



OASEES

The GAIA-X Framework – Correlation and Relevance to the OASEES Project



GROUP OF COMPANIES

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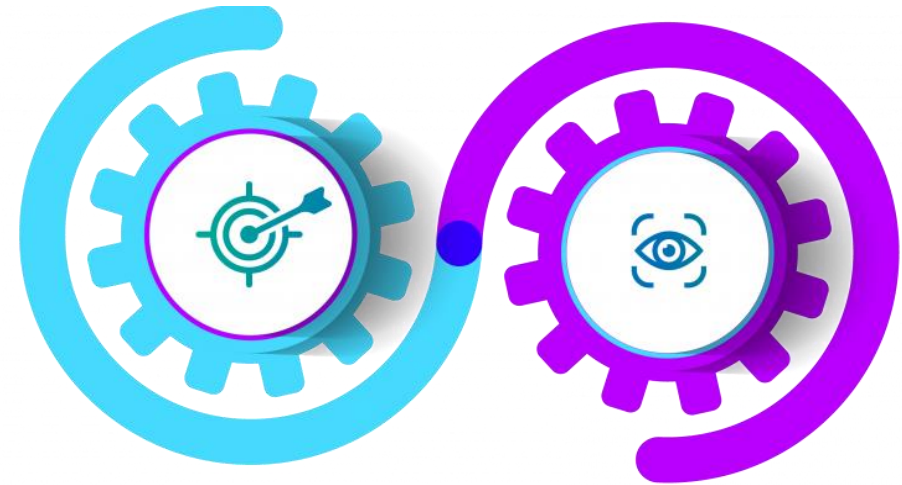
OASEES Use Cases

European Strategy for data

- **Data** is a **vital resource** for economic growth, competitiveness, innovation job generation and overall improvements in society.
- The increased volume, variety, social and economic significance of data indicates a **fundamental change** towards a **data-driven socio-economic model**.
- The **European strategy for data** aims at **creating a single market for data**.
- **Data Act** is a **key pillar** of the European strategy for data. Its main objective is to make Europe a leader in the data economy.
- **Data Economy** depends on a **shared framework of trust** that allows for the creation of common dataspace.

Gaia-X Project Vision & Mission

- **Gaia-X project was initiated in 2019 by the German and French Ministers of Economy** to ensure that *companies would not lose control of their industrial data when it is hosted by non-EU cloud service providers*
- **Gaia-X represents the next generation of data infrastructure:** An open, transparent and secure digital ecosystem, where data and services are available, collated and shared in an environment of trust.
- **Gaia-X aims to create new opportunities for innovative data-driven business models in the European Single Market**



A networked system that links many clouds and data service providers together



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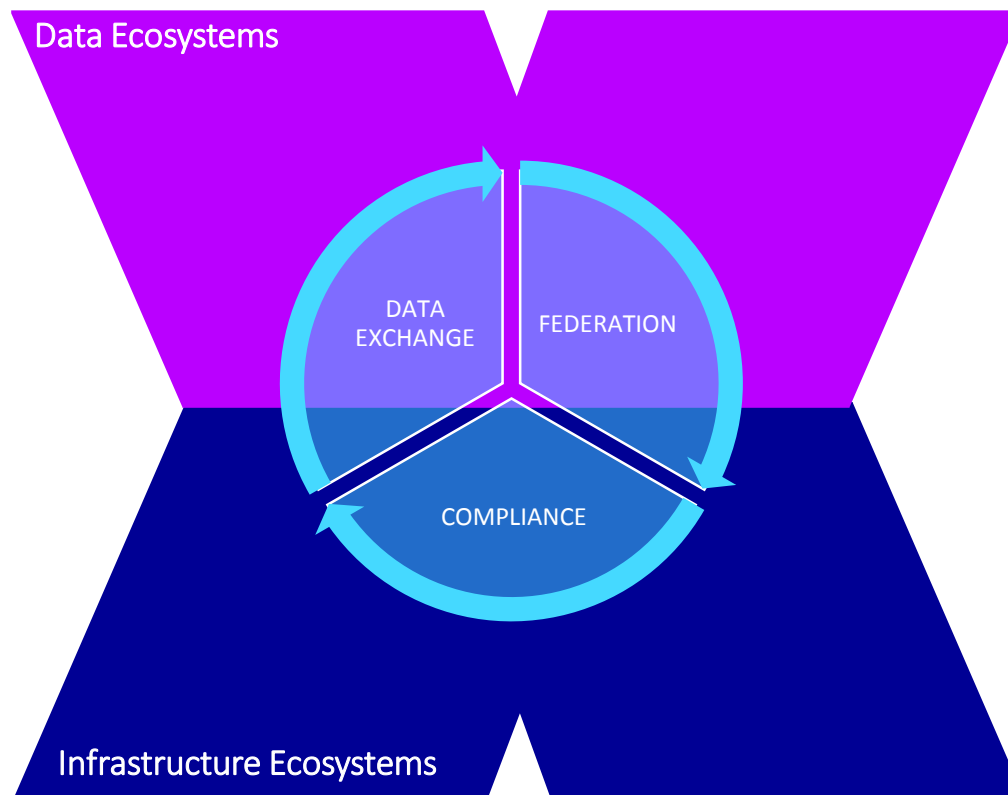
Gaia-X Connect Disjoint Ecosystem

Gaia-X enables and boosts the creation of Data Spaces **through trusted platforms** that comply with common rules, allowing users and providers to trust each other on an objective technological basis, to safely and freely share and exchange data across multiple actors.

Gaia-X aims **to connect** the **Data** and **Infrastructure Ecosystems** and **relies upon 3 conceptual pillars** to achieve that, *as follows*:

- **Gaia-X Compliance:** Decentralized services to enable objective and measurable trust.
- **Data Spaces / Federations:** Interoperable & portable (Cross-) Sector data-sets and services.
- **Data Exchange:** Anchored contract rules for access and data usage.

source: <https://gaia-x.eu/>



Gaia-X Data ecosystems

Data Spaces form the foundation of Data Ecosystems

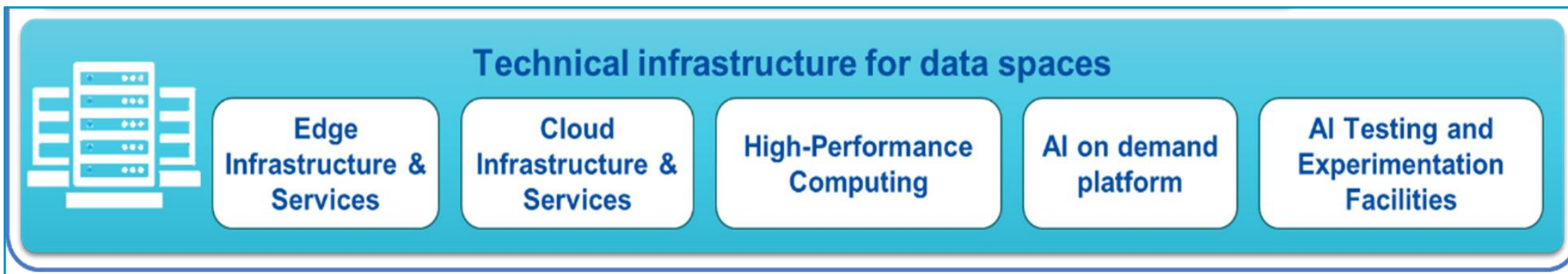
Data Space key features:

- *A secure and privacy-preserving infrastructure.*
- *A clear and practical structure for access to and use of data.*
- *European rules and values, personal data protection, consumer protection legislation and competition law, are fully respected.*
- *Data owners will be able to share or grant access to specific data that they are under their control.*
- *Data that is made available can be reused against compensation, including remuneration, or for free.*
- *Participation of an open number of organisations and individuals.*



Gaia-X Infrastructure ecosystem

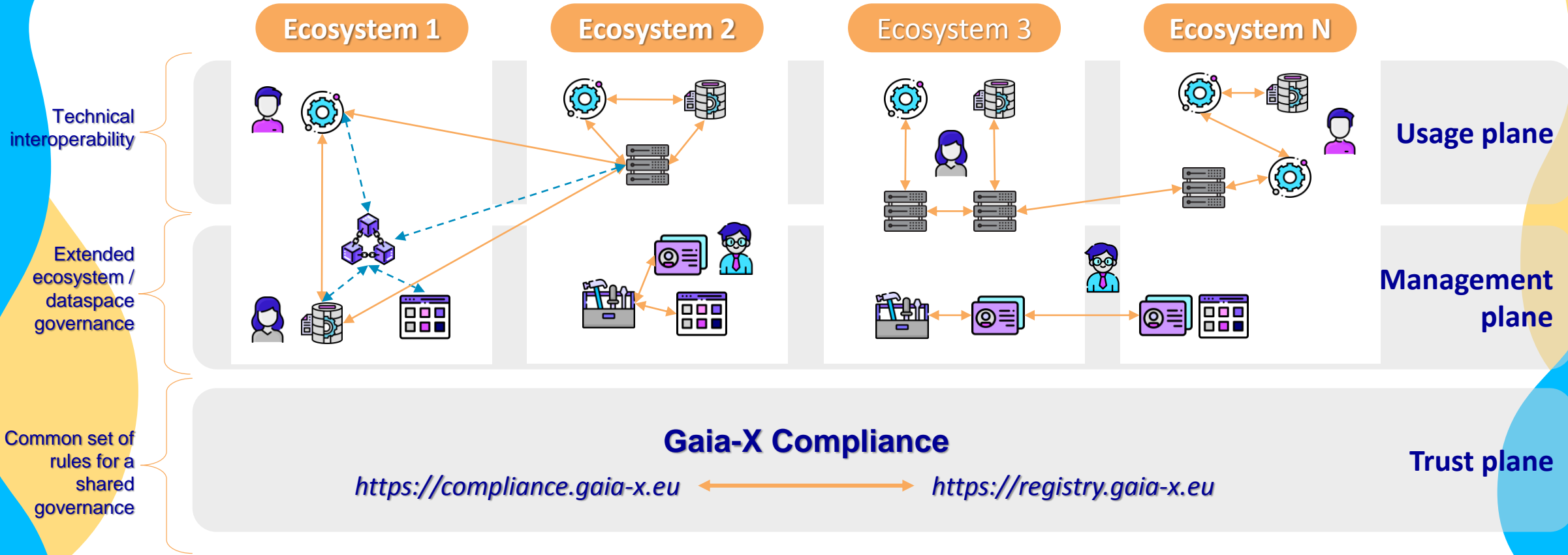
- **Gaia-X creates an infrastructure ecosystem by establishing portability and interoperability** between network and interconnection providers, Cloud Solution Providers (CSP), High Performance Computing (HPC), sector-specific clouds and edge systems.
- **Mechanisms are developed to find, combine and connect services** from participating providers to **enable a user-friendly infrastructure ecosystem**.
- **Gaia-X supports distributed use cases**, spanning from on-premise set-ups, cloud hosted infrastructure through to facility to edge cases.
- **Gaia-X address the complete technical stack**, including infrastructure and existing network/interconnection requirements (Architecture of Standards) of distributed use cases.





One Gaia-X Ecosystem, federating interoperable autonomous data-infrastructure ecosystems

Gaia-X Ecosystem: The virtual set of Participants, Service Offerings, Resources fulfilling the requirements of the Gaia-X Trust Framework



Gaia-X Federation Services (GXFS)

Gaia-X Federation Services (GXFS) represent the minimum technical requirements and services needed to operate federated Gaia-X ecosystems of infrastructure and data

➡ The technical implementation of these **Federation Services** focuses on:

- The implementation of secure **Federated Identity** and trust mechanisms (security and privacy by design).
- **Sovereign Data Services** which ensure the identity of source and receiver of data and the access and usage rights towards the data.
- Easy access to the available providers, nodes and services. Data will be provided through a **Federated Catalogue**.
- The establishment of a **Compliance framework** and **Certification and Accreditation services**.

Open autonomous programmable cloud apps & smart sensors



Duration: 3 years
Start Date:
January 1st, 2023



Work Programme:
Horizon Europe



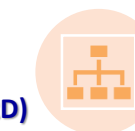
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101092702



Project's Budget:
€ 7.987.425



Project Coordinator:
National Centre for Scientific
Research "Demokritos" (NCSR)



Technical Manager:
IMEC



<https://oases-project.eu/>



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Major Issues and Challenges



As a result of the exponential growth of device connectivity and generated data, intelligent processing services that generate insights and exploit data in a multimodal way have multiplied.



At present, the most robust data processing is conducted in a centralised way via the cloud, enabling efficient resource allocation and scalability. By utilising centralised processing and cloud hosting, organisations restrict the resources that can be allocated to their services and applications.



Organizations depend on large single entities to supply the following:

- i) Authentication, ii) Data storage, iii) Data processing, iv) Connectivity, and
- v) Vendor-locked environments for development and orchestration



This restricts the user's ability to administer their **data governance and identity** significantly.

In the same way, current approaches to periphery device authentication require the trust and authentication of a centralised entity, thereby establishing an identification paradigm that is not portable.

OASEES objectives



Objective 1

Design a **decentralized, agile and secure architecture** for collaborative smart nodes at the edge, backed by the **Decentralized Autonomous Organization (DAO) paradigm integration**



Objective 2

Native device support by integrating Self Sovereign Identity (SSI) for a portable digital identity .

OASEES Decentralized device identity will fulfil all four requirements: persistence, global resolvability, cryptographic verifiability, and decentralization



Objective 3

Build rapid development kits (RDks) for an open programmable framework across different smart edge nodes, while incorporating efficient cloud-to-edge continuum intelligence across heterogeneous target environments



Objective 4

Demonstrate the **framework and programmability toolkit in a set of different vertical use cases** and evaluate the benefits across different sectors



Objective 5

Maximize the impact of the OASEES results. **Foster the creation of an open-source community** around the OASEES solution, engaging a diverse set of stakeholders



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OASEES Scope

- **OASEES vision** is to provide the **open tools and secure environments for swarm programming and orchestration for numerous fields**, in a completely decentralized manner.
- **OASEES targets the implementation of a portable and privacy preserving ID federation system** (for Identification and Identity management), for edge devices and services, **with full compliance and compatibility to Gaia-X federation trust directives and specifications.**
- **OASEES provides a secure data exchange mechanism through Gaia-X framework** for data exchange across actors in the same or different OASEES instances.
- **OASEES will contribute to European level projects like Gaia-X** that aim to maximise benefits from the use of data.
- **OASEES will utilise GAIA-X data formats to ensure interoperability**, provide feedback on the use of its technologies and investigate how AI/ML models compatible with their data formats can be distributed to the OASEES platform.



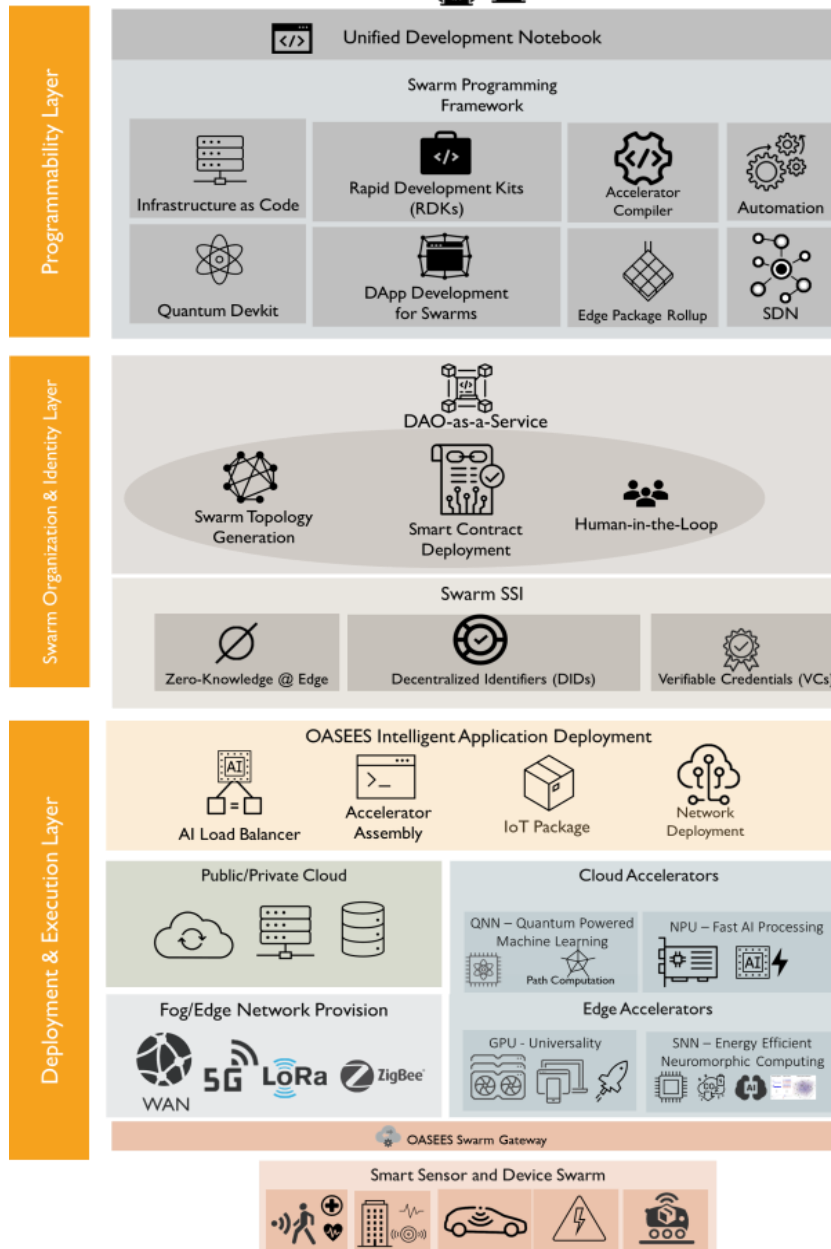
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OASEES Architecture

Programmability Layer

Swarm Organisation & Identity Layer

Deployment and Execution Layer



Data Federation Layer

Data Federation Layer





OASEES Architecture

OASEES The OASEES project, similarly to the **Gaia-X** project, is built on the core principles of data democratization, shared governance, secure data exchange, and trusted data sharing.

Adopting a decentralized architecture will create a low latency environment for various applications and services, ensuring data privacy, security, cost-effective storage and data availability.

■ **Programmability Layer**

OASEES portals and tools interact with data, identity and trust services. The components of OASEES SDK are used for the programmability and orchestration of the swarm of IoT devices.

■ **Swarm Organization and Identity Layer**

- ✓ **DAO as a service.** Decentralized Autonomous Organizations (DAOs) are **blockchain-based communities** that are designed to bring a new, more **open and democratic** management structure
- ✓ **Swarm Self-Sovereign-Identity introduces a new approach** in which the users and devices manage their identity themselves with increased end-to-end security and data privacy by controlling what is shared, with whom and for what purpose

■ **Deployment & Execution Layer (Application Deployment, Cloud, Cloud/Edge Accelerators, Network Provision)**

OASEES, like **Gaia-X**, enables combinations of services that range across multiple providers of the Ecosystem. OASEES's authentication feature guarantees that **only nodes with a trusted hardware, firmware, and operating system are used**. The Infrastructure Ecosystem has a focus on computing, storage and interconnection services. *Interconnection services enable various providers to offer services, ensuring the performance of single-provider network on a multi-provider "composed" network.*

OASEES Data federation and sovereignty framework

Use Gaia-X Identity and Trust plane for Authentication/Authorisation and Trust Services

Use Gaia-X/IDSA Data exchange tools for Data sharing (Sovereign Data Exchange)

Use Gaia-X Federated Catalogue instead of developing a specific Broker within OASEES

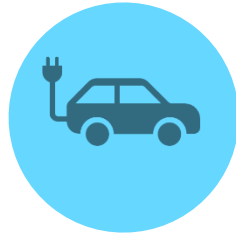
Evaluate if GXFS tools are suitable for an OASEES specific implementation of Gaia-X concepts

Include OASEES instances and infrastructure providers within the Gaia-X ecosystem

OASEES Swarm Use cases



E-Health: Smart Nodes for Analysis of Voice, Articulation and Fluency disorders in Parkinson Disease



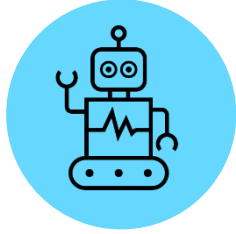
Mobility: EVs fleet coordinated recharging to support optimal operation of electricity grid



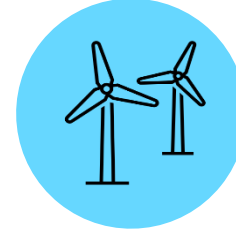
Security: Drone Swarm over 5G for High Mast Inspection



Buildings: Swarm powered intelligent Structural safety assessment for Buildings



Industrial: Robotic Swarm powered Smart Factory for I4.0



Renewable Energy: Smart Swarm Energy harvesting and Predictive Maintenance Wind turbines

Thank you!
Do you have any questions?

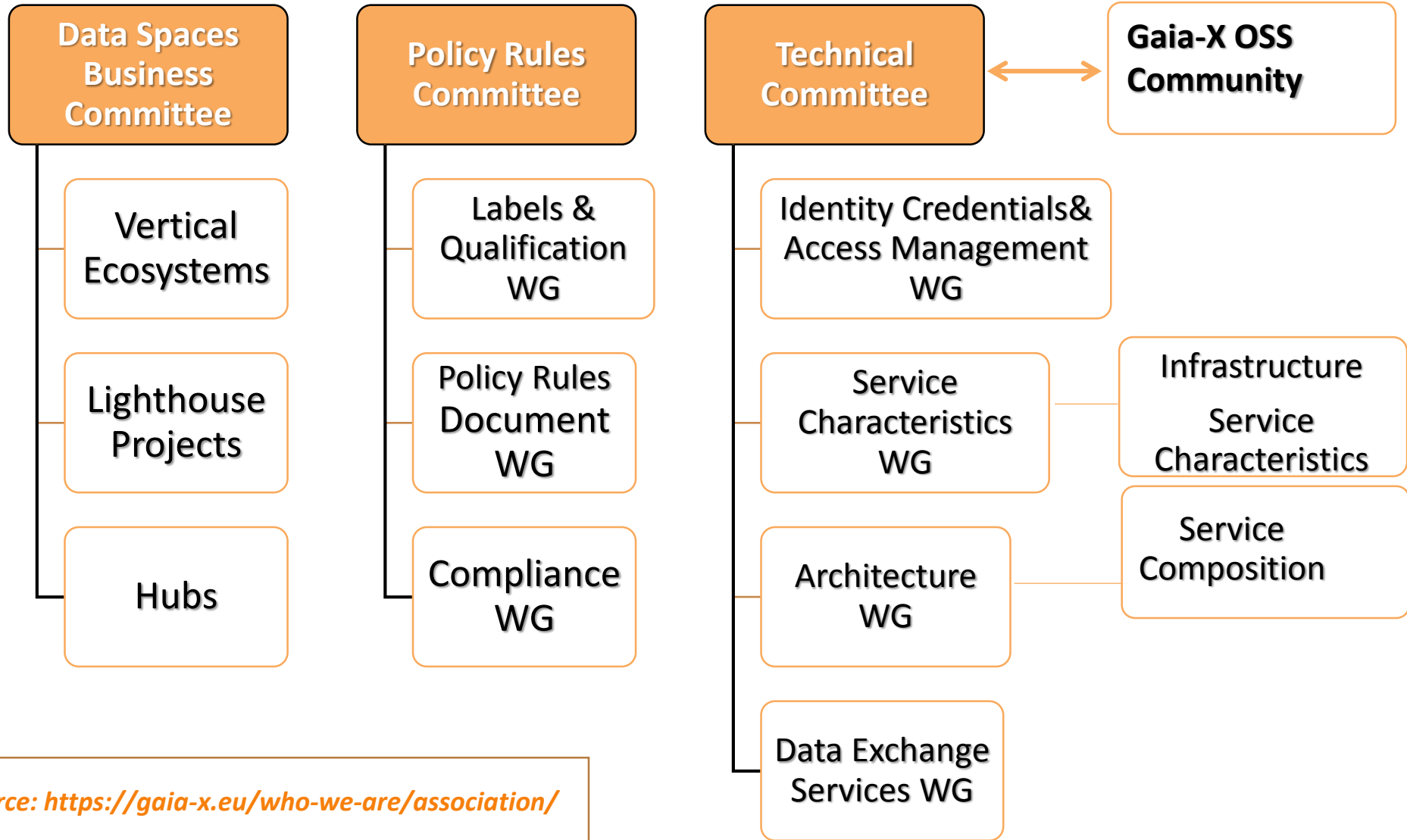


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Gaia-X Committees & Working Groups



Source: <https://gaia-x.eu/who-we-are/association/>