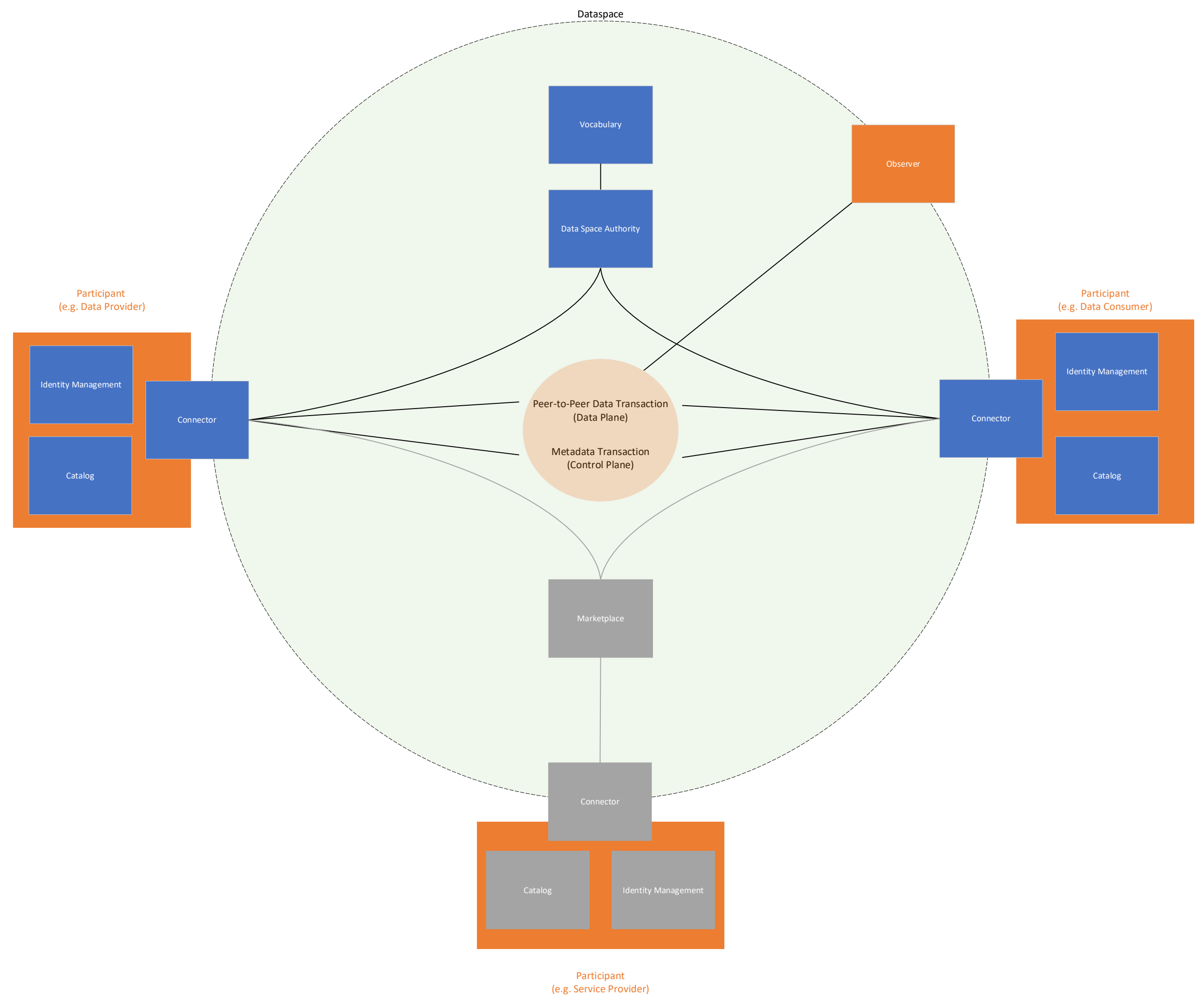
MODEL (2)
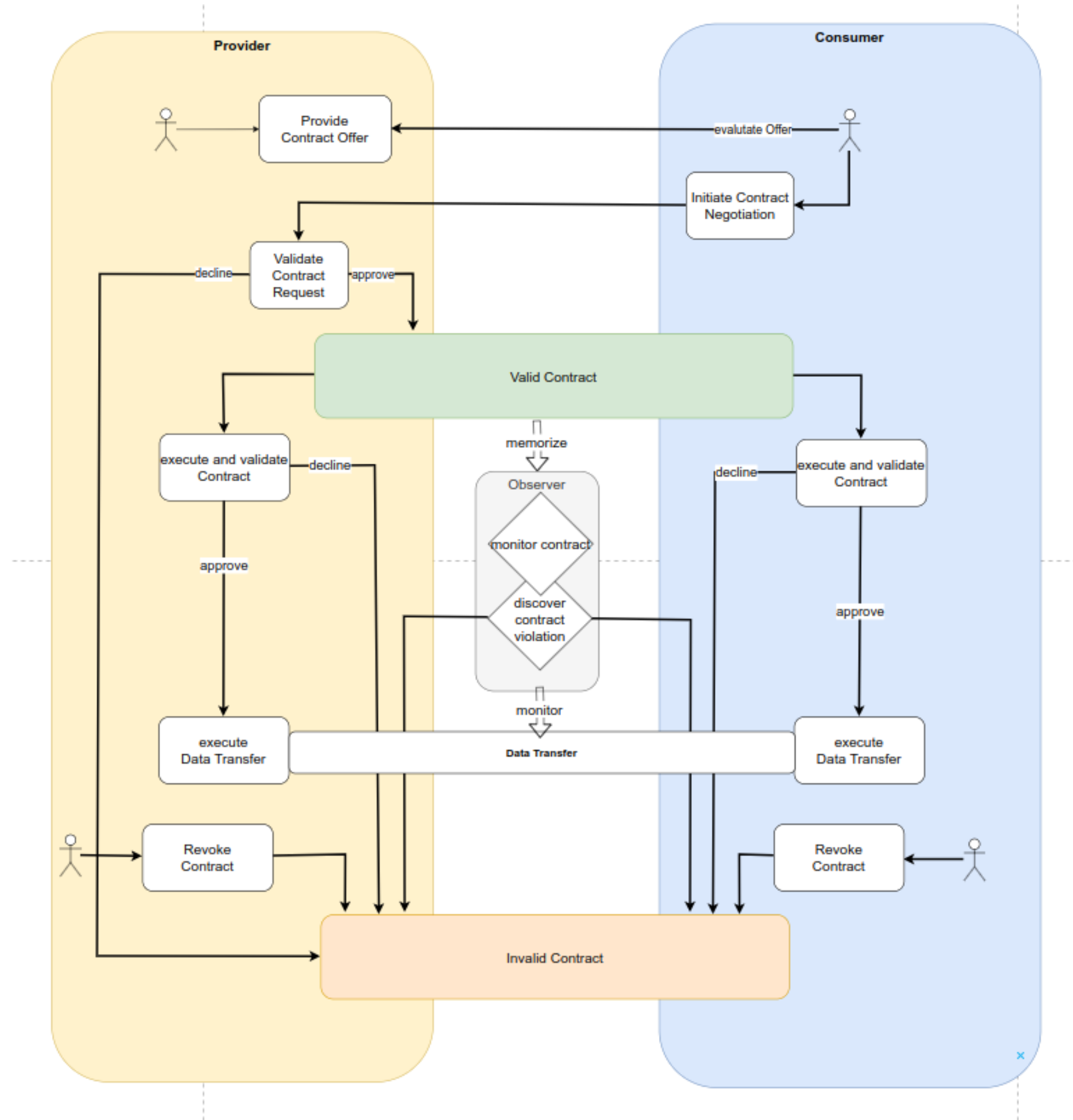
POLICIES

JOINING A DATASPACE

DATA CONTRACTS

SEMANTIC MODELS
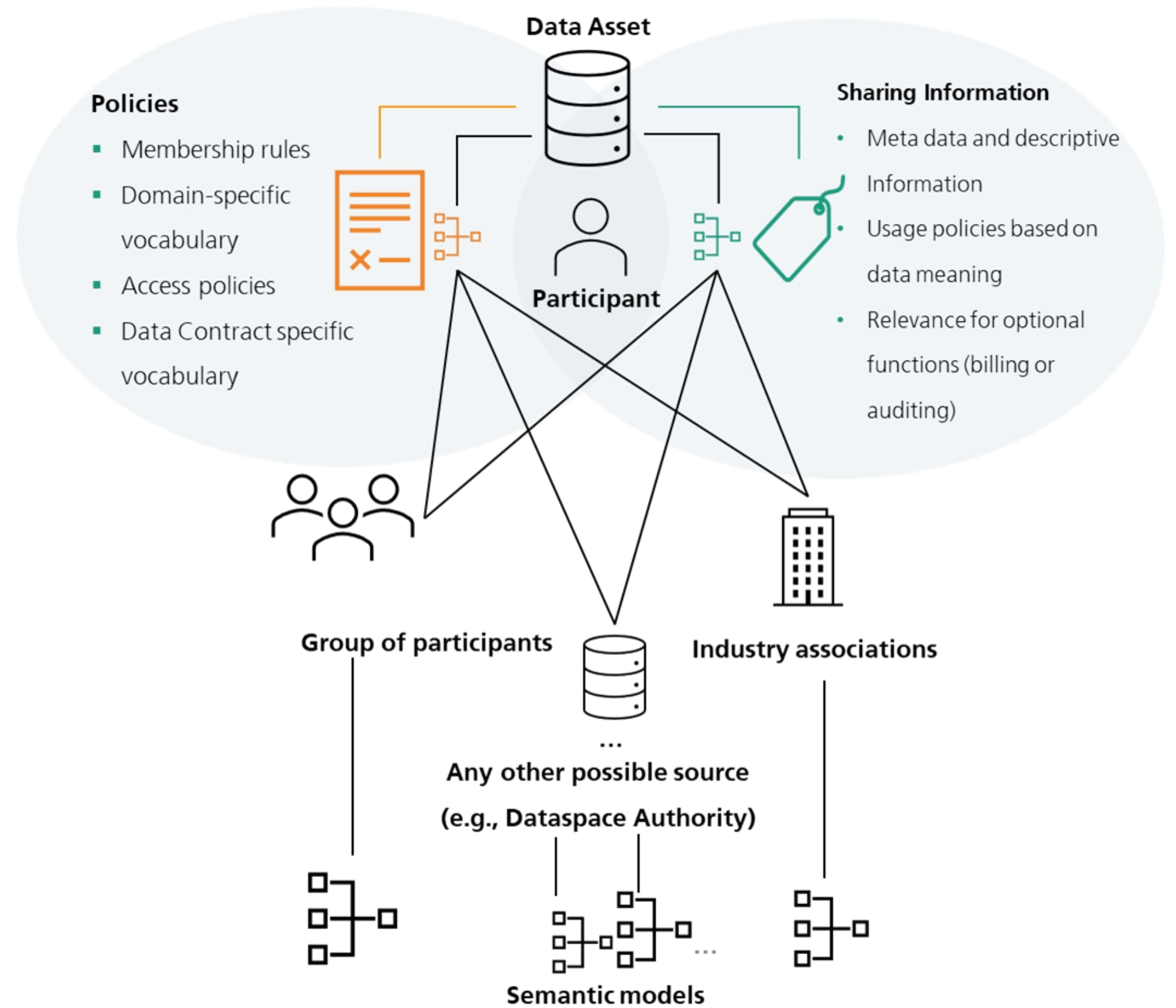
Interoperability Models

Intra-Dataspace
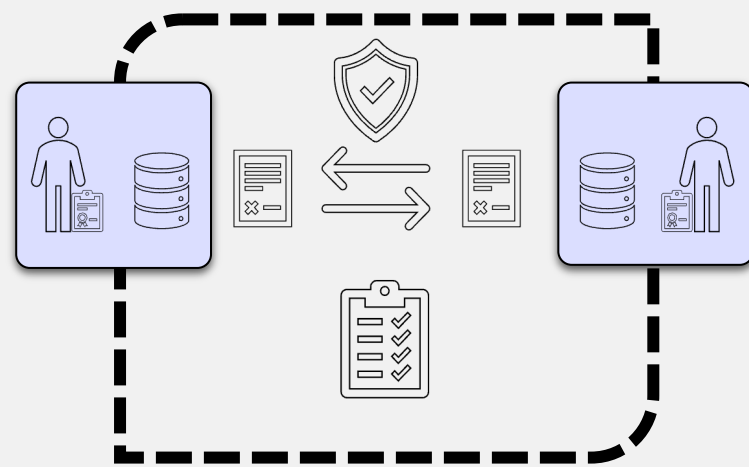
Inter-Dataspace
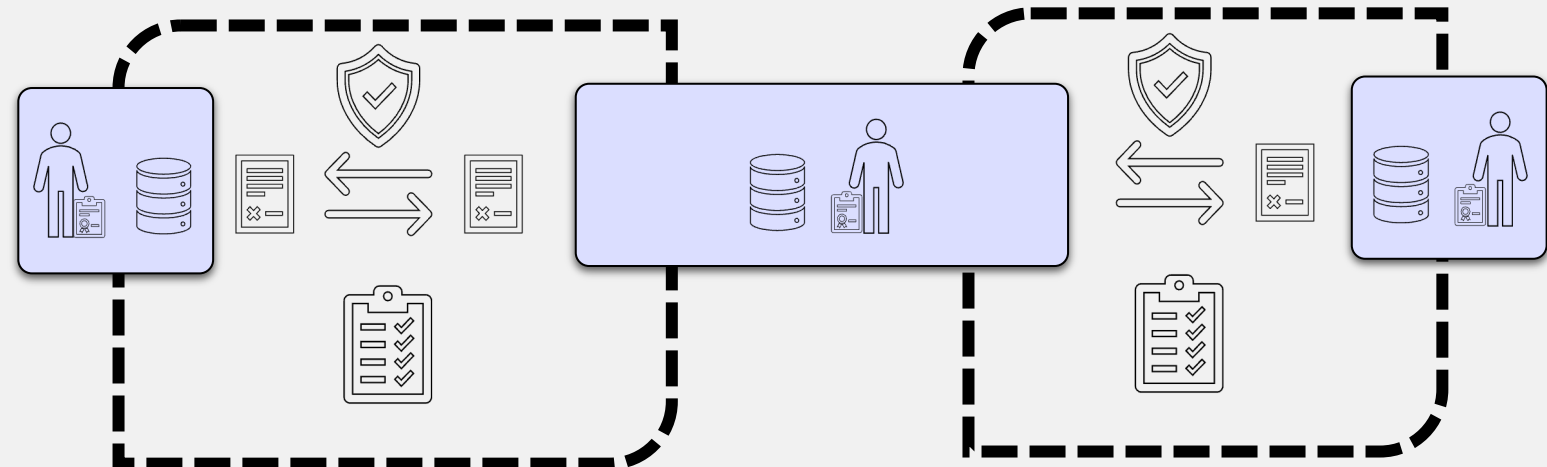
Interoperability Standards
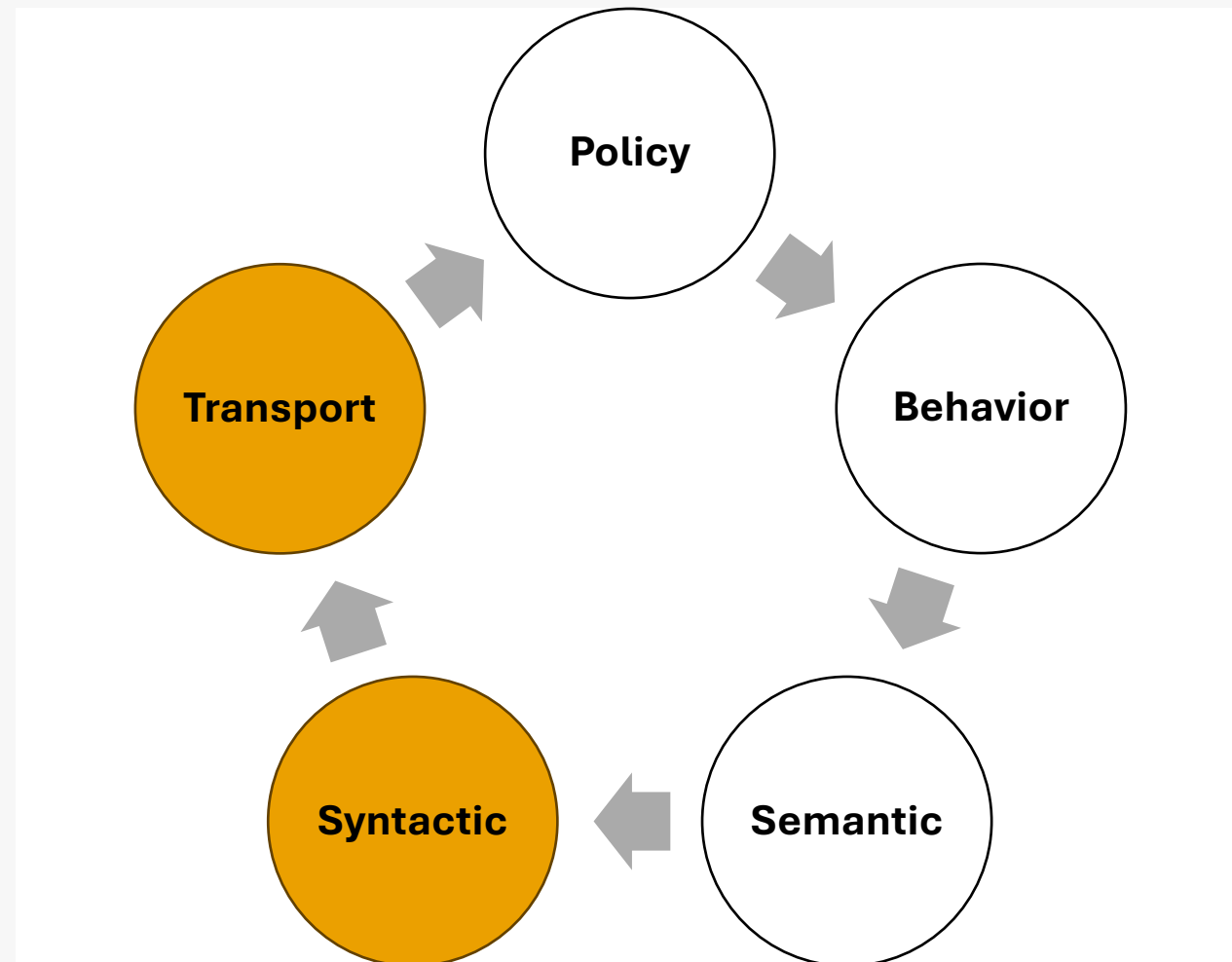
ISO 19941 – Cloud Computing Interoperability and Portability

-referenced in EU Data Act

European Interoperability Framework

-creating a digital single market

-improving interoperability

-boasting internet trust and security

-encouraging investment in R&D

Legal

Organizational

Semantic

Technical

https://www.iso.org/obp/ui/#iso:std:iso-iec:19941:ed-1:v1:en

https://standards.iso.org/ittf/PubliclyAvailableStandards/c066639_ISO_IEC_19941_2017.zip

https://joinup.ec.europa.eu/interoperable-europe
https://ec.europa.eu/isa2/sites/default/files/eif_brochure_final.pdf

15
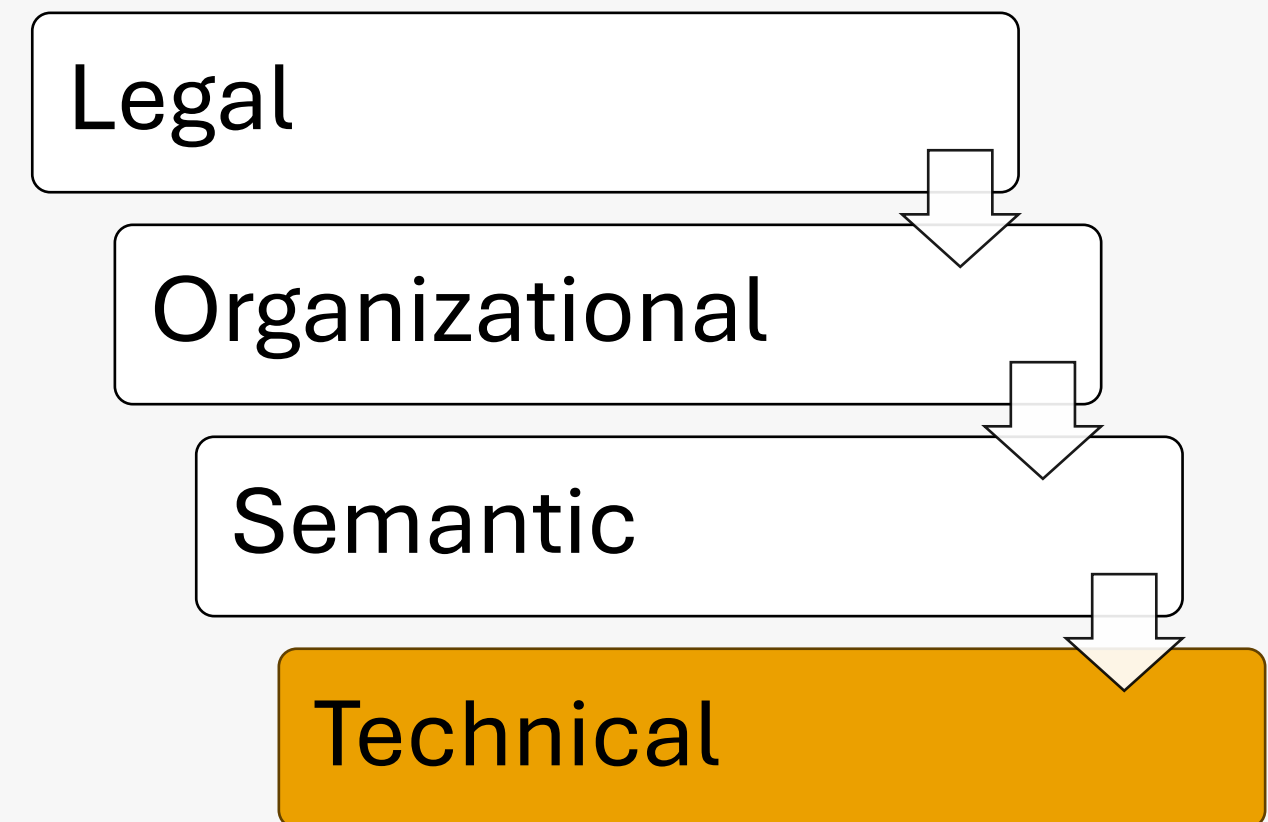
Interoperability Layers in Dataspaces

LEGAL

Are contractual statements legally equivalent?

IDSA Legal Task Force, Trust Frameworks, Trust Anchors

ORGANIZATIONAL

Are business procedures compatible?

IDSA Rulebook, Dataspace Organizations

SEMANTIC

Do policies and attributes express the same meaning?

Dataspace Authority Policies, Semantic Models

TECHNICAL

Can different connectors communicate with each other?

Dataspace Protocol

Eclipse Dataspace Components as a reference framework

Dataspace Standardization

Conceptual Standards

ISO/IEC JTC 1 / SC38 – *ISO/IEC PWI 20151Dataspaces*

CEN/CENELEC Workshop on Trusted Data Exchange

Technical Standards

Dataspace Protocol Specification

Trust Protocol Specification

Semantic Models for Trust

Reference Implementation

Ecosystem of OSS projects to build and participate in Dataspaces

Eclipse Dataspace Working Group as a center of gravity for dataspace projects

BIG PICTURE

BIG PICTURE

DATASPACES

Catena-X
Eona-X
Mobility Data Space
Greendata Hub Austria
Health-X
Data Loft
SCSN
Factory-X
AG Datahub
Omega-X
...

⟷ Governments

⟷ EU DSSC | International Dataspace Organizations

⟷ Gaia-X | IDSA | iShare

⟷ Eclipse Dataspace Working Group (EDWG)

International Standards Organizations
(ISO, IEC, CEN/CENELEC, ETSI, W3C, IEEE, IETF, OASIS,...)

BIG PICTURE

DATASPACES

Catena-X
Eona-X
Mobility Data Space
Greendata Hub Austria
Health-X
Data Loft
SCSN
Factory-X
AG Datahub
Omega-X
...

Governments

EU DSSC

International Dataspace Organizations

Gaia-X   IDSA   iShare

Eclipse Dataspace Working Group (EDWG)

International Standards Organizations
(ISO, IEC, CEN/CENELEC, ETSI, W3C, IEEE, IETF, OASIS,...)

European Commission
Governments
Ministries
Public Sector
Regulators
Non-Profit/NGOs

Consultancies
Certification Body
Auditors

Cloud Providers
Software Vendors
Solution Integrators
Dataspace Service Provider
Data Service Provider

BIG PICTURE

DATASPACES

Catena-X
Eona-X
Mobility Data Space
Greendata Hub Austria
Health-X
Data Loft
SCSN
Factory-X
AG Datahub
Omega-X
...

Governments

EU DSSC | International Dataspace Organizations

Gaia-X | IDSA | iShare

Eclipse Dataspace Working Group (EDWG)

European Commission
Governments
Ministries
Public Sector
Regulators
Non-Profit/NGOs

Consultancies
Certification Body
Auditors

Cloud Providers
Software Vendors
Solution Integrators
Dataspace Service Provider
Data Service Provider

ECLIPSE OSS PROJECTS

Dataspace Protocol (DSP) Specification | DSP TCK

Eclipse Dataspace Components (EDC)

Eclipse Dataspace Authority Tools

Dataspace Trust Protocol (DTP) Specification | DTP TCK

Eclipse Dataspace Trust Components (EDTC)

Eclipse Confidential Data Plane | Eclipse Event Data Plane

and many more to come

International Standards Organizations
(ISO, IEC, CEN/CENELEC, ETSI, W3C, IEEE, IETF, OASIS,...)
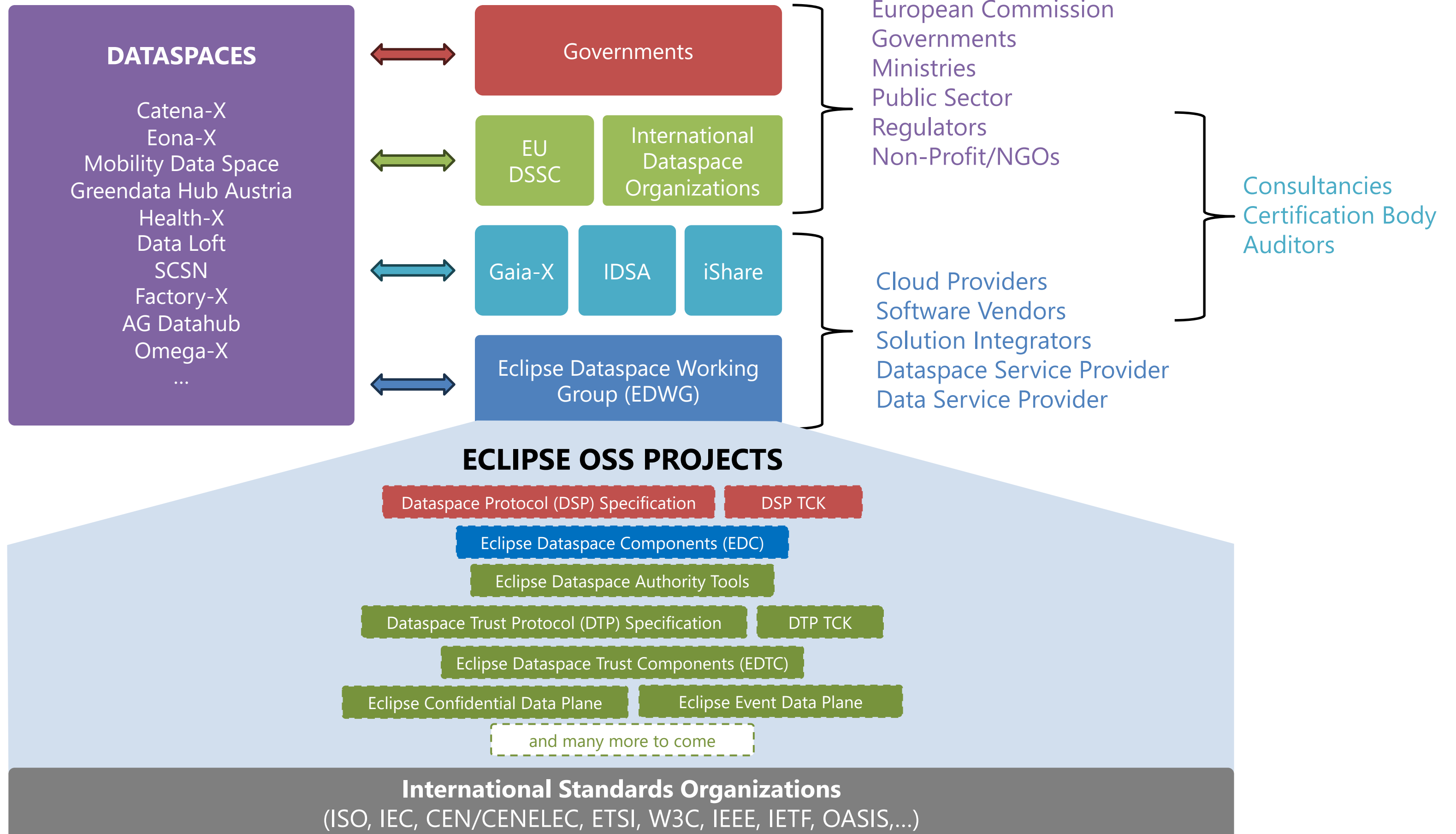
Eclipse Dataspace Components

- A **reference implementation** for the **Dataspace Protocol**

- Implements the **GAIA-X Trust Framework**

- Community driven Open Source project under **Eclipse Foundation** on **GitHub**

- Free of intellectual property rights under **Apache 2.0** license

- Used by many **Dataspace** projects

- Modular / Extendable Based on **Java** SPI

- https://projects.eclipse.org/projects/technology.edc

- https://github.com/eclipse-edc

Components

DataSpaceConnector

- Control Plane
- Data Plane

FederatedCatalog

Identity Hub

RegistrationService

DataDashboard

MinimumViableDataspace

Architecture

Separation of Control and Data Plane

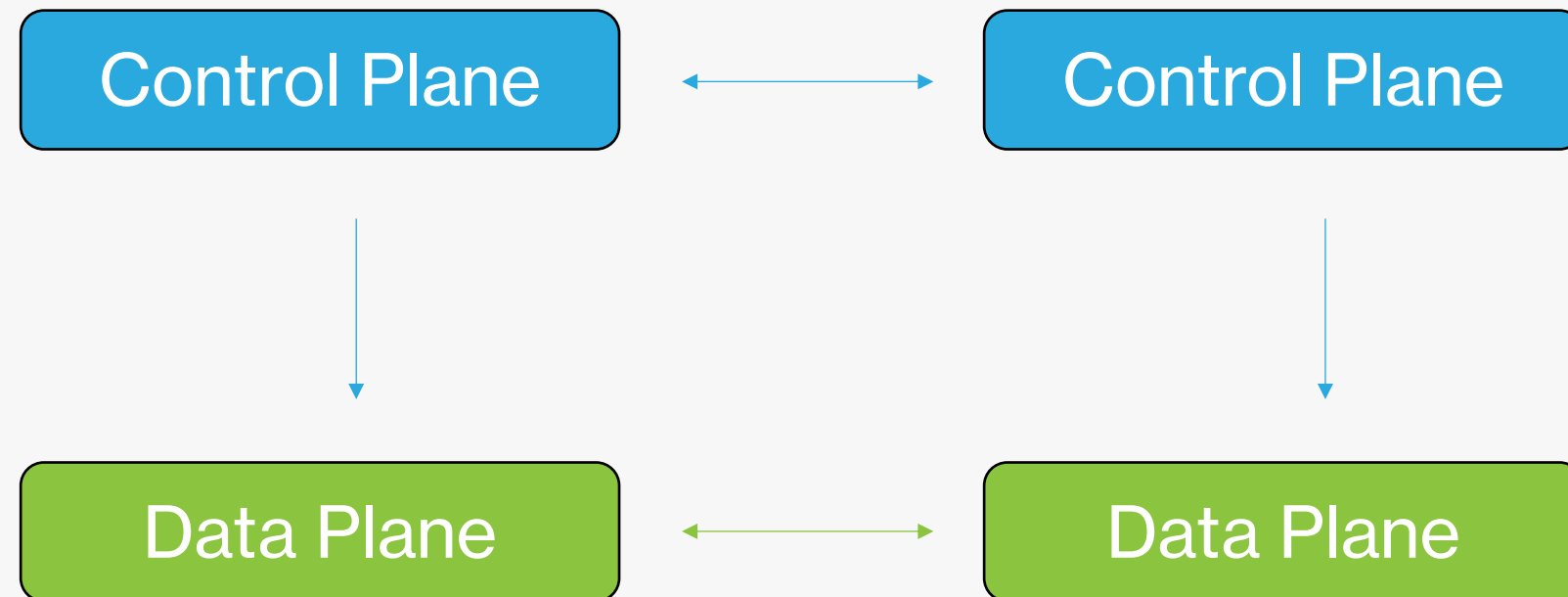Extensible through Java SPI

Acts as an orchestrator for data transfer

Asynchronous processing for maximum scalability

Decentralized Identity Management with customizable Trust Anchors

Control and Data Plane

Control Plane	←→	Control Plane

- Verification
- Contract negotiation
- Oversee policy enforcement
- Manages provisioning

Data Plane	←→	Data Plane

- Moves bits
- Big Data
- Streaming
- Events

How to participate

As a company – join IDSA
- https://internationaldataspaces.org/make/working-groups-and-task-forces/

As a company – join the Eclipse Dataspaces Working Group
- https://www.eclipse.org/org/workinggroups/dataspace-charter.php

As a developer – join the open-source projects!
- https://github.com/eclipse-edc
- https://github.com/eclipse-dataspacetck

As an architect – join the IDSA Architecture Working Group
- https://github.com/International-Data-Spaces-Association

As a business strategist or legal expert – join the IDSA Rulebook Working Group
- https://github.com/International-Data-Spaces-Association/IDSA-Rulebook

As a Dataspace Enthusiast
- Project Manager, Technical Writer, Marketing Manager, Copy Editors,..
- **Join the working groups and be active – we appreciate any help we can get!**