

Culture Data Space: A Case Study in Federated Data Ecosystems

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Overview

- **Political and Technical Context**
- **Core Functionality and Value of Data Spaces in Culture**
 - Initial architecture evolved from another early data space (mobility)
- **Culture-Specific Requirements**
 - Extracted from many stakeholder dialogues with and four large use case analyses in different cultural sectors
- **Dealing with Rapid Change and Legacy : Federated Achitecture**
 - Architecture variants IDS A – GAIA-X – Eclipse Data Foundation
 - Design process in Data Space Culture

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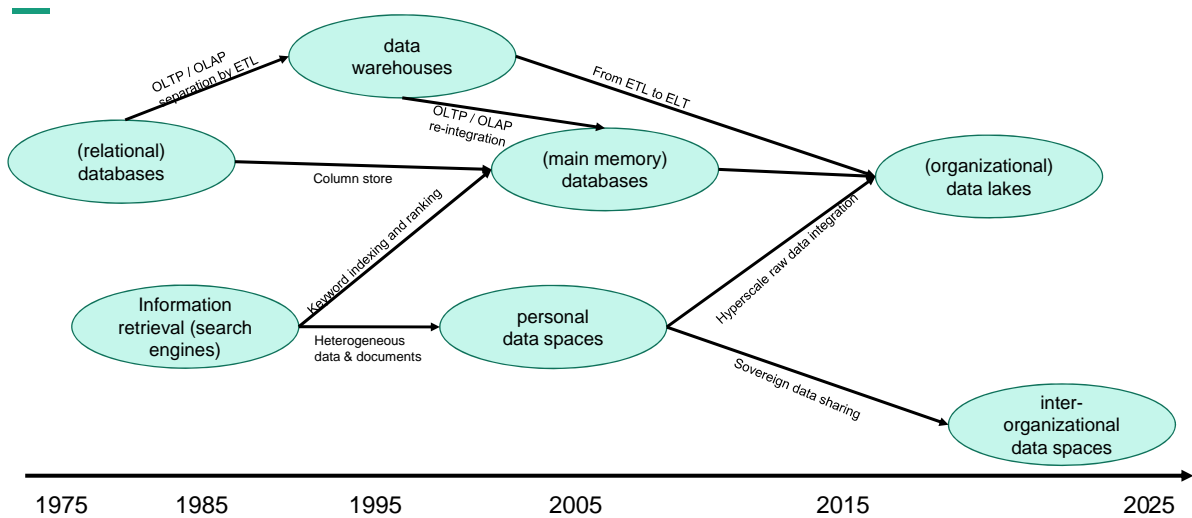
• **Historical and Political Context**

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Evolution of Data Management Paradigms



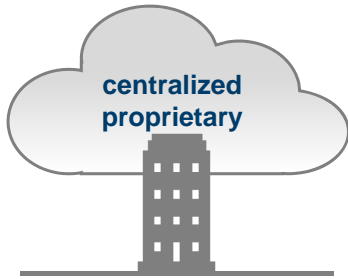
- Informationsklassifizierung -



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Data spaces aim at organizational data sovereignty

Keystone Cloud („Hyperscaler“)

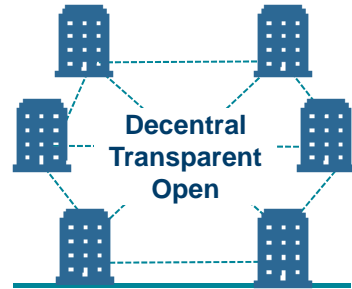


Abhängig

Logically central data lake
Rules for data & services

Ways of achieving sovereignty and trust

Decentralized Data

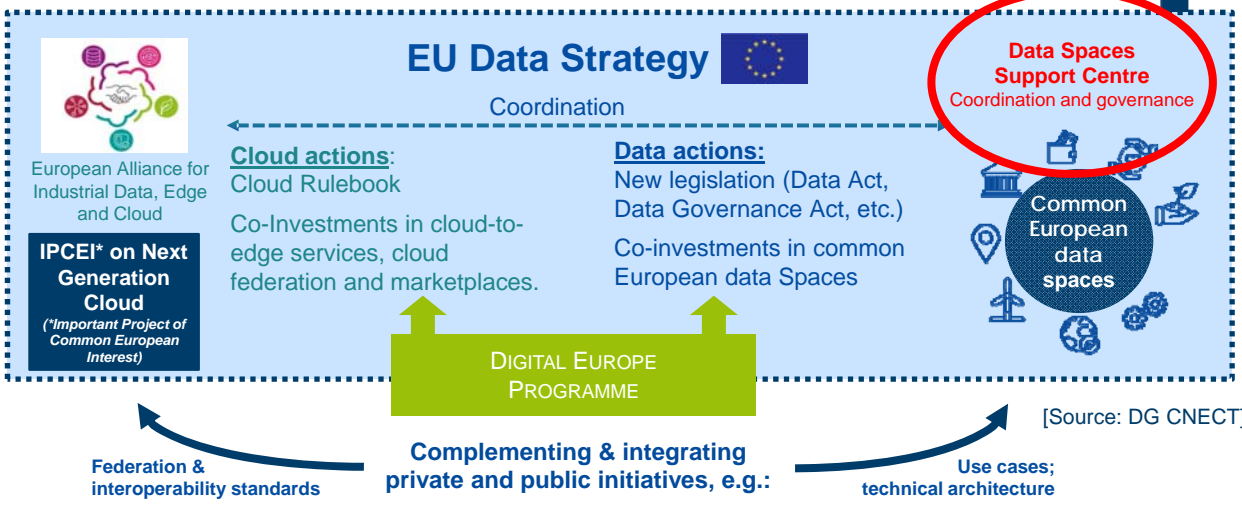


Eigenständig

No central storage, but controlled P2P sharing through community protocols and services

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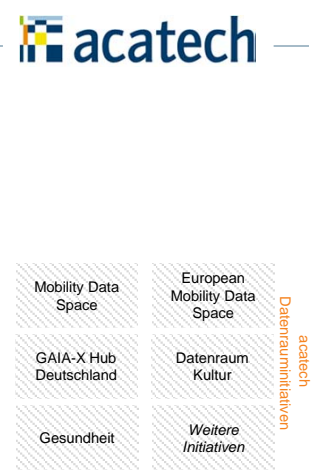
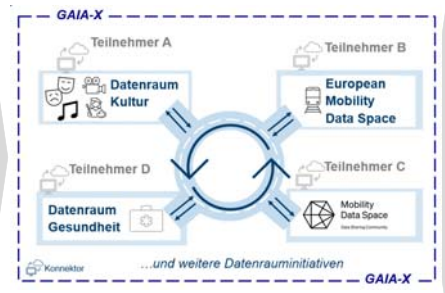
Interoperable Data Spaces – Data Space Culture as a National Digital Lighthouse Project (1 of 18)



Digitalstrategie Deutschland
Widerstand des Bundeskanzlers Viktor Witsing

<https://digitalstrategie-deutschland.de/>

Wir bringen allen Menschen Kultur durch Daten näher
 Digitaler Angebote machen die Vielfalt der **Kultur** zugänglich. Sie unterstützen Menschen mit Behinderungen – und sprechen ein breiteres Publikum an.



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Core Functions and Value Contribution of Early Data Spaces

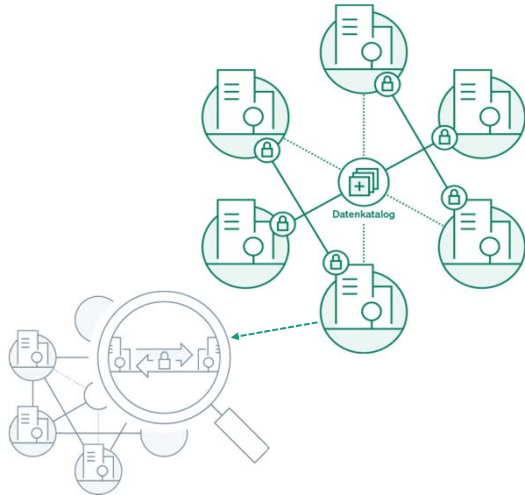
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General Goals



- Data exchange direct and protected from data owner to user.
- Data exchange in diverse circles for better accessibility and broader visibility also for small cultural institutions
- Basis for decentral development of innovative data-driven services (considering the interests of data owners, creators, and user organizations – B2B focus)
- Access to sustainable additional infrastructure offers for smaller cultural players, townships, federal states Kommunen, Länder

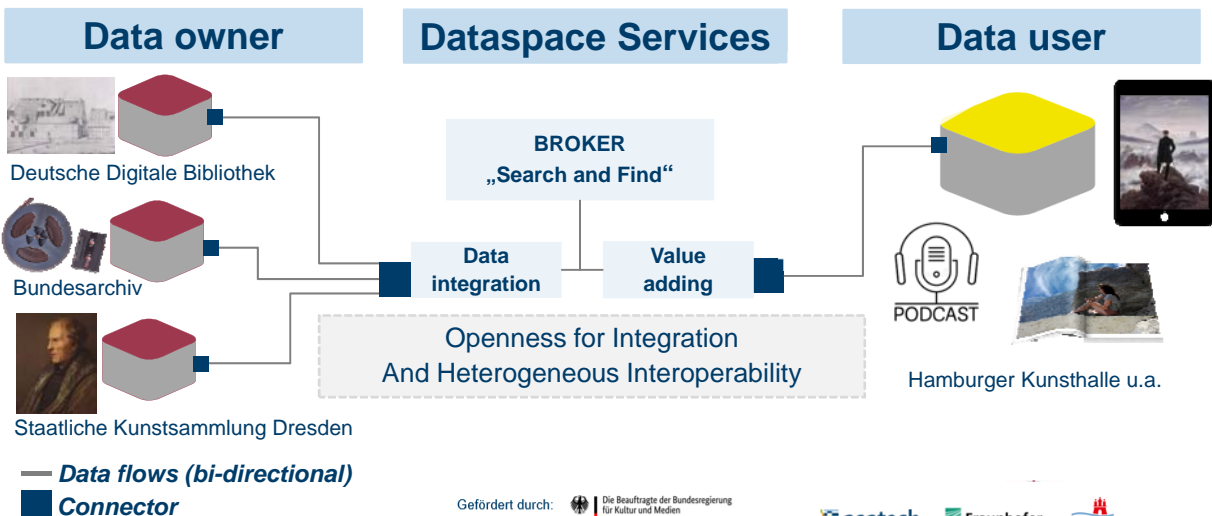


- Informationskollaboration -



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Technological Core Functions (1): Date integration and value creation by Connectors and Brokers

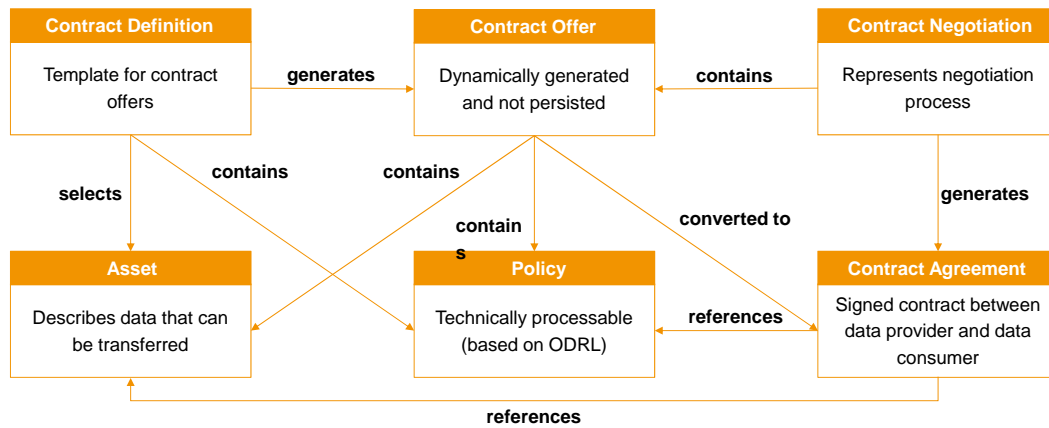


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Core Elements (2): Contracting Workflow



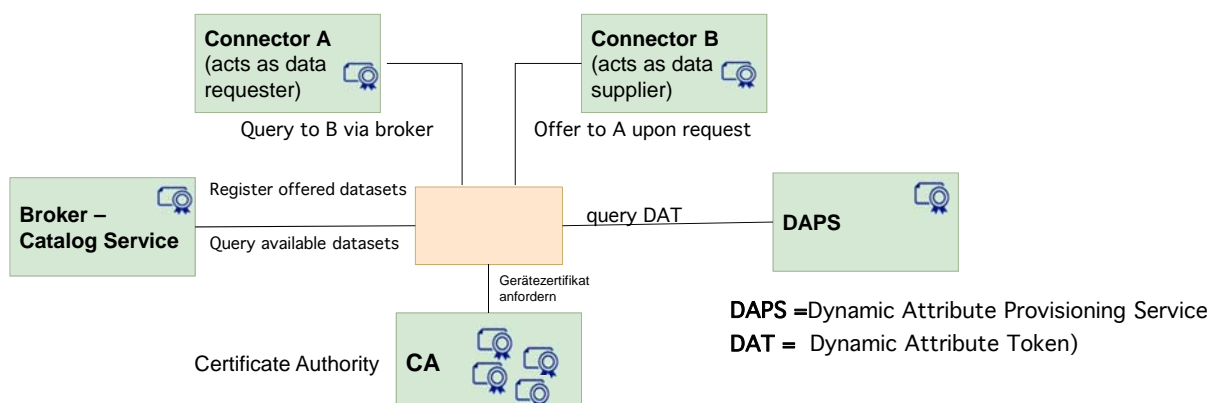
Source: Fraunhofer ISST

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Core Functions (3): Authentication und Certification

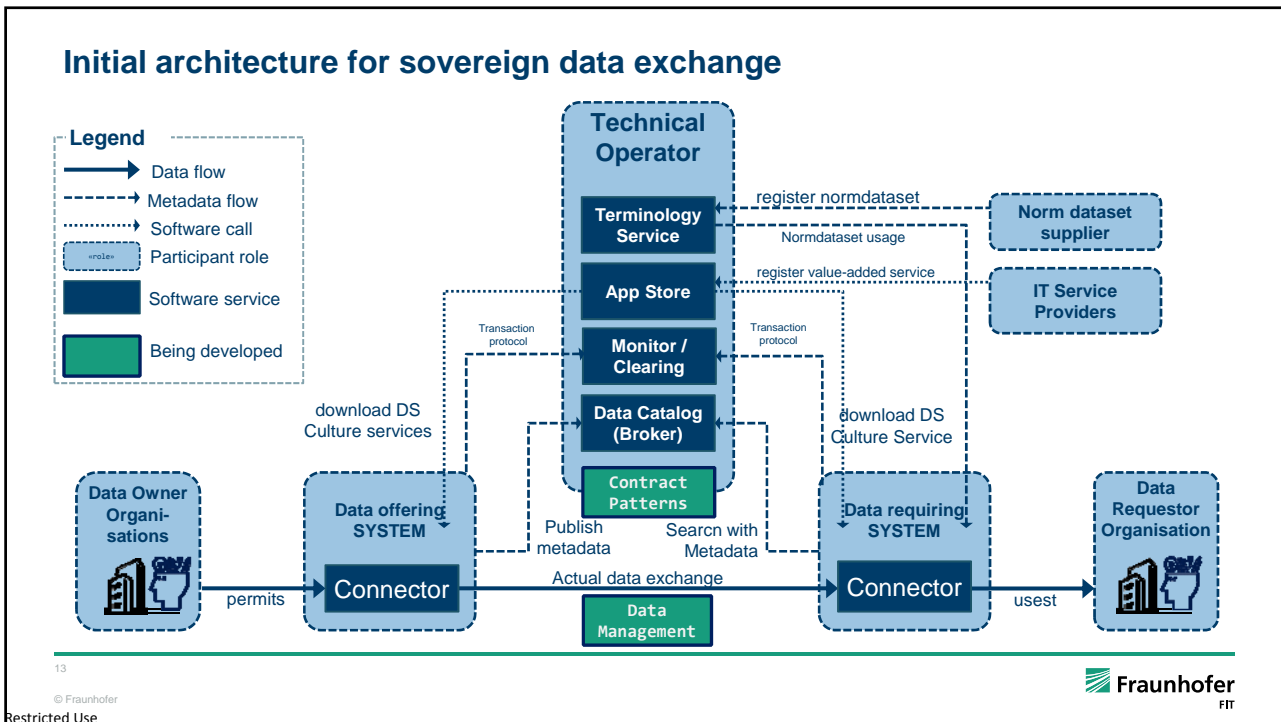
according to IDSA Association (IDSA) certification regulations



Adapted from IDSA Rule Book

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Culture-Specific Experiences and Requirements

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Use Cases in the Project Culture Data Space

	1	2	3	4
	Networked Culture Platforms	Smart Museum Services	Smart Theater Services	Smart Music Services
Lead				
Beteiligte Partner				
Beschreibung	Networking and mutual enrichment of existing regional culture platforms	250. Anniversary Caspar David Friedrich. Repurposing digitalized material for four different perspectives in leading international museums	Standardization of interfaces to theater play plans, to enable networking with diverse data and platforms	Creating a music market place for networking regional and cross-regional music service providers (choirs, music teachers, music co-players).
Ergebnisse	Interoperable culture platforms that can also interact with related topical data spaces (e.g. public-private local mobility)	Cross-organizational and cross-culture area reusable multimedia artefacts and exhibition designs	<ul style="list-style-type: none"> Machine-readable theater schedules Standard connector for theaters 	Matching von demand and supply for music-related data and services Realtime music making at distance

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Hamburger Kunsthalle
CASPAR DAVID FRIEDRICH.
Kunst für eine neue Zeit
15. Dezember 2023 bis 1. April 2024

Alte Nationalgalerie, Berlin
Caspar David Friedrich. Die Wiederentdeckung
19. April bis 4. August 2024

Staatliche Kunstsammlungen Dresden
Caspar David Friedrich. Wo alles begann
24. August 2024 bis 5. Januar 2025 | Albertinum
24. August bis 17. November 2024 | Kupferstich-Kabinett

Nationalgalerie
Staatliche Museen zu Berlin

Staatliche Kunstsammlungen
Dresden

Source: Hamburger Kunsthalle, DR-Kultu Forum 2023

Expected Value of Culture Data Space for Museum Sector

- More visibility of small collections, semantic connection among collections
- Income by (reusable, reconfigurable) digital offers
- Secure linkage of digital assets to their source
- Simplified clarification of image / media rights, licensing
- Simplified procedure for loaning originals
- Enrich own offers with media from other areas
- Linkage to parallel ongoing standardization activities



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Music-Making Market

Human cultural activity since 60.000 years.

75% of Germans play an instrument at some point in their lives.

Currently mostly offline and fragmented :

- 57% of interested students cannot find a suitable teacher nearby
- 91% teachers independent & hard to find



„Give everyone who wants to make music simple access to *learn, rehearse, play, and use own results* alone or in teams.“

(Michael Petermann, Director Hamburg Conservatory)



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Architectural Implications in Face of Rapid Parallel Developments and Varying Uptake Speeds

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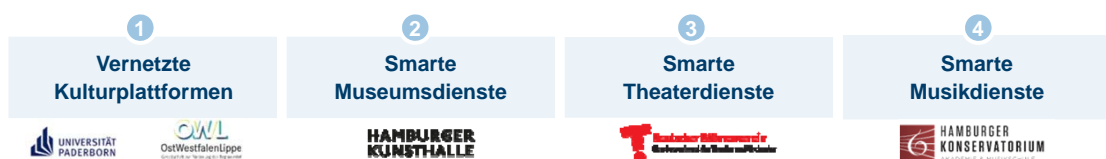
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Requirements derived from the use cases



- **Scale of Participants:** numerous small organizations with extreme diversity
- Conflicting regulations and rights make (copy)rights management and usage control a core topic, including the inclusion of existing copyright organizations, unions, ...
- Reduce double work and inconsistencies, exploit synergies with complementary public and private data collections (DNB, DDB, Archives, Media), standards organizations and support centers (NFDI4Culture, EU DSSC)
- Translate among heterogeneous metadata structures, considering important culture-specific standards and metadata repositories
- Culture-specific data layer: highly diverse need for storage, query, integration, analytics, and personalization services on heterogeneous databases and data streams

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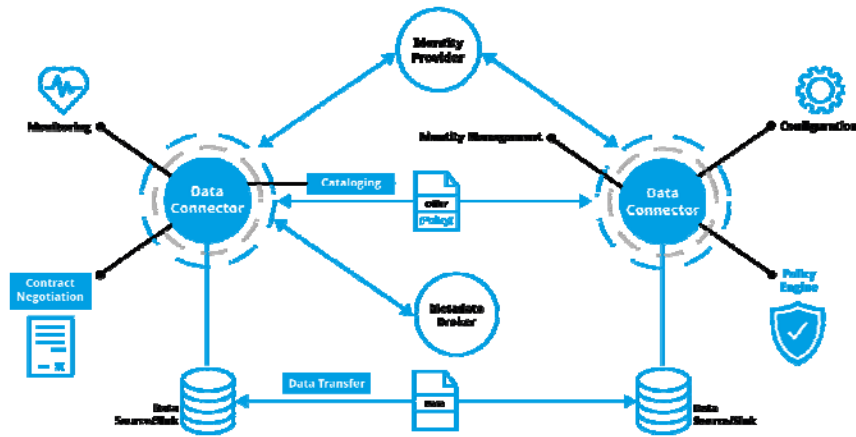
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Industry-oriented approach (IDSA): Central Services moved into connectors as configurable „extensions“



Source: <https://docs.internationaldataspaces.org/communication-guide-v2-draft>

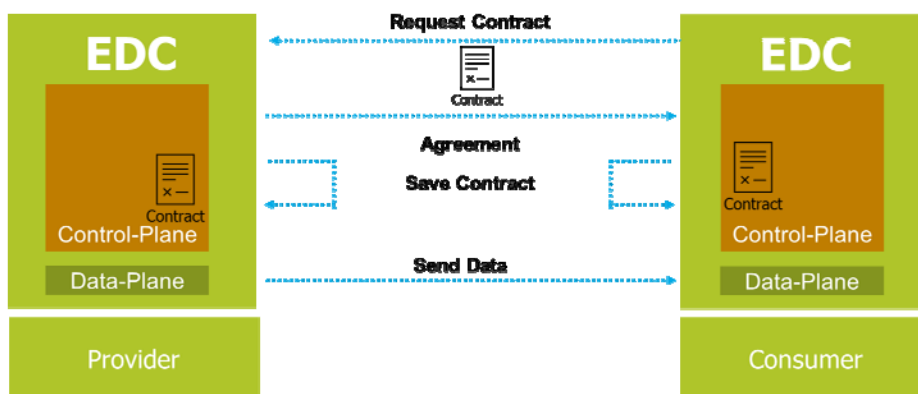
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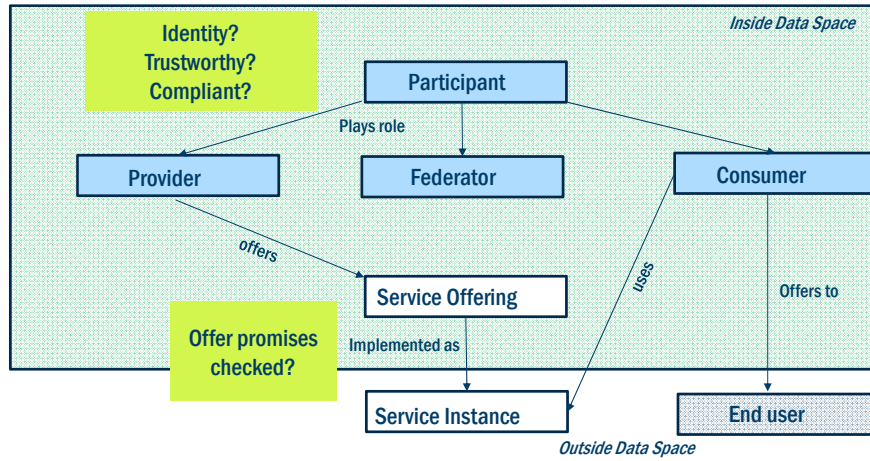
Eclipse Data Connector (EDC) to satisfy contract and separate Control Plane from Data Plane



Source: [Catena-X](#)

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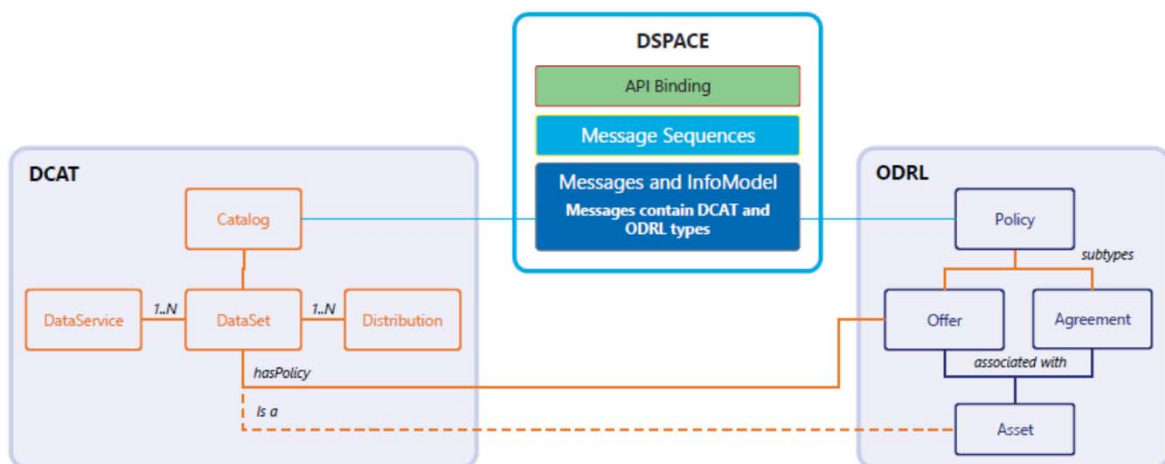
Alternative: Federated Service Orientation in Gaia-X



Simplified from: [Gaia-X Architecture Document](#)

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W3 Standards for Catalog Services and Usage Rules as Starting Points for Clear Definition and Automated Monitoring



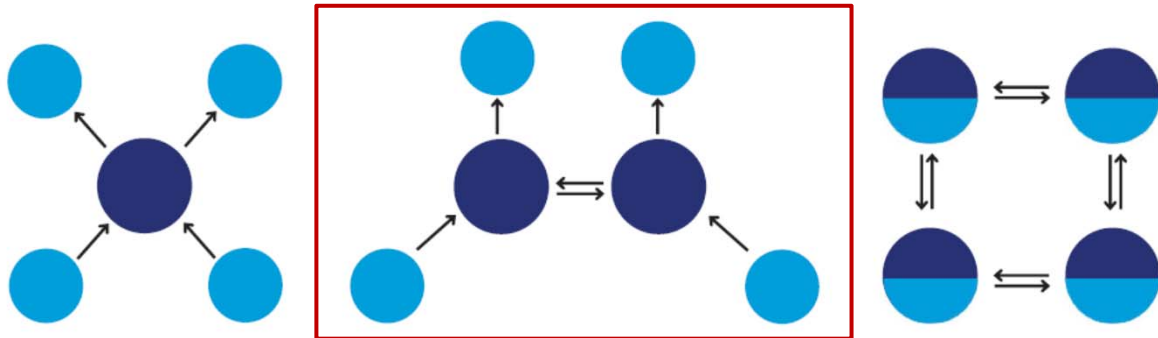
24 Source: adapted from IDSA Rulebook

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Conclusion: Federated Architecture for interest-specific, user-friendly, and governable extensibility of Culture Data Space



Largely independent subrooms of cultural organizations, regional institutions, large-scale data contributors (digital libraries, city archives, mediathecs) help small institutions and solo artists