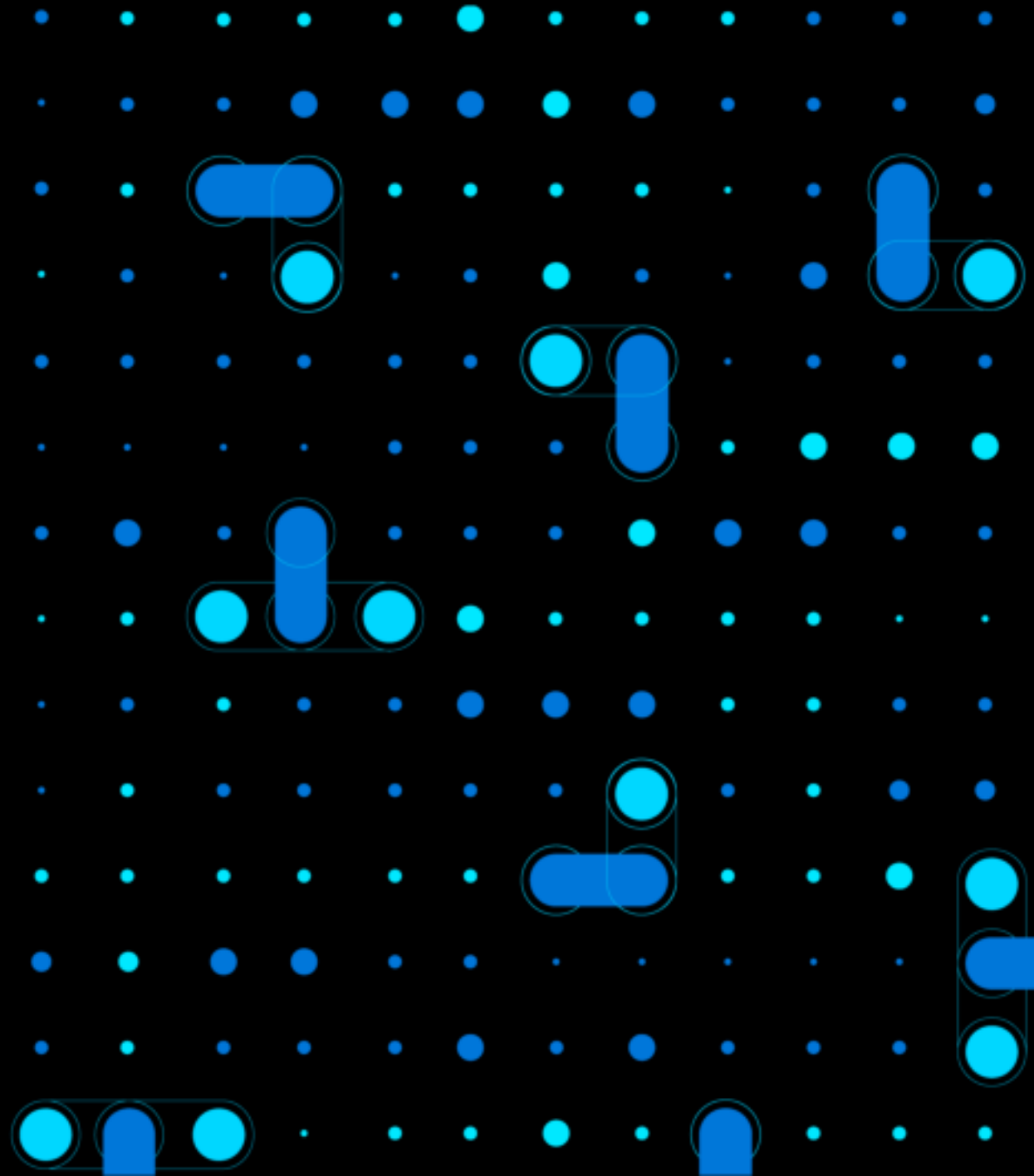


September 2022

Was verwende ich für meinen Data Space?

Matthias Buchhorn-Roth
Architect Dataspaces

Microsoft

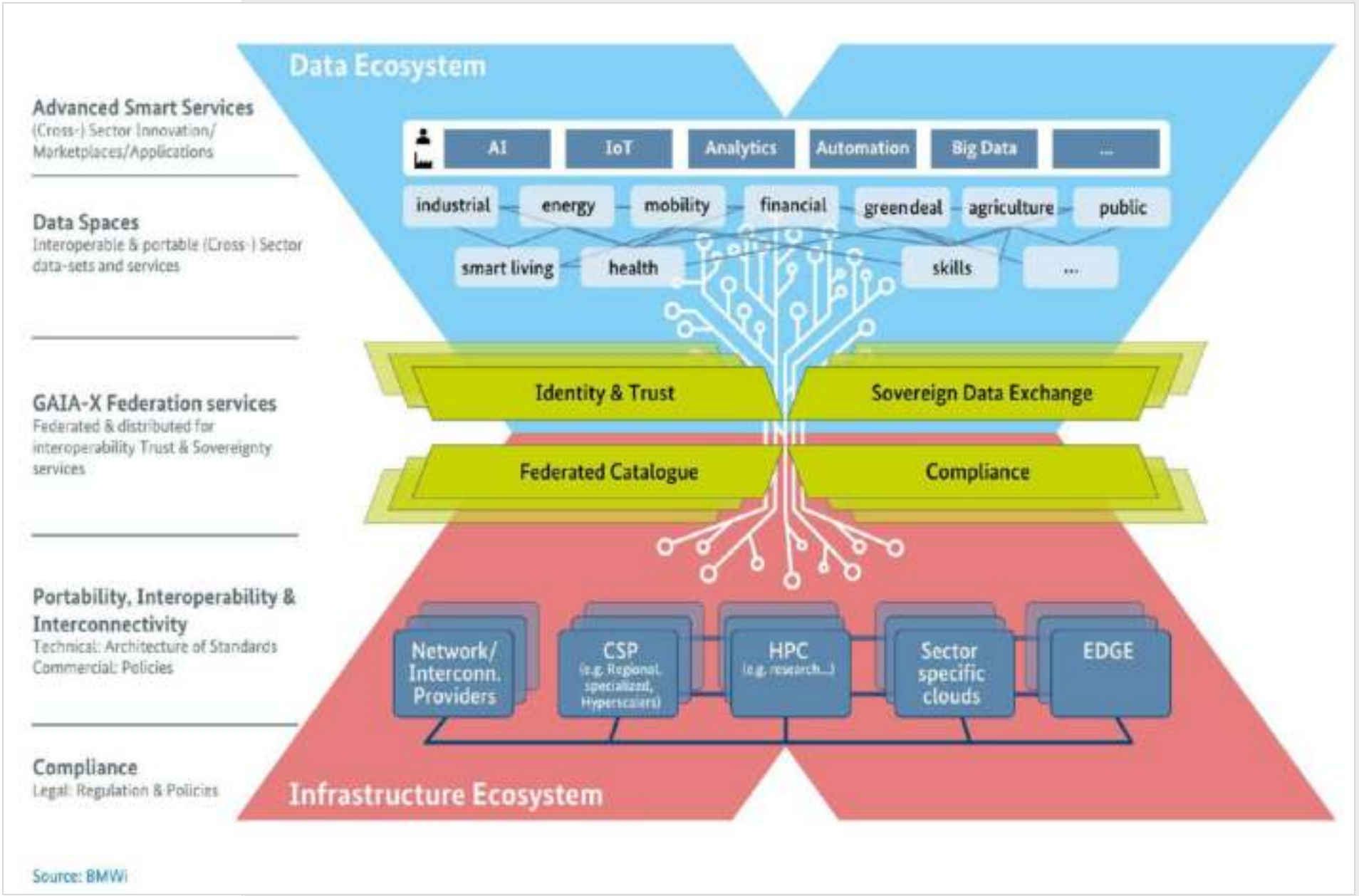
Our vision

“Enable all customers to share data with a sovereign and decentralized approach. In various ecosystems independed of technical infrastructures”

Using established standards like W3C, CNCF, DCAT, ODRL, IDSA, GAIA-X

gaia-x

Gaia-x Architectural Design



https://projects.eclipse.org/projects/technology.dataspaceconnector

https://github.com/eclipse-dataspaceconnector/DataSpaceConnector

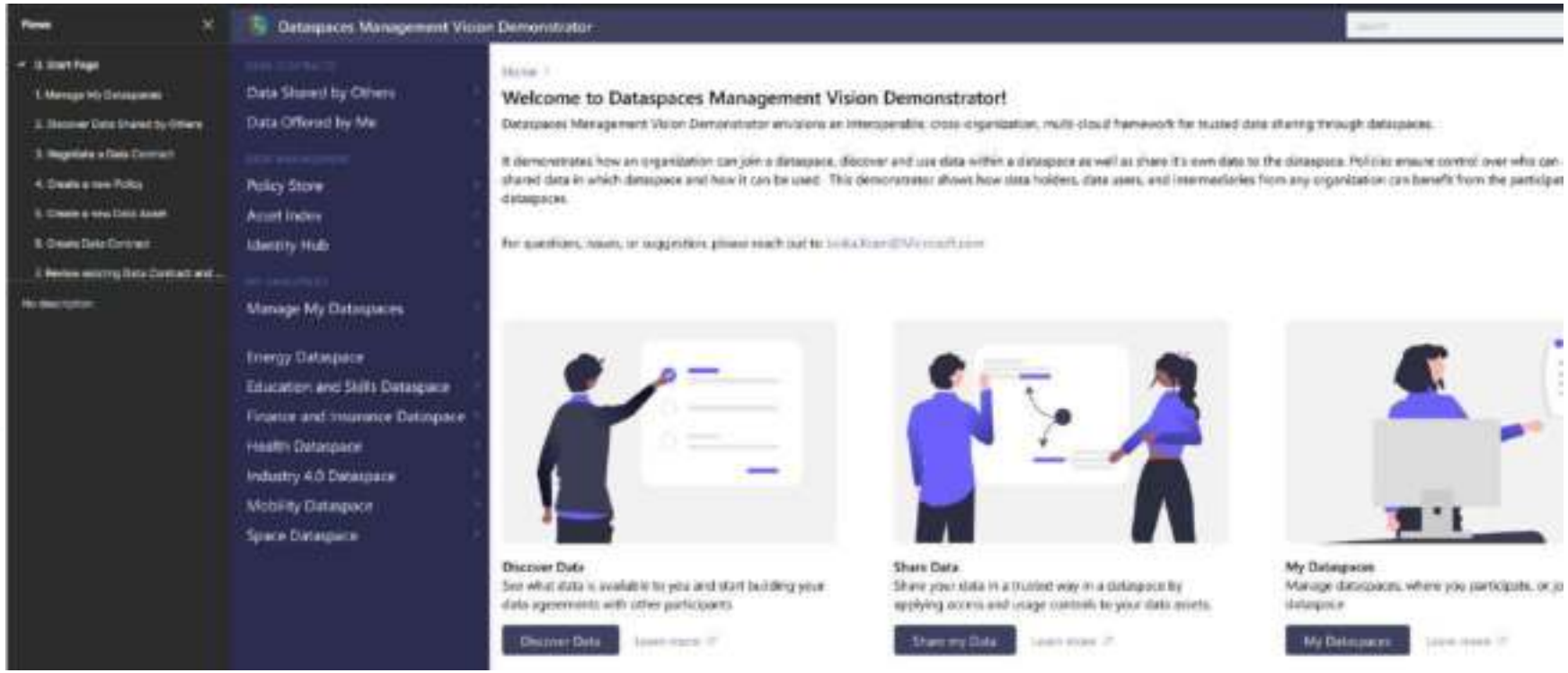
Eclipse Dataspace Connector framework (EDC)

A reference architecture for gaia-x compliant federation services

- Reference Implementation of IDSA RAM 4.0
- Open Source under Apache 2.0 on GitHub
- Free of intellectual property rights
- Used in GAIA-X projects Catena-X, SafeFBDC
- Modular / Extendable Architecture
- Based on Java 11+

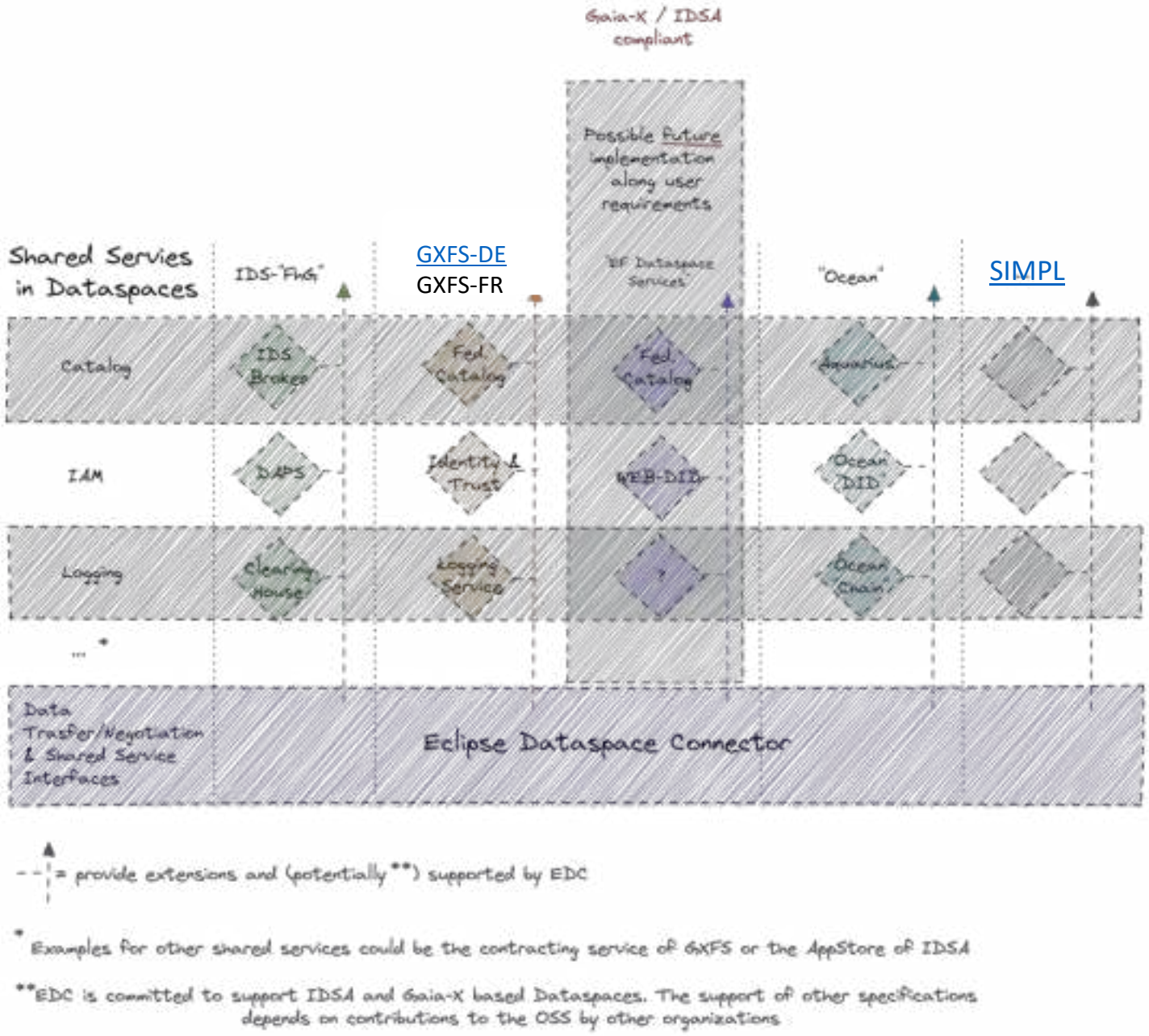
Everything starts with a vison

http://aka.ms/edc-vision



Ecosystem Integration

- EDC has a flexible, modular system
- Modules can be exchanged
- Custom modules can be created
- Existing modules can be extended
- Can be fully decentralized or partially centralized



Alignment with International Data Spaces Association

http://internationaldataspaces.org/

Already supporting IDS-based massages and policy definitions

Support development of IDSA Reference Architecture Model 4.0

Part of IDS Open Source Landscape

Participating in IDSA committees and working groups

Architecture WG

Rule Book WG

Alignment with Gaia-X

Fulfillment of the mandatory and further criteria

- Support for Gaia-X Trust Framework
- Support Gaia-X compliant Self-Description
- Gaia-X Registry Extension and support for VC
- Currently planning for alignment with Gaia-X Federation Services v2, pending finalization of specification

Possible Integration with GXFS-DE implementation project

- Evaluated existing specifications
- Waiting for tangible code to evaluate integration

Alignment with lighthouse projects to meet their requirements for building economically viable dataspaces and using Gaia-X

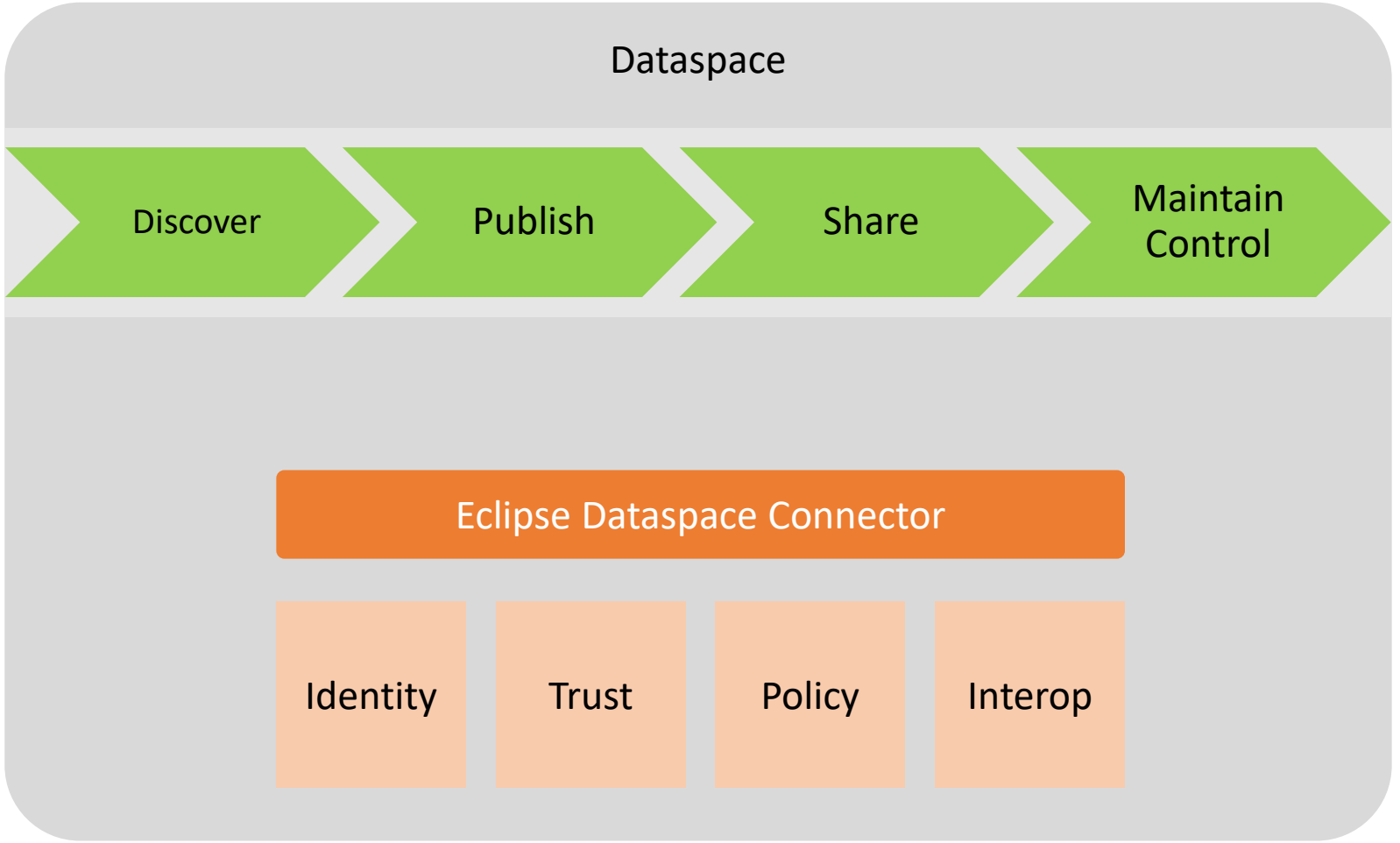
The characteristics of a gaia-x federated dataspace

Main Functionalities of a gaia-x Dataspace

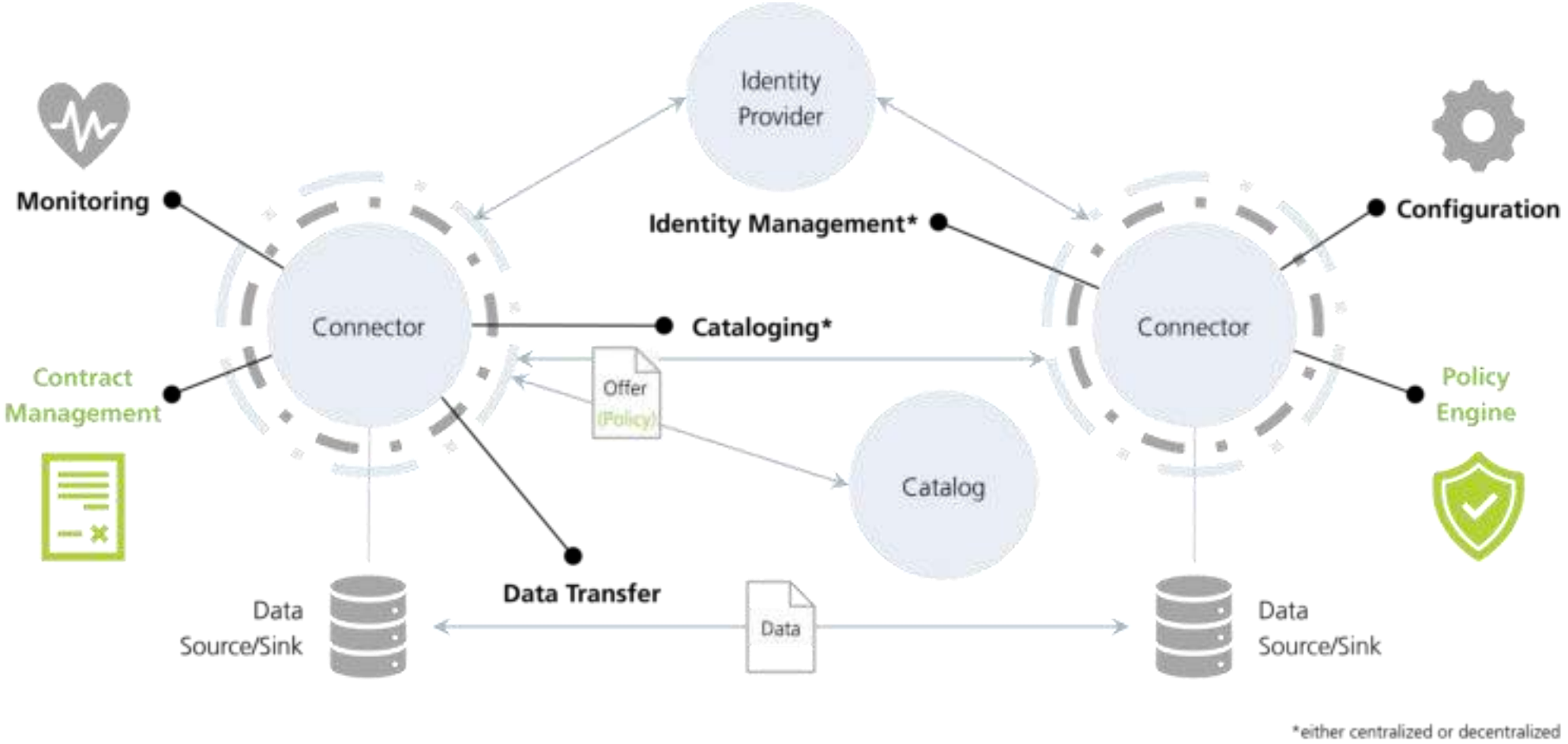
- *Catalogue (Discoverability)*
- *Sovereign Data Exchange*
- *Identity & Trust*
- *Compliance*

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?



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

EDC Data Space Components

RegistrationService
Central Dataspace Authority

DataSpaceConnector (Core)
Contract negotiation, data transfer, authentication protocols, monitor

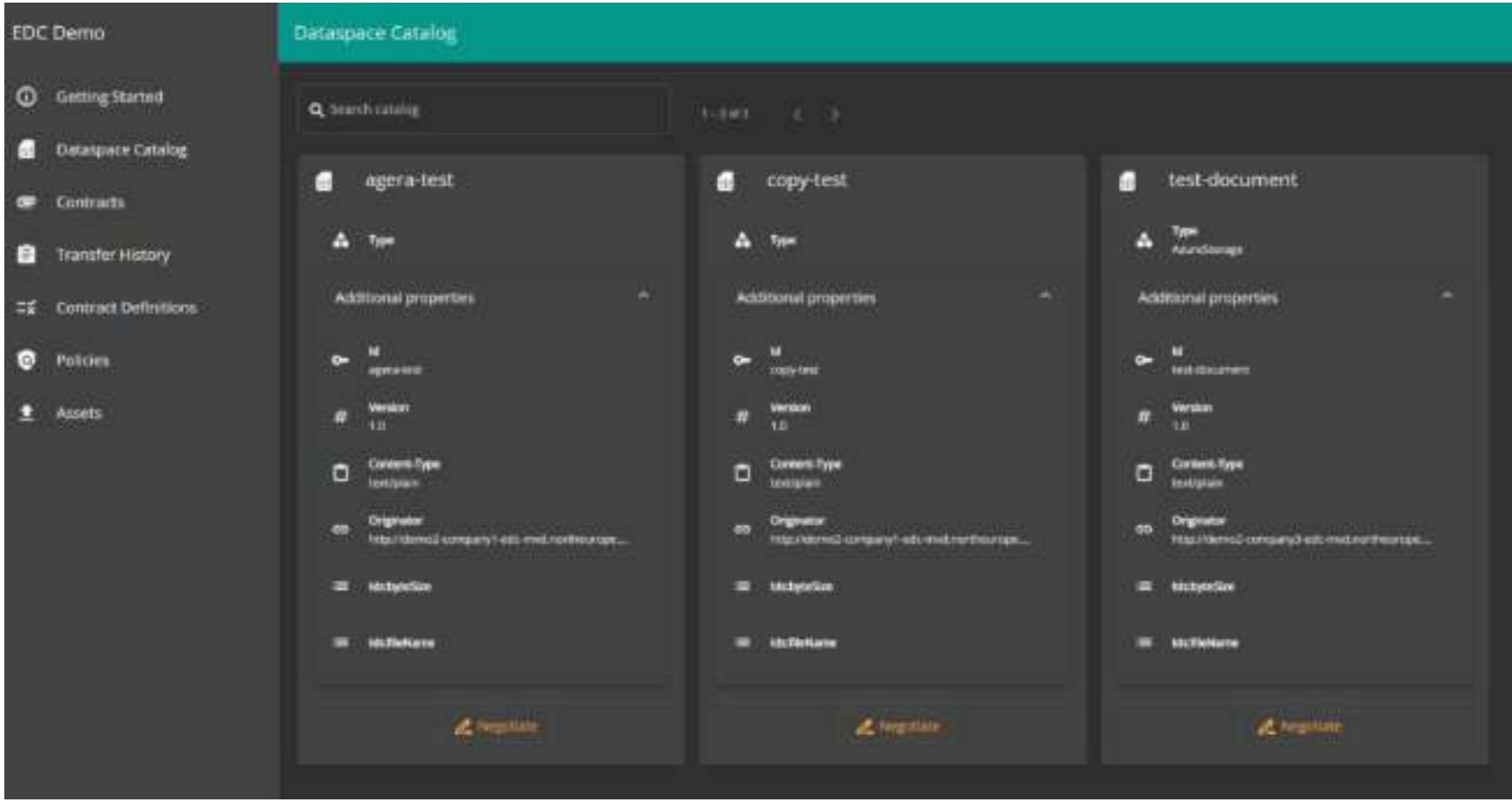
DataDashboard
User Interface for each participent

FederatedCatalog
prototype implementation of a Federated catalog

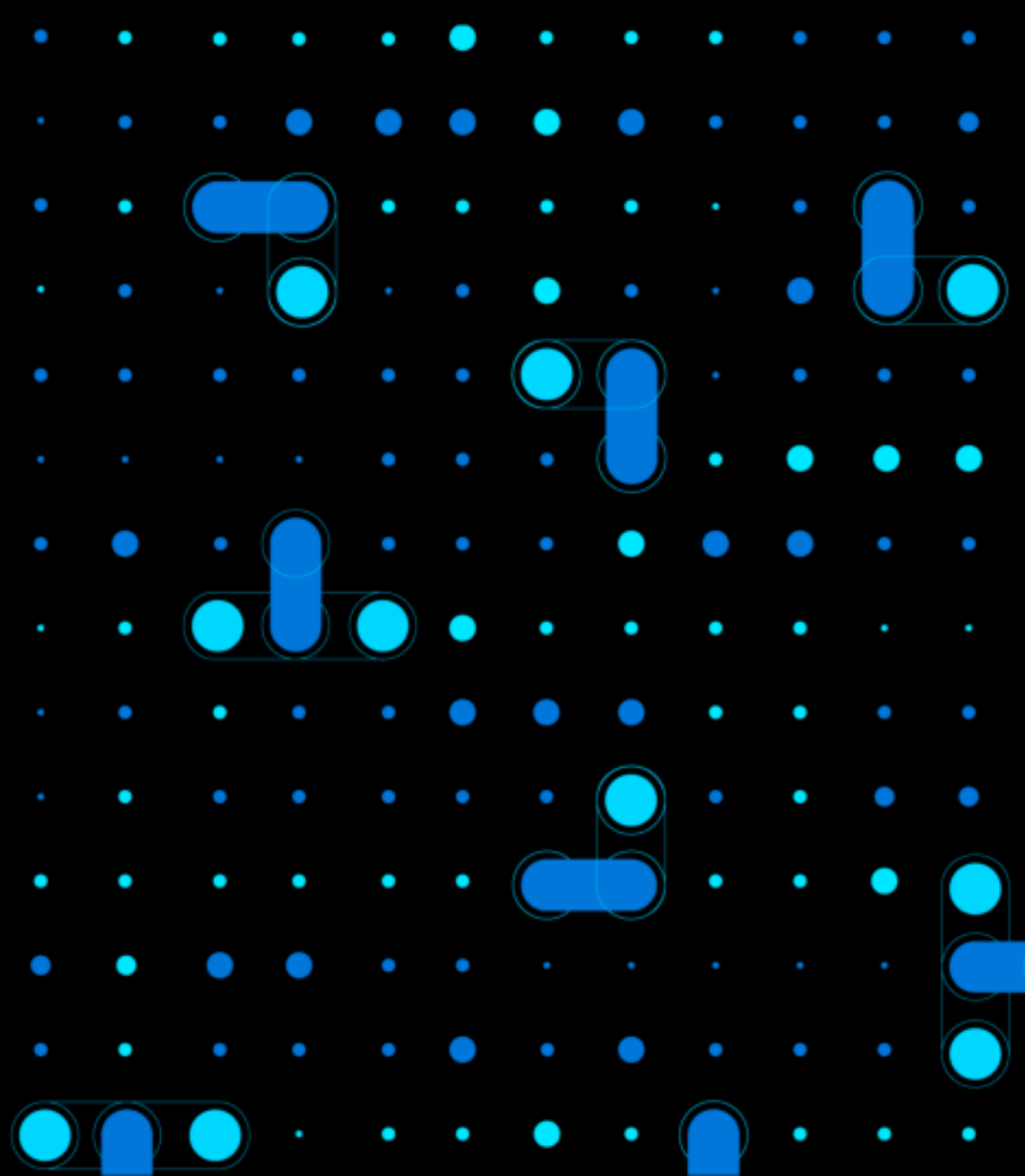
IdentityHub
W3c complained prototype implementation of an DID: web identity provider

Minimum Viable Dataspace

Functional prototype for your data space



https://github.com/eclipse-dataspaceconnector/MinimumViableDataspace



Appendix

Data Spaces Strategy

Standards

- Contribute to open Standards
- IDSA Reference Architecture (RAM 4.0 in public preview)
- GAIA-X Architecture
- W3C Decentralized Identity

Open Source

- Contribute to open Source and IPR free Reference Implementation of IDSA
- Eclipse Data Space Framework under Apache 2.0 license

Data Spaces

- Support for Data Space projects in national Gaia-X Hubs and DSBA
- Projects fulfill the perquisites of a dataspace and are using the EDC as base technology
- demonstrate interoperable data exchange for multi cloud

Engineering

- Identify the market needs
- Plan roadmap for product and services

Principals & Functions

- Connections in a dataspace are always peer-to-peer
- Multiple participants can cooperate, but data is always exchanged 1:1
- Participants can have multiple roles
  - Data Owner, Data Holder, Data Processor, Data Recipient, Algorithm Provider,…
- Patterns
  - **Aggregator** – combining data from multiple sources for computation at one partner (Specialization: Data Trustee)
  - **Supply Chain** – data moves through multiple participants adding value along the way with potential aggregation, anonymization,…
  - **Code to data** – code packages can be transferred by EDC to where data resides, execution controlled through policies and custom extensions

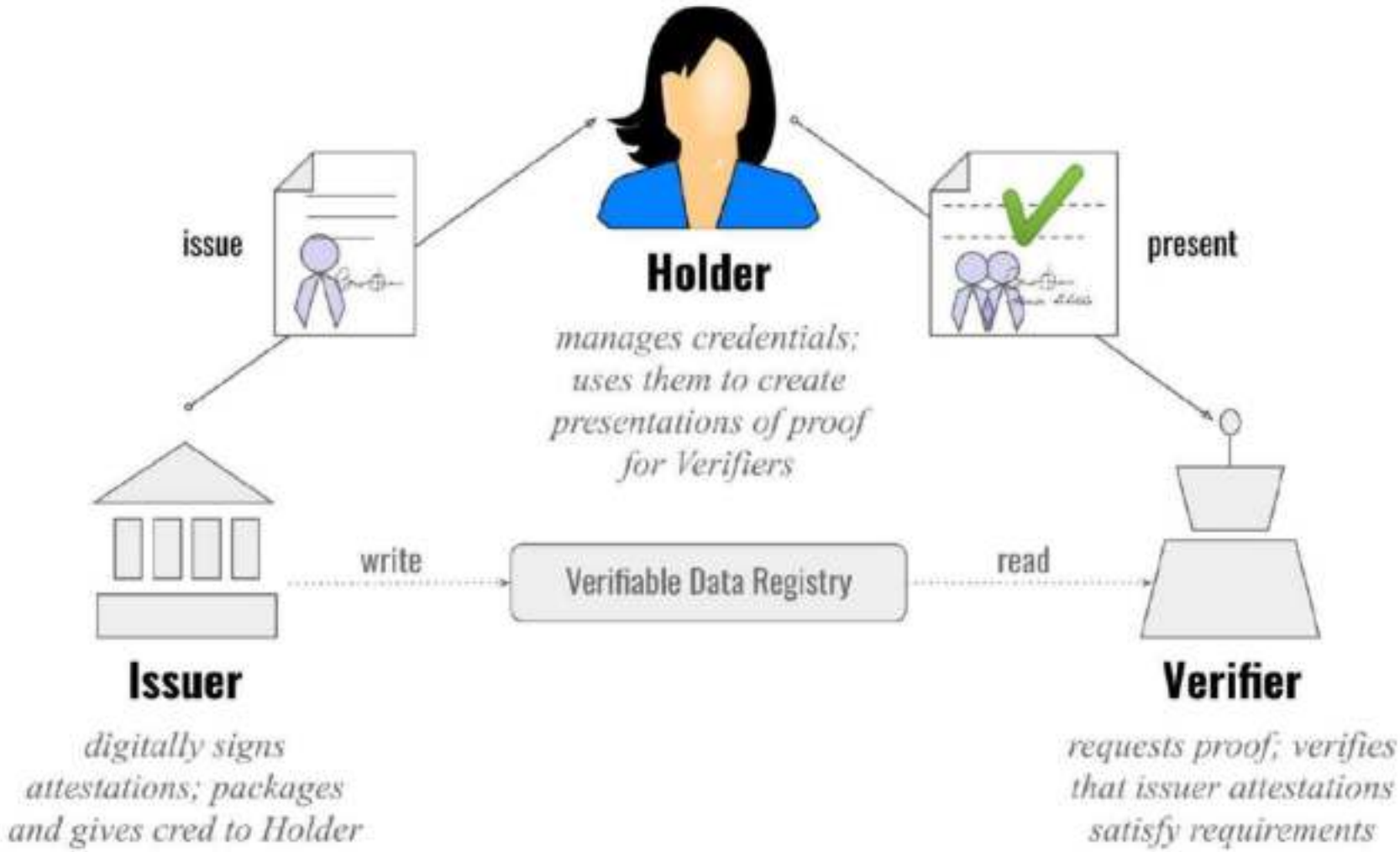
Why data spaces need a decentralized design?

1. **Participants of a dataspace must have full control over which data they share with whom**
2. Participants need to decide who they trust on a case-by-case basis
3. Participation in a dataspace must be based on rules that apply to everyone
4. No central gatekeeper that can decide arbitrarily on participation
5. Decentralized systems are resilient and provide higher availability
6. No central system that holds the keys to the entire kingdom
7. Heterogeneous environments with many different technologies and operating models
8. Transitive trust based on common trust anchors

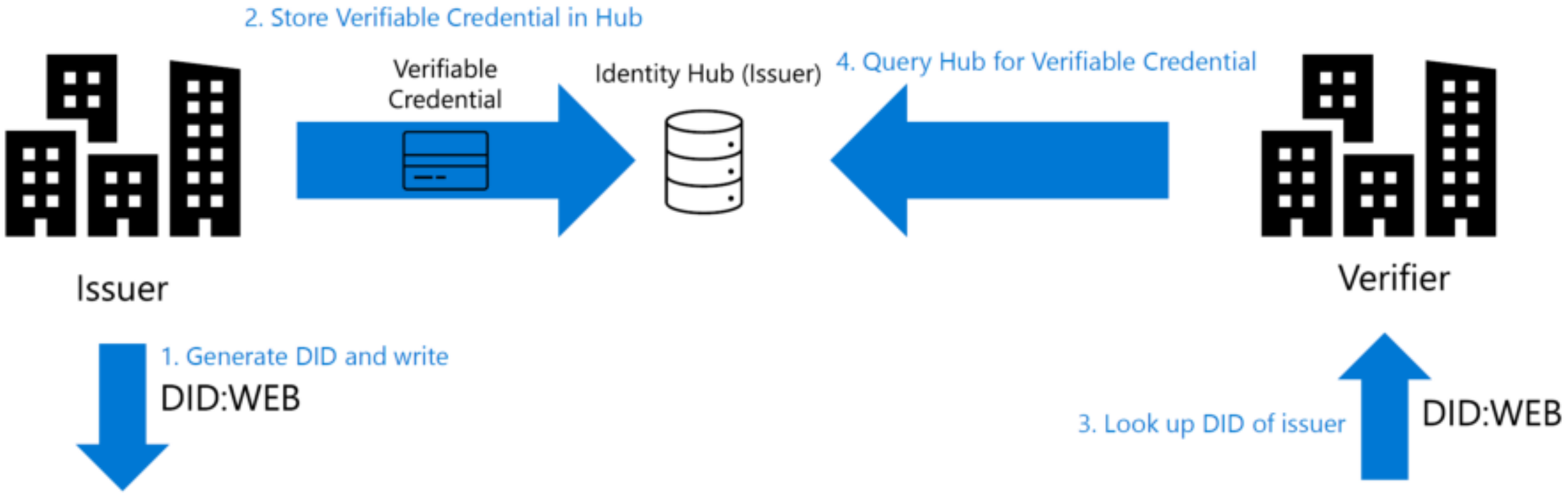
Digital Sovereignty

Digital Sovereignty requires full autonomy, which is different from independence – it means acting with choice.
True Digital Sovereignty requires decentralized technology without central gatekeeping but instead rules governing the behavior and interaction of autonomous actors in a federation.

W3C Verifiable Credentials



Putting it all together: Using identity hub

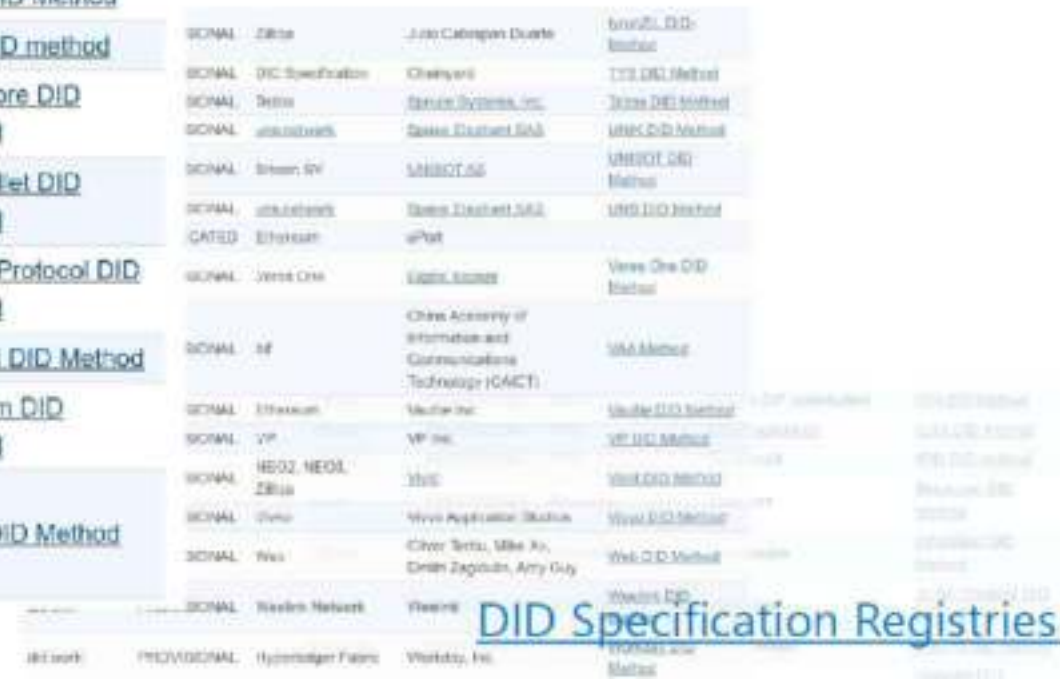


[Presentation](#) and [recording](#) of Stefan van der Wiele

Decentralized Identifiers Methods

- Over 80 different methods
- Defines the trusted infrastructure
- How to read and write identifiers to the infrastructure

did:ion:	PROVISIONAL	Bitcoin	Various DIF contributors	ION DID Method
did:iota:	PROVISIONAL	IOTA	IOTA Foundation	IOTA DID Method
did:ipid:	PROVISIONAL	IPFS	TranSendX	IPID DID method
did:is:	PROVISIONAL	Blockcore	Blockcore	Blockcore DID Method
did:iwt:	PROVISIONAL	InfoWallet	Raonsecure	InfoWallet DID Method
did:jlinc:	PROVISIONAL	JLINC Protocol	Victor Grey	JLINC Protocol DID Method
did:jnctn:	PROVISIONAL	Jnctn Network	Jnctn Limited	JNCTN DID Method
did:jolo:	PROVISIONAL	Ethereum	Jolocom	Jolocom DID Method
did:keri:	PROVISIONAL	Ledger agnostic	Dr. Sam Smith, Charles Cunningham, Phil Feairheller	KERI DID Method



DID Specification Registries (w3.org)

Scheme

did:example:123456789abcdefghi

DID Method

DID Method-Specific Identifier

1. Locate DID document

2. Read DID document

1. **DID** (for self-description)
2. **Set of public keys** (for verification)
3. **Set of auth methods** (for authentication)
4. **Set of service endpoints** (for interaction)
5. **Timestamp** (for audit history)
6. **Signature** (for integrity)

Distributed infrastructure

3. Verify VC signature

Verifiable Credential