Agenda

1. **What is Gaia-X?**

2. **The Inspiring parts of Gaia-X**

3. **Use Cases for Gaia-X 4 INSPIRE**

4. **What is a Self-Description? The Gaia-X Catalogue**

5. **An example**
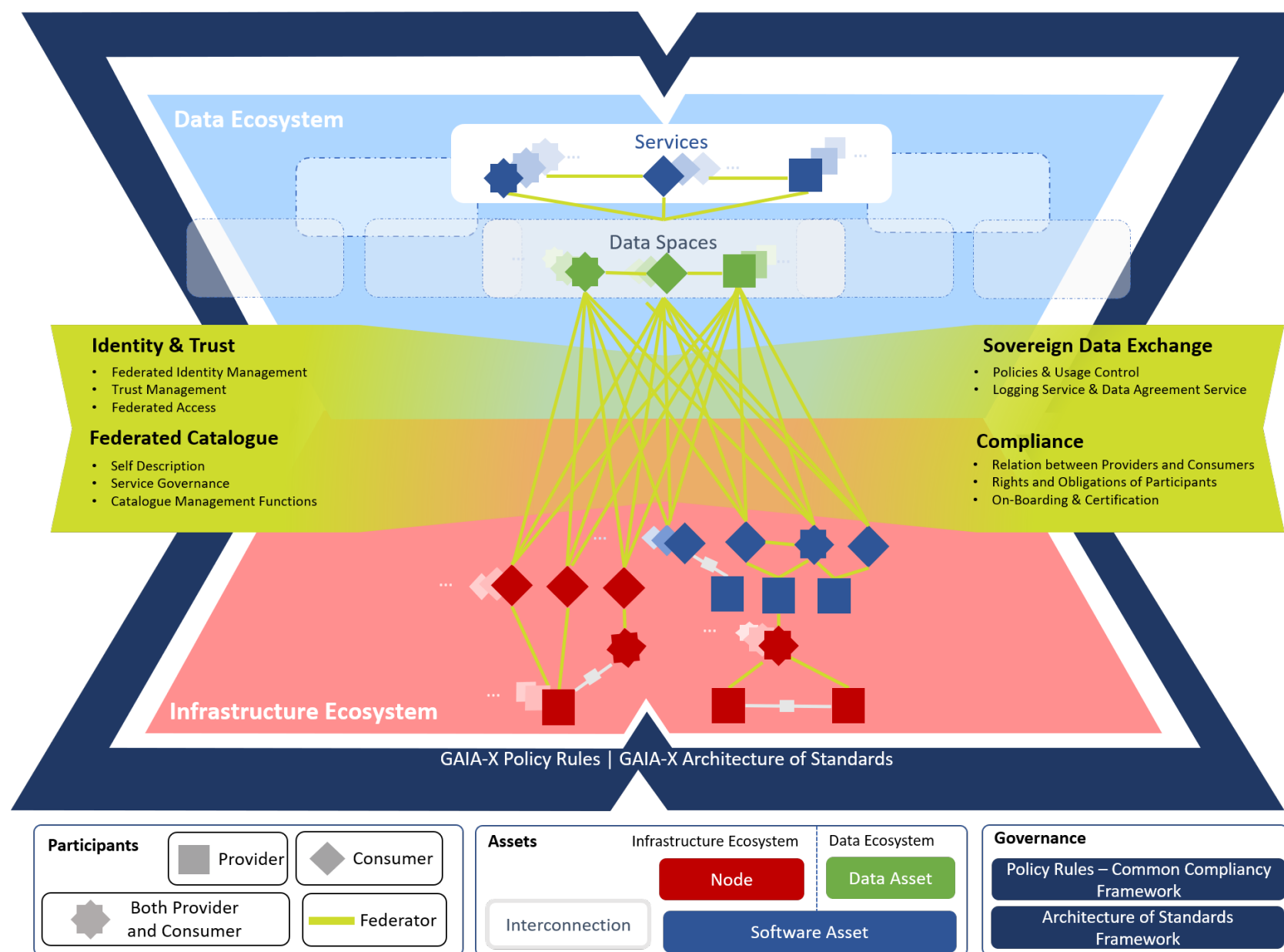
6. **State of Gaia-X**

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What is Gaia-X?

It is a federated and secure data infrastructure, whereby data are shared openly, with users retaining control over their data.
It links many cloud service providers in a wider, transparent and open ecosystem to drive the European Data economy of tomorrow.

https://gaia-x.eu/what-is-gaia-x/

What is Gaia-X?

Ecosystems

Data Ecosystem

Services

Data Spaces

Identity & Trust
- Federated Identity Management
- Trust Management
- Federated Access

Federated Catalogue
- Self Description
- Service Governance
- Catalogue Management Functions

Sovereign Data Exchange
- Policies & Usage Control
- Logging Service & Data Agreement Service

Compliance
- Relation between Providers and Consumers
- Rights and Obligations of Participants
- On-Boarding & Certification

Infrastructure Ecosystem

GAIA-X Policy Rules | GAIA-X Architecture of Standards

Participants		
Provider	Consumer	
Both Provider and Consumer	Federator	

Assets		
	Infrastructure Ecosystem	Data Ecosystem
Interconnection	Node	Data Asset
	Software Asset	

Governance
Policy Rules – Common Compliancy Framework
Architecture of Standards Framework

https://docs.gaia-x.eu/technical-committee/architecture-document/latest/ecosystem/

Gaia-X 4 INSPIRE

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Inspiring Parts of Gaia-X
Overview

- Identity & Trust

- Federated Catalogue

- Compliance

- Data Sovereignty
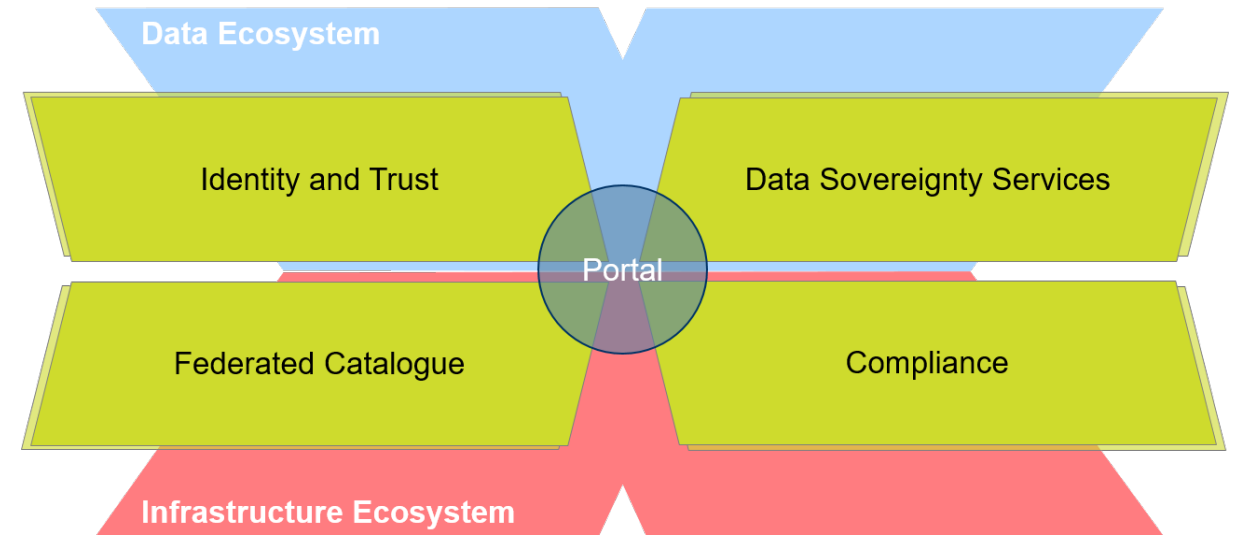
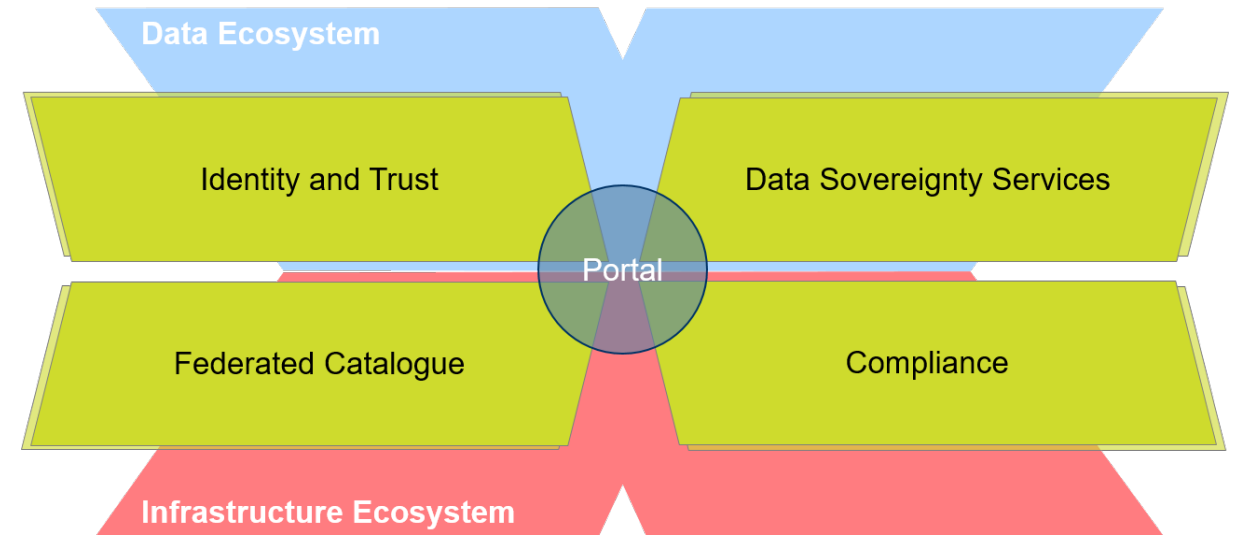# Inspiring Parts of Gaia-X
Identity & Trust

- Identity & Trust
    - Is the publisher valid?
    - Is the self-description (**SD**) truthful?
    - Is the SD published by the publisher?
    - Based on Trust Anchors
        - eIDAS[1] Trusted Lists
    - Specification partly in advanced state
        - Self-description specification lacking details (domain-specific extensions)

- INSPIRE Benefits
    - Authenticity of data

[1] electronic IDentification, Authentication and trust Services: EU regulation on electronic identification and trust services for electronic transactions in the European Single Market

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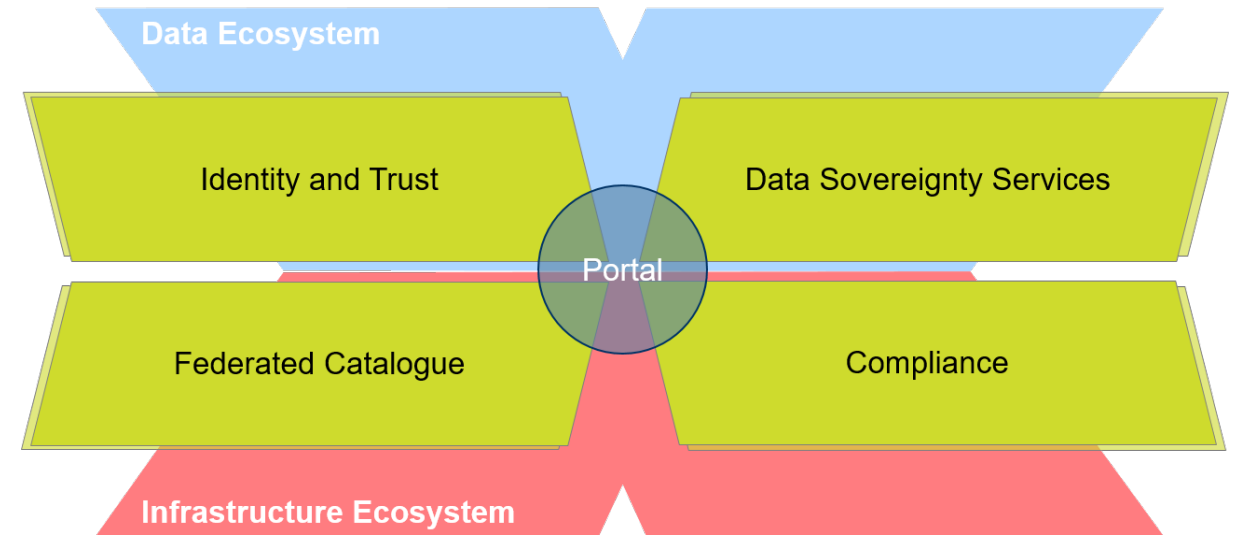# Inspiring Parts of Gaia-X
Federated Catalogue

- Federated Catalogue

  - Finding data & publishers

  - Distributed or Single Instance

  - Validates Self-Descriptions

    - Schema & Signing keys

  - Specification

    - depends on Self-Descriptions

- INSPIRE Benefits

  - Semantically queryable Catalogue

  - Distributed

- Alignment INSPIRE ⬌ Gaia-X challenging

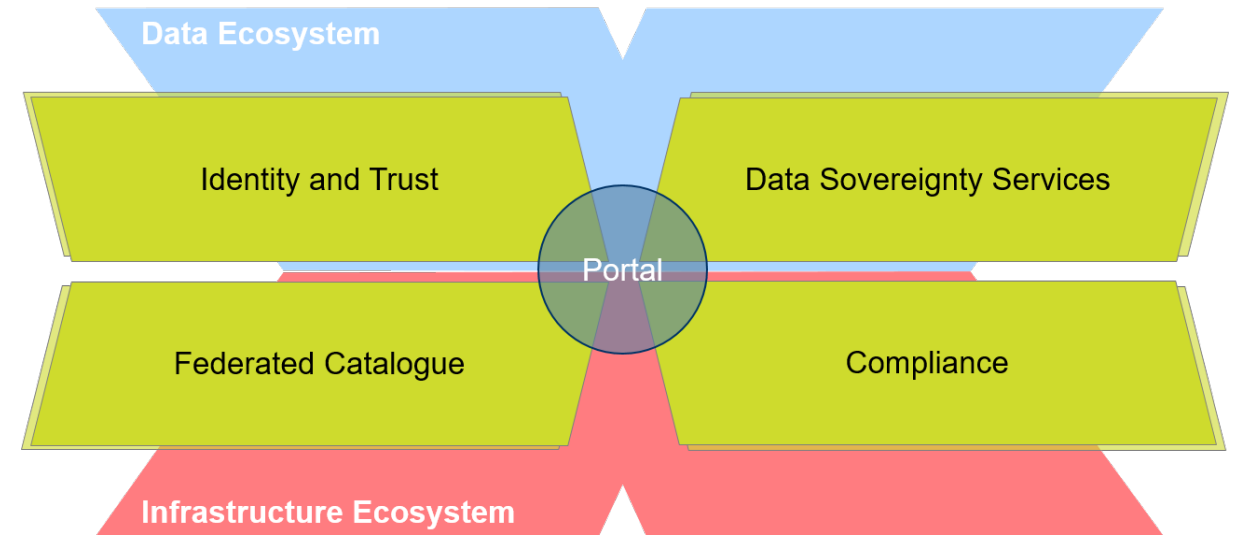# Inspiring Parts of Gaia-X
Compliance

- Compliance
  - Gaia-X rules & onboarding (non technical)
  - Is the self-description valid
  - Is the self-description correct
  - Initial specification
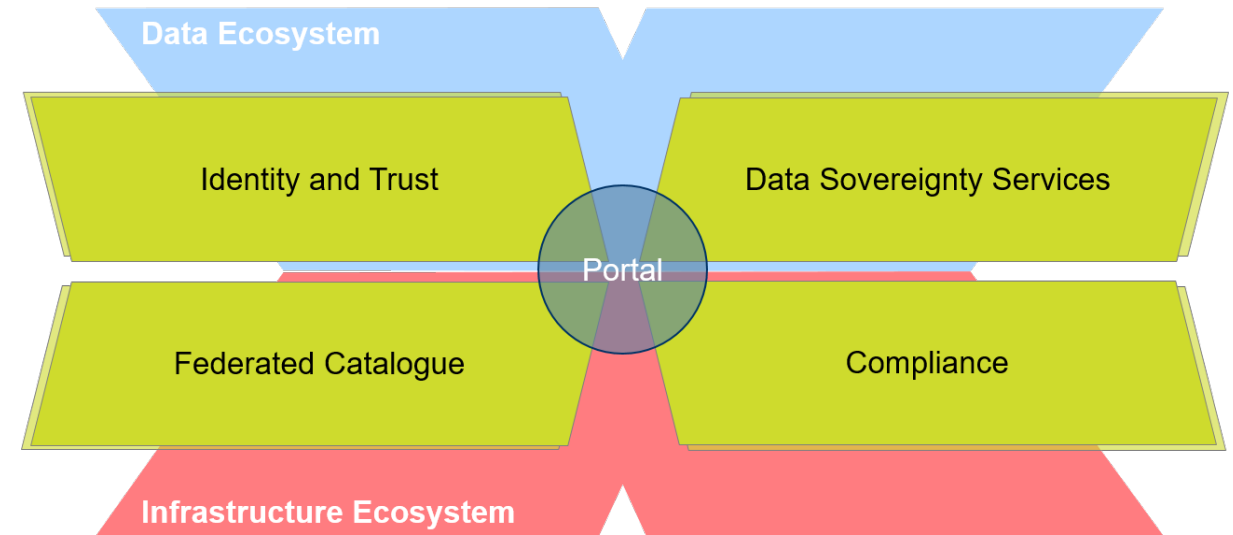   - Depends on self-descriptions & Labels
- INSPIRE Benefits
  - Automatic enforcement of INSPIRE rules/directives

Data Ecosystem

Identity and Trust

Data Sovereignty Services

Portal

Federated Catalogue

Compliance

Infrastructure Ecosystem

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Inspiring Parts of Gaia-X
Data Sovereignty

- Data Sovereignty
  - Is data used according to the license
  - Trusted Computing
  - Compute-to-Data
- INSPIRE Benefits
  - Potential to publish GDPR-Sensitive data

Data Ecosystem

Identity and Trust

Data Sovereignty Services

Portal

Federated Catalogue

Compliance

Infrastructure Ecosystem

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Example Use Cases
Sourced from API4INSPIRE and GeoE3

■ Franco-Germanic Flow

■ Smart Transport in Smart Cities

■ Optimising the heating and cooling system of a building

■ Analysing the efficiency of expansion of urban land

■ Co-operative Intelligent Transport Systems (C-ITS)

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Example Use Cases
Franco-Germanic Flow

- The Rhine:
  - One River
  - Many Countries

- "Can I swim here?"
  - The best swimming spots near the user
  - Water bodies related to these swimming spots
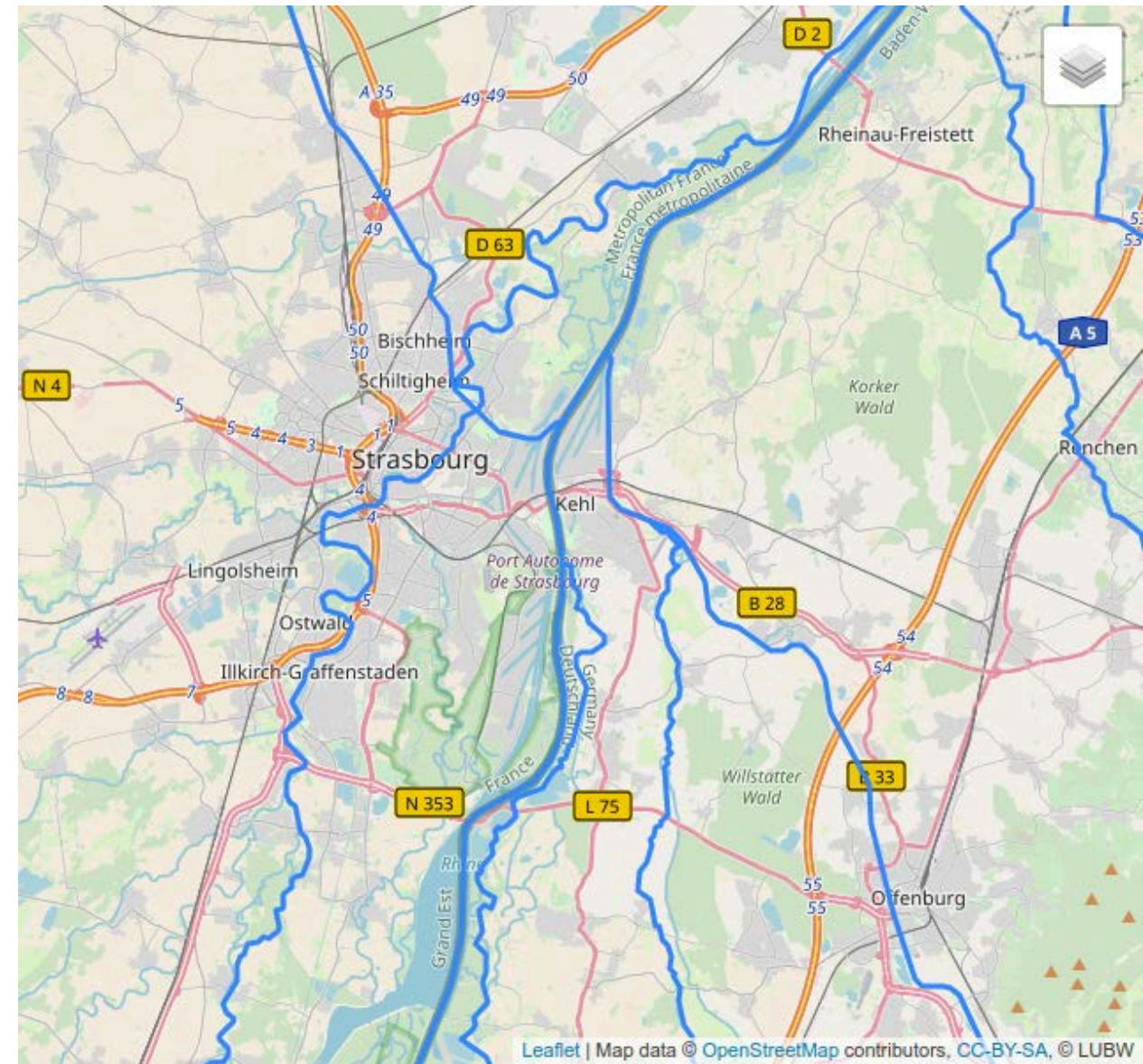 - Water quality measurements for these water bodies

https://datacoveeu.github.io/API4INSPIRE/datanests/franco-germanic-flow.html

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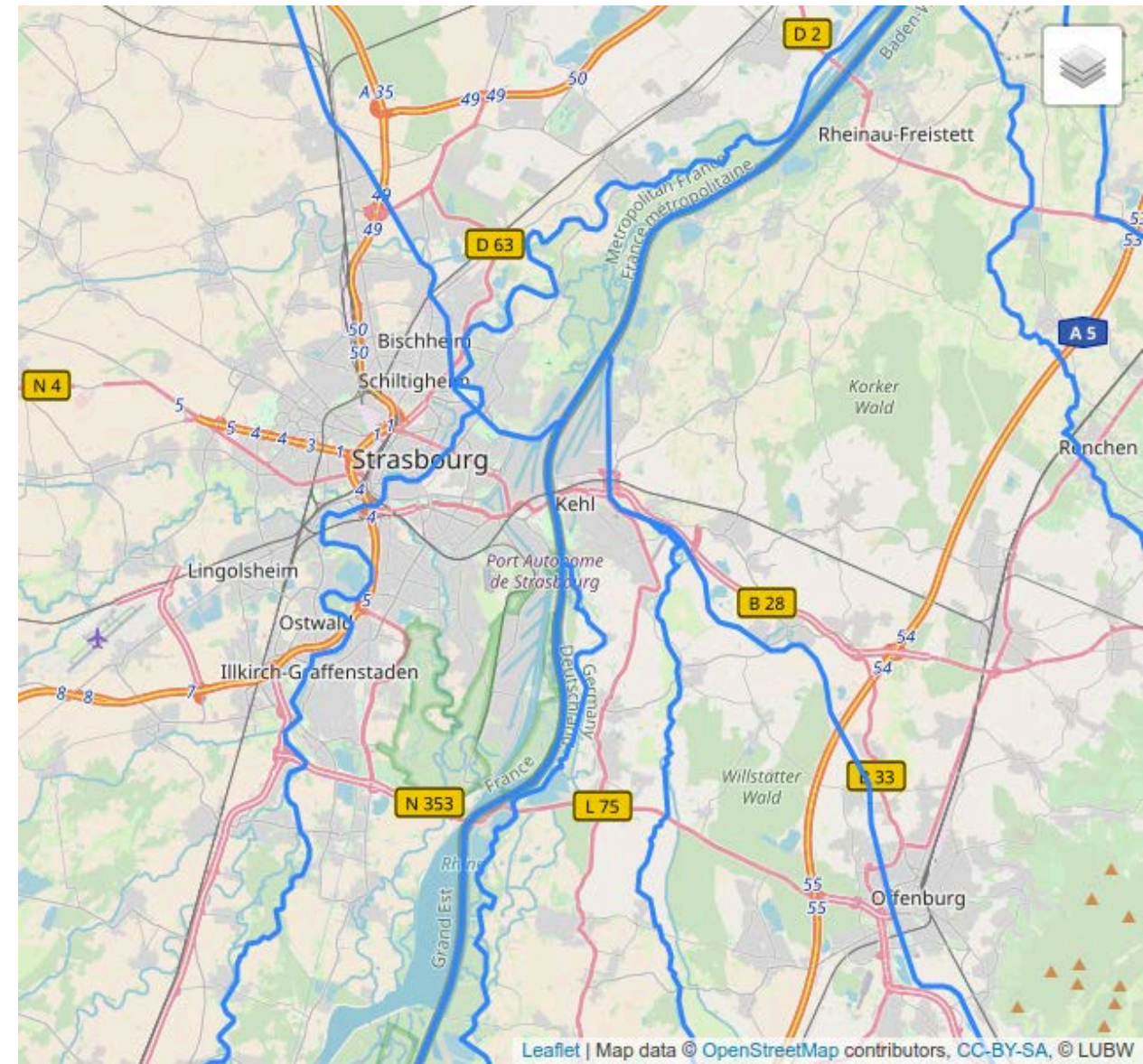
Example Use Cases
Franco-Germanic Flow

- Identity & Trust: ++

- Federated Catalogue: +

- Compliance: -

- Data Sovereignty: -

https://datacoveeu.github.io/API4INSPIRE/datanests/franco-germanic-flow.html
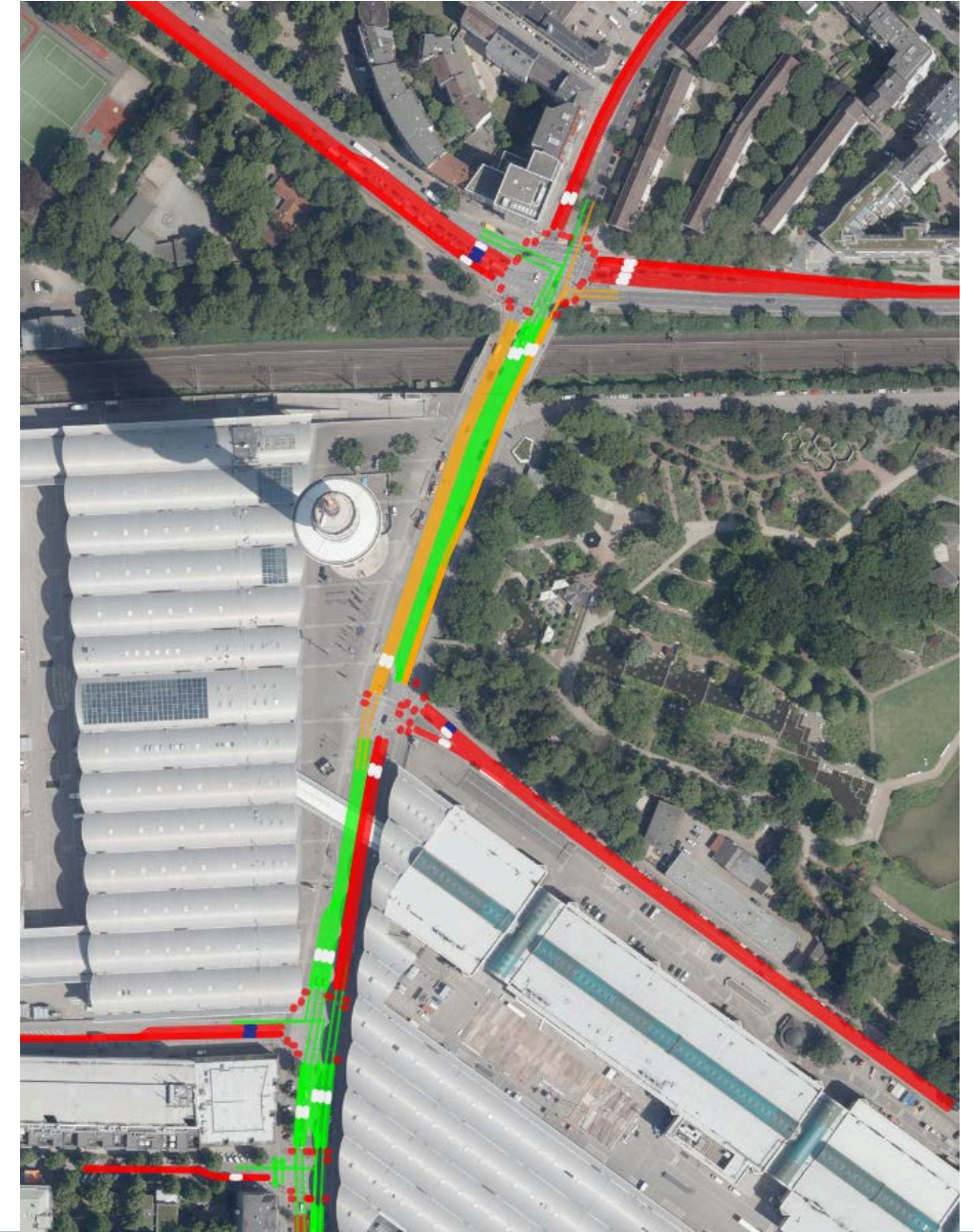
Example Use Cases

Smart Transport in Smart Cities

- Visiting a City

  - Where do I charge my car?

  - Why is this traffic light still **RED**?

  - Are there construction works ahead?

  - How is the traffic flow?

https://geoportal-hamburg.de/geo-online/
?Map/layerIds=12883,12884,16101,19969,94,19968,23219,23214,23221,23216,23212,23210
&Map/center=[565083,5935345]&Map/zoomLevel=9

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Example Use Cases
Smart Transport in Smart Cities

—

- Identity & Trust: **+++**

- Federated Catalogue: **++**

- Compliance: **-**

- Data Sovereignty: **+**

https://geoportal-hamburg.de/geo-online/
?Map/layerIds=12883,12884,16101,19969,94,19968,23219,23214,23221,23216,23212,23210
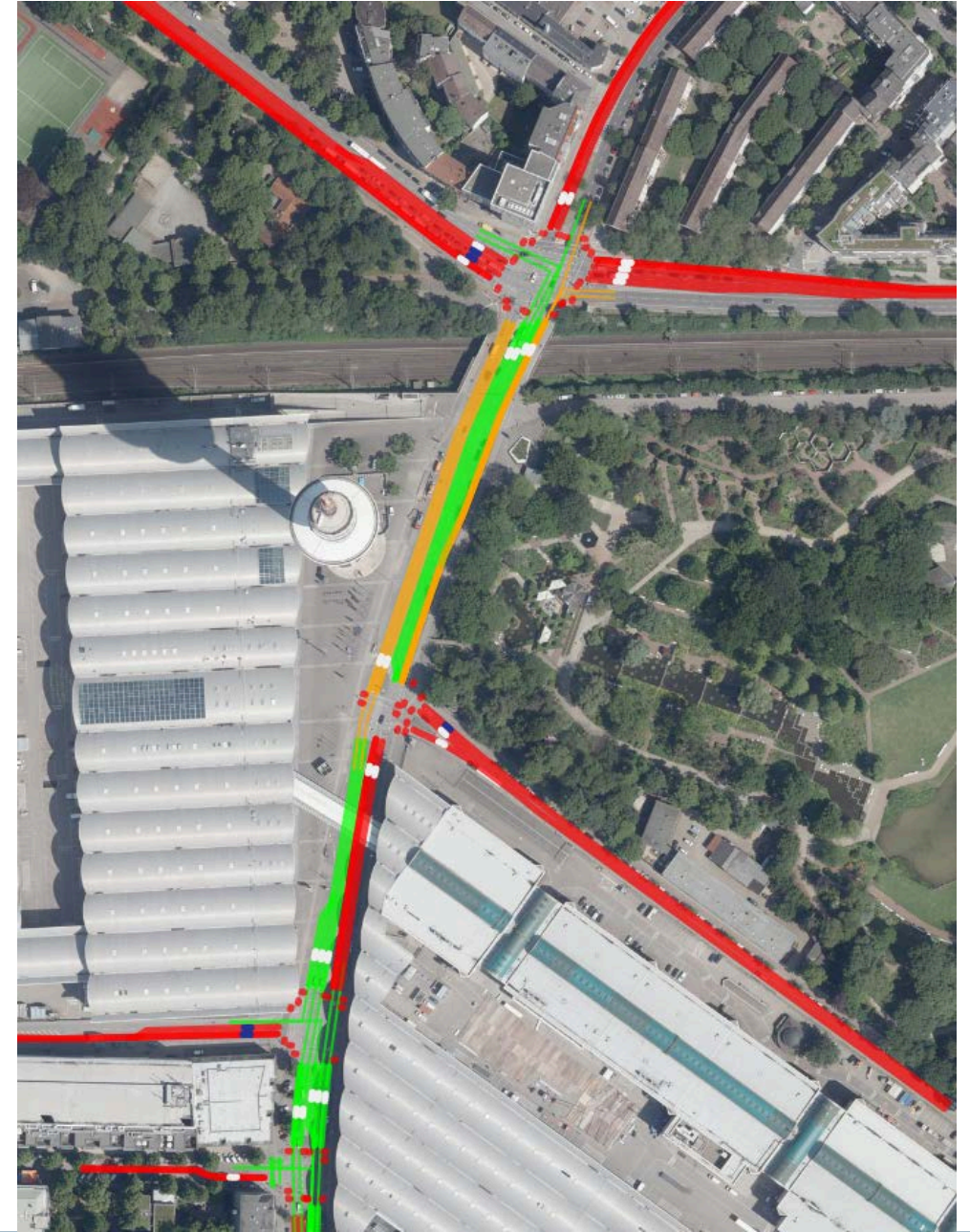&Map/center=[565083,5935345]&Map/zoomLevel=9

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What is a Gaia-X Self-Description?

The Contents

| Image Classification Service |
| SLA: 99.999% uptime |
| Hosted in Berlin |
| INSPIRE Compliant |

Claims

| Image Classification Service |
| SLA: 99.999% uptime |
| Hosted in Berlin |
| INSPIRE Compliant |

Verifiable Credentials

| Image Classification Service |
| SLA: 99.999% uptime |
| INSPIRE Compliant |

Verifiable Presentation

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The Gaia-X Catalogue
Finding Self-Descriptions

- The Catalogue hosts Self-Descriptions

- Based on a Graph Database

- Queried using OpenCypher
  https://en.wikipedia.org/wiki/Cypher_(query_language)

- Stand-alone or federated

- Validates Self-Descriptions

- Flexible, customisable schema

  - Gaia-X base schema   → validated by Gaia-X Compliance Service

  - Custom domain extensions

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What is a Gaia-X Self-Description
The Format

It's a JSON file

+

**Semantics
JSON-LD**

Base Schema
(serialized RDF)


```
1
2  {
3      "@id": "http://example.edu/verifiablePresentation/self-description1",
4      "type": [
5              "VerifiablePresentation"
6      ],
7      "issuer": "https://example.edu/issuers/particiant1",
8      "issuanceDate": "2010-01-01T00:00:00Z",
9      "verifiableCredential": [{
10             "@id": "http://example.edu/verifiableCred/participantVC",
11             "type": [
12                     "VerifiableCredential"
13             ],
14             "issuer": "https://example.edu/issuers/particiant1",
15             "issuanceDate": "2010-01-01T00:00:00Z",
16             "credentialSubject": [{
17                     "@id": "did:example:particiant1",
18                     "type": "participant",
19                     "registrationNumber": {
20                             "@value": "3234566",
21                             "@type": "xsd:string"
22                     },
23                     "headquarterAddress.countryCode": {
24                             "@value": "DEU",
25                             "@type": "xsd:string"
26                     },
27                     "legalAddress.countryCode": {
28                             "@value": "DEU",
29                             "@type": "xsd:string"
30                     }
31             }],
32             "proof": {
33                     "type": "JsonWebSignature2020",
34                     "created": "2022-02-25T14:58:43Z",
35                     "verificationMethod": "https://example.edu/issuers/
```

self-description.json   1.94 KiB   Edit   Lock Replace Delete

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Creating a Self-Description
Scenario

- "ACME" wants to offer their air quality data set on the Gaia-X Marketplace.

- They expose their data set using REST API that follows several data and interface standards.

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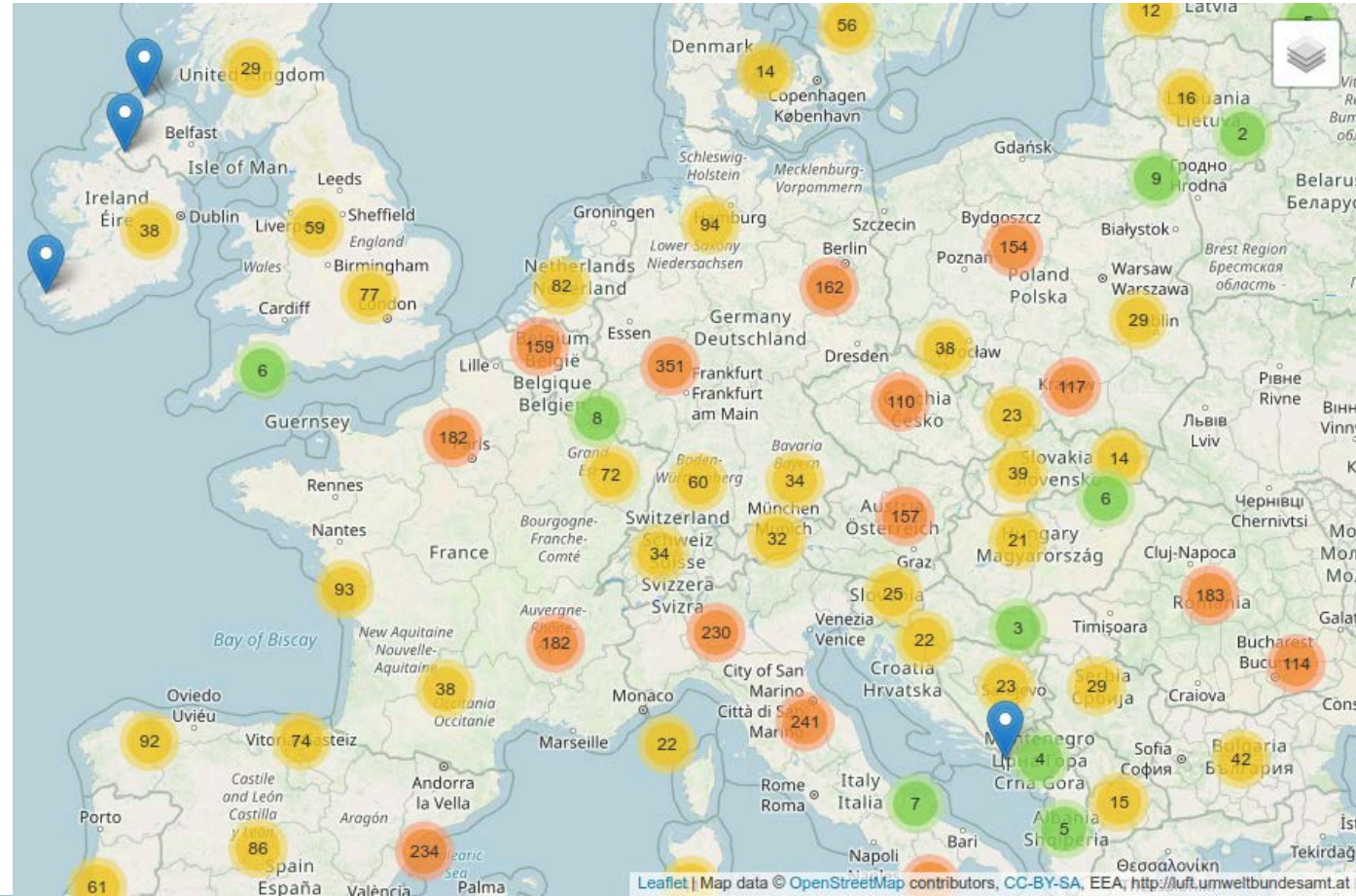
Creating a Self-Description
Mapping to Conceptual Model

ACME is a *Provider* in this scenario

and its air quality data service is a *Service Offering*

of type *Data Service Offering*

that serves a *Resource*

of type *Data Resource*, being the air quality data.

The Resource is owned by ACME as *Resource Owner*.
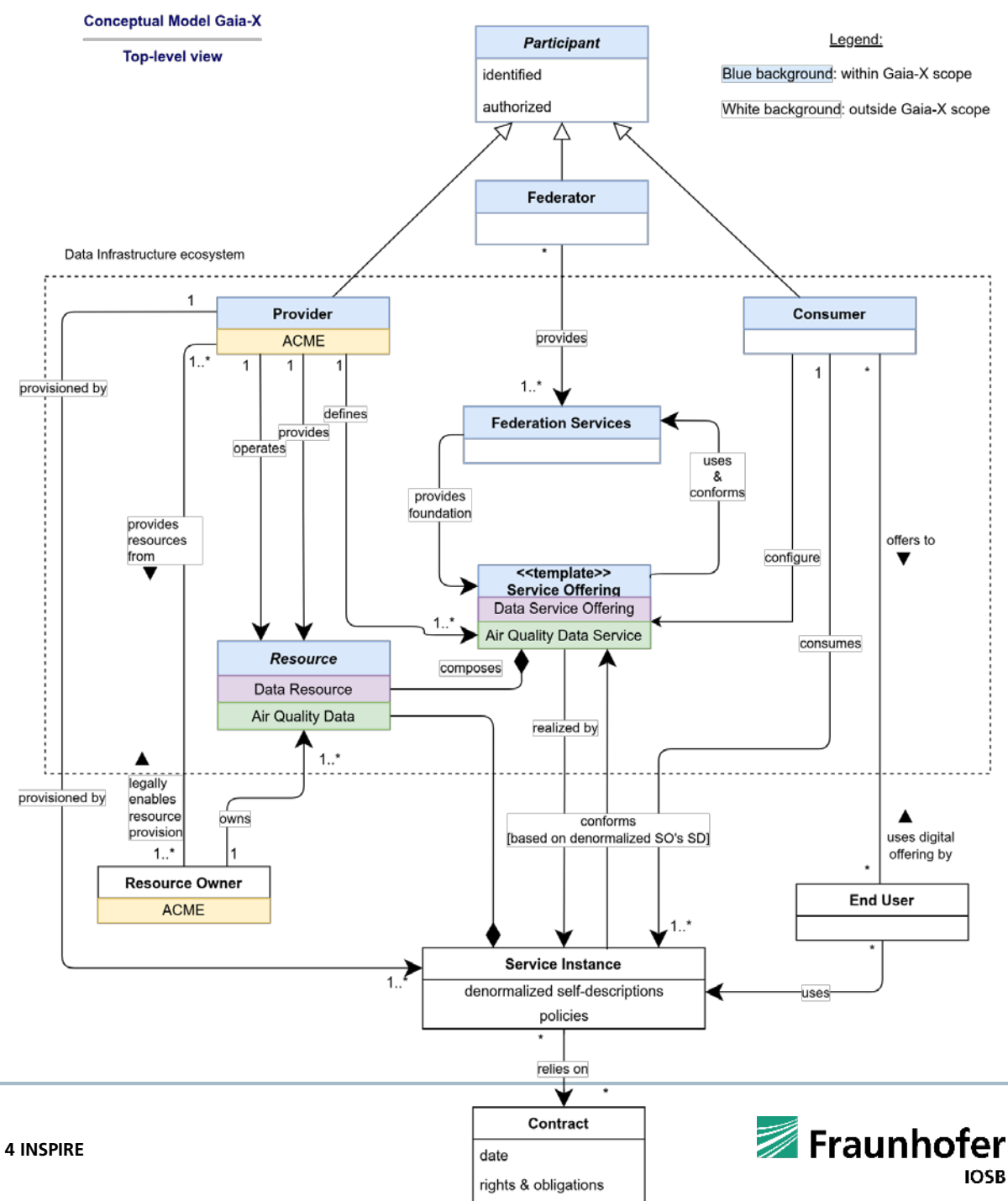
Creating a Self-Description
Mapping to the Ontology

- Data Service Offering Class

  - Inherits from

    - Service Offering

  - composed of

    - DataResource

    - Standard

    - Endpoint

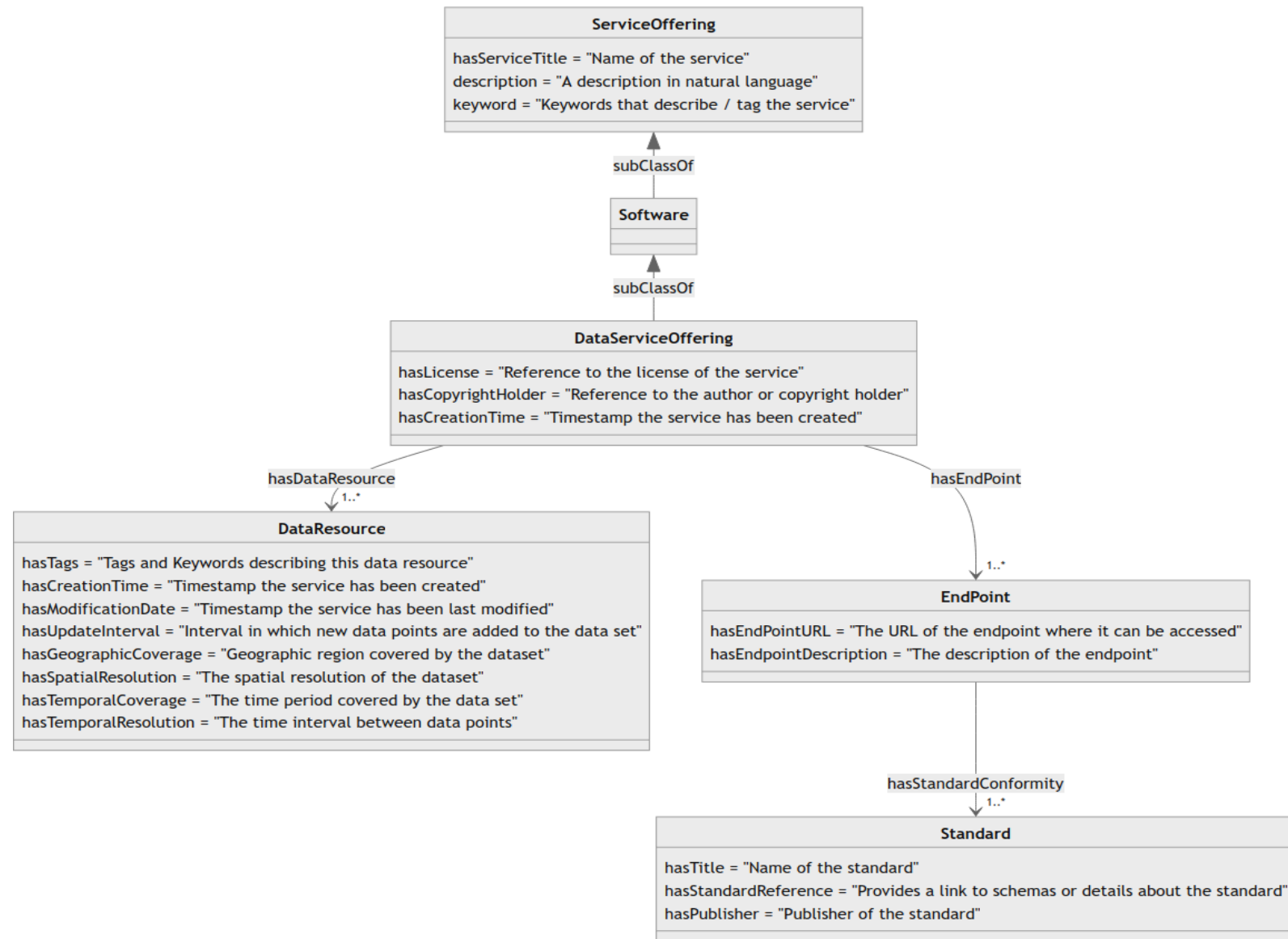
ServiceOffering

hasServiceTitle = "Name of the service"
description = "A description in natural language"
keyword = "Keywords that describe / tag the service"

subClassOf

Software

subClassOf

DataServiceOffering

hasLicense = "Reference to the license of the service"
hasCopyrightHolder = "Reference to the author or copyright holder"
hasCreationTime = "Timestamp the service has been created"

hasDataResource
1..*

DataResource

hasTags = "Tags and Keywords describing this data resource"
hasCreationTime = "Timestamp the service has been created"
hasModificationDate = "Timestamp the service has been last modified"
hasUpdateInterval = "Interval in which new data points are added to the data set"
hasGeographicCoverage = "Geographic region covered by the dataset"
hasSpatialResolution = "The spatial resolution of the dataset"
hasTemporalCoverage = "The time period covered by the data set"
hasTemporalResolution = "The time interval between data points"

hasEndPoint
1..*

EndPoint

hasEndPointURL = "The URL of the endpoint where it can be accessed"
hasEndpointDescription = "The description of the endpoint"

hasStandardConformity
1..*

Standard

hasTitle = "Name of the standard"
hasStandardReference = "Provides a link to schemas or details about the standard"
hasPublisher = "Publisher of the standard"

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Creating a Self-Description
Signing & Distributing

- Self-Sign the SD with its Claims

- Let a Trust Anchor sign the Claims

- Upload to a Catalogue

- Customers can

    - Find the Self-Description

    - Validate the Claims (if they trust the Trust Anchor)

    - (Negotiate a contract)

    - Use the service

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The state of Gaia-X

- Architecture & Policy Rules documents defines Gaia-X compliance

- GXFS-DE & GXFS-FR
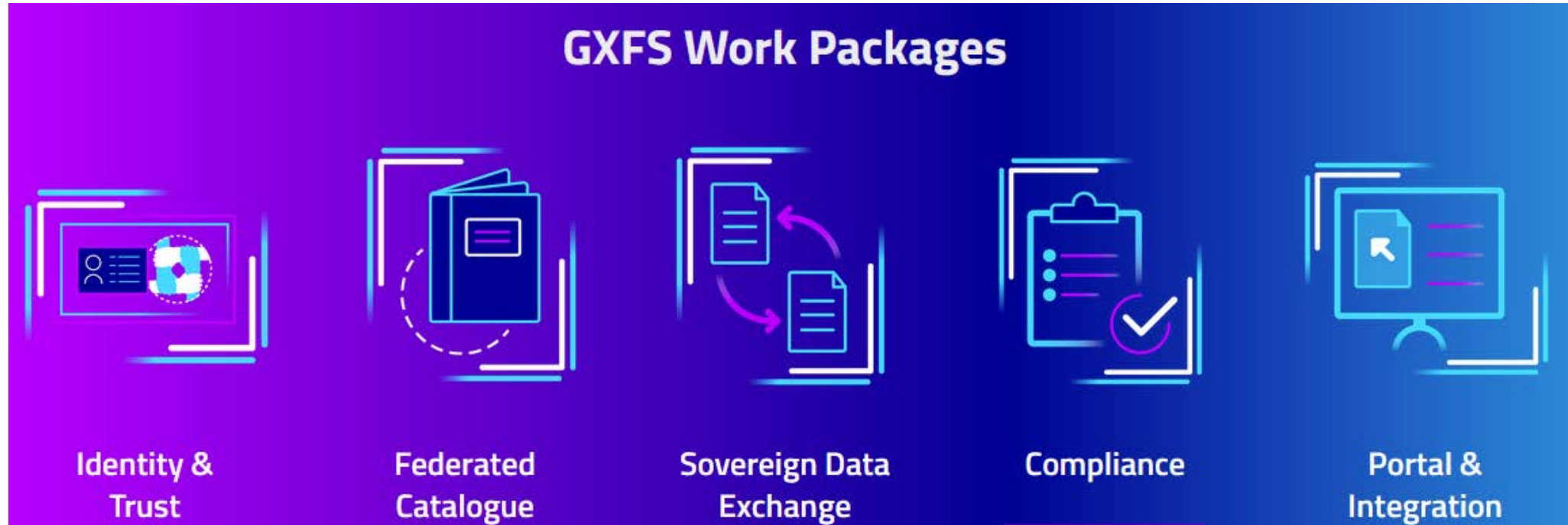
https://www.gxfs.eu/

Gaia-X Structure

Contact

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