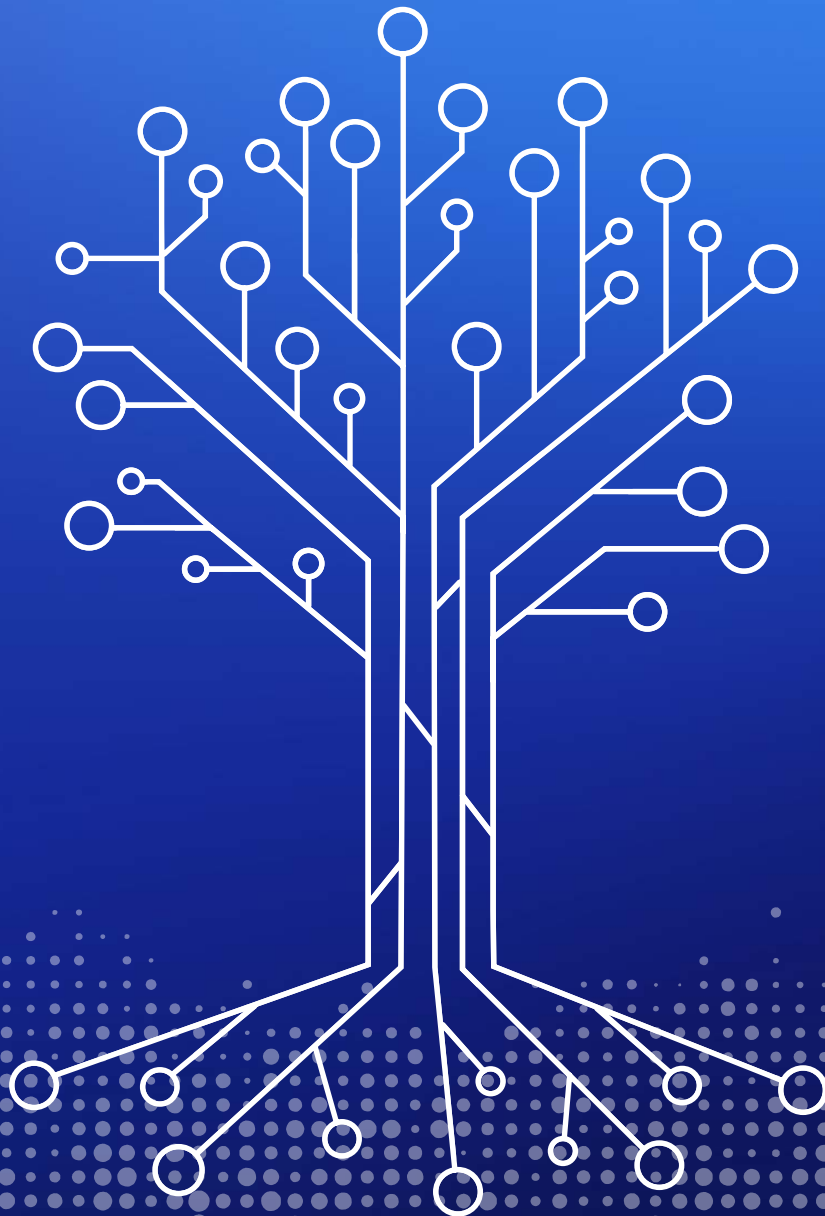


GAIA-X

# GAIA-X: The European project kicks off the next phase



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# GAIA-X: The European project kicks off the next phase

Driven by the conviction that we can push forward the development of a sustainable and innovative data economy in Europe, we launched the GAIA-X project in autumn 2019<sup>1</sup>. Encouraged by widespread support, the development of a trustworthy and sovereign digital infrastructure for Europe remains our declared goal. GAIA-X will support the development of a digital ecosystem in Europe, which will generate innovation and new data-driven services and applications. To this end, GAIA-X will enable interoperability and portability of infrastructure, data and services and establish a high degree of trust for users.

We – European partners from business, science and politics – see the GAIA-X project as a unique opportunity to strengthen the European Digital Single Market and its competitiveness. In our view, GAIA-X provides a strong foundation for the European strategy for data<sup>2</sup> – which we support – in order to create and secure sovereignty regarding the core foundations of a data-driven economy. The result will be a modern, competitive next-generation data infrastructure that meets the needs of business, science and society.

## Box 1: Guiding principles of GAIA-X – Digital Summit 2019

1. European data protection
2. Openness and transparency
3. Authenticity and trust
4. Digital sovereignty and self-determination
5. Free market access and European value creation
6. Modularity and interoperability
7. User-friendliness

1 [https://www.bmwi.de/Redaktion/EN/Publikationen/Digitale-Welt/project-gaia-x.pdf?\\_\\_blob=publicationFile&v=4](https://www.bmwi.de/Redaktion/EN/Publikationen/Digitale-Welt/project-gaia-x.pdf?__blob=publicationFile&v=4)

2 [https://ec.europa.eu/info/sites/info/files/communication-european-strategy-data-19feb2020\\_en.pdf](https://ec.europa.eu/info/sites/info/files/communication-european-strategy-data-19feb2020_en.pdf)

GAIA-X is receiving a great deal of attention, interest and, above all, extensive support from business and politics in Europe and beyond. The expectations are high. We – representatives from about 300 companies and organisations from many countries – have been working intensively on the GAIA-X project over the past six months. We have taken a big step forward in the development of a digital infrastructure ‘Made in Europe’, which will offer both providers and users a multitude of new possibilities. Thereby we have remained aligned with our guiding principles (Box 1), which we have deepened in the Franco-German position on GAIA-X<sup>3</sup>.

With the first draft of an architecture paper, we introduce a concept of GAIA-X that technically defines the core functions in the GAIA-X ecosystem, the so called ‘federated services’ and role models as well as functionalities. The federated architecture is based on European policy rules and standards and will implement these efficiently. We are making first proposals for our ‘Policy Rules and Architecture of Standards (PRAAS)’ and how they are to be systematically compiled and amended. Further, we have produced a list of forty use cases presenting innovative ideas, which require GAIA-X in order to be implemented. Using them, we have defined cross-sectoral requirements of GAIA-X.

We will now transform GAIA-X into a broad-based European project and continue to develop it further. In this context, we are striving for synchronisation with the European data strategy, in particular with the planned European Cloud Federation and the creation of a cloud rule book. At the same time, we reiterate our invitation to all those who share our values and goals to participate in the GAIA-X project.

The road map for GAIA-X foresees the creation of an international, non-profit society governed by Belgian law (“GAIA-X foundation AISBL”<sup>4</sup>) that will shape the framework for the GAIA-X ecosystem and provide key functionalities. Based on examples of existing European not-for-profit companies, a corporate legal framework was outlined. The purpose of this organisation is to commit the members to our common goals: data sovereignty, data availability, interoperability, portability, transparency and fair participation.

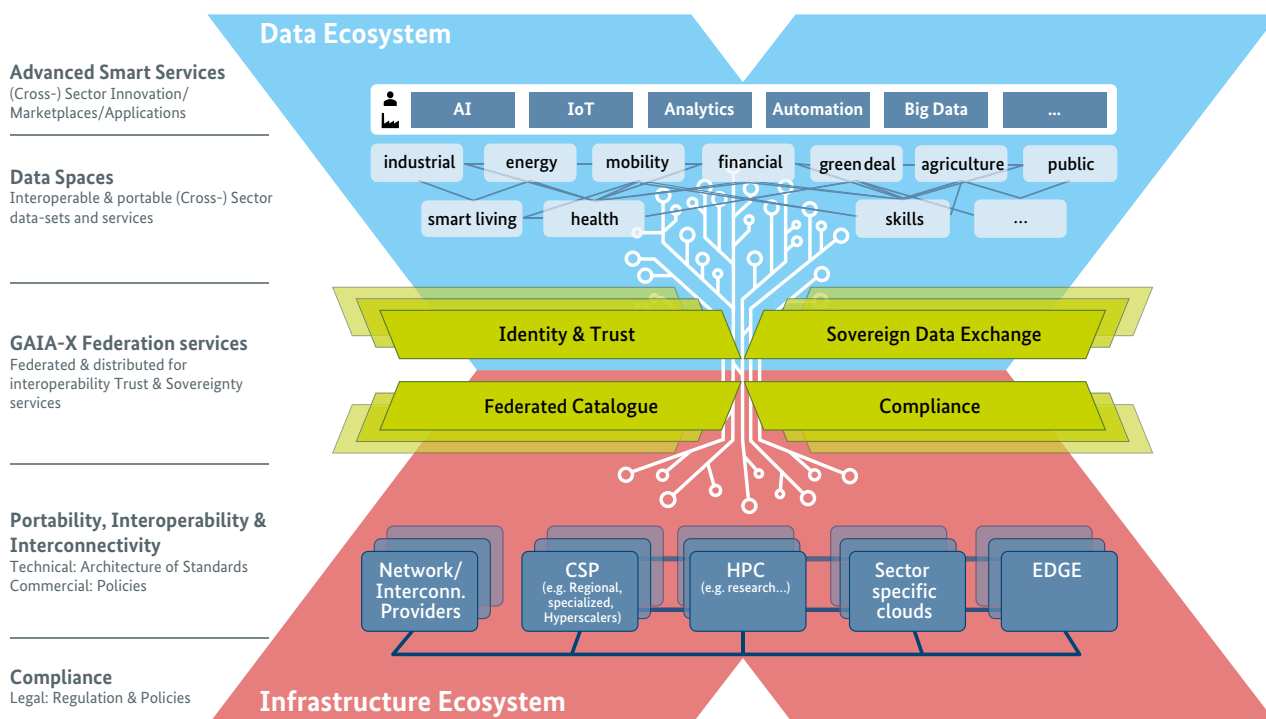
3 Franco-German Position on GAIA-X, Februar 18th, 2020 – [https://www.bmwi.de/Redaktion/DE/Downloads/F/franco-german-position-on-gaia-x.pdf?\\_\\_blob=publicationFile&v=10](https://www.bmwi.de/Redaktion/DE/Downloads/F/franco-german-position-on-gaia-x.pdf?__blob=publicationFile&v=10)

4 AISBL: Association internationale sans but lucratif.

## The emergence of an innovative data and services ecosystem

The intended set of rules and regulations and the implementation of GAIA-X provide for the linking of data ecosystems and infrastructure ecosystems (Figure 1). The result is a federated and interoperable digital ecosystem.

Figure 1: Architectural concept with GAIA-X federated services



Source: BMWi

Participants maintain sovereignty when using data and services across sector-specific data spaces. All data and service offers are transparent and the dependencies ('lock-in effects') on individual providers are reduced. A uniform data and service space is created based on jointly agreed rules and standards (see PRAAS).

For providers in the infrastructure ecosystem, a standardised set of interconnected nodes offers new opportunities to bring innovative and customised offers to the market. For example, they can link their services with each other and jointly evolve, expand and scale them.

The first demonstrators of subfunctions of GAIA-X services are already in the process of development and will be steadily improved. For this purpose, GAIA-X federation services linked to various use cases and sectors are being implemented as prototypes. The federation services themselves will be continuously enhanced in a dialogue with users to ensure their practicality.

An extensive description of the mechanics of GAIA-X and the resulting opportunities for both users and providers can be found in the document 'GAIA-X: Driver of digital innovation in Europe – Featuring the next generation of data infrastructure'.

Link: [www.data-infrastructure.eu/gaia-x-driver-of-digital-innovation-in-europe](http://www.data-infrastructure.eu/gaia-x-driver-of-digital-innovation-in-europe).

## European values as the basis of GAIA-X

GAIA-X is committed to European values. We have therefore started a European process, which we will now broaden, to identify the rules ('Policy Rules') relevant to GAIA-X. These include, above all, requirements of the European Data Protection Regulation, the 'Free Flow of Non-Personal Data Regulation' and the Cybersecurity Act. GAIA-X will provide the necessary mechanisms to ensure that GAIA-X participants are compliant with these rules and that they are made transparent to the customer.

The GAIA-X ecosystem will be based on regulatory, sector-specific and technical standards – which we call 'Architecture of Standards'. Only the application of these standards in their entirety will bring to fruition the high level of interoperability and security in the GAIA-X ecosystem that we are promising. It will enable the easy switching of providers, facilitate portability across providers and interlinking of data and services. GAIA-X will build on what already exists. Proven standards, architectures and activities of various initiatives will be the foundation. Here too, we are initiating a broad and transparent European process to define an 'Architecture of Standards' for GAIA-X, and to continuously extend and evolve it.

Detailed information regarding the transfer of European values into a GAIA-X-set of rules ("PRAAS-process") can be found in the document 'GAIA-X: Policy Rules and Architecture of Standards'.

Link: [www.data-infrastructure.eu/gaia-x-policy-rules-and-architecture-of-standards](http://www.data-infrastructure.eu/gaia-x-policy-rules-and-architecture-of-standards).

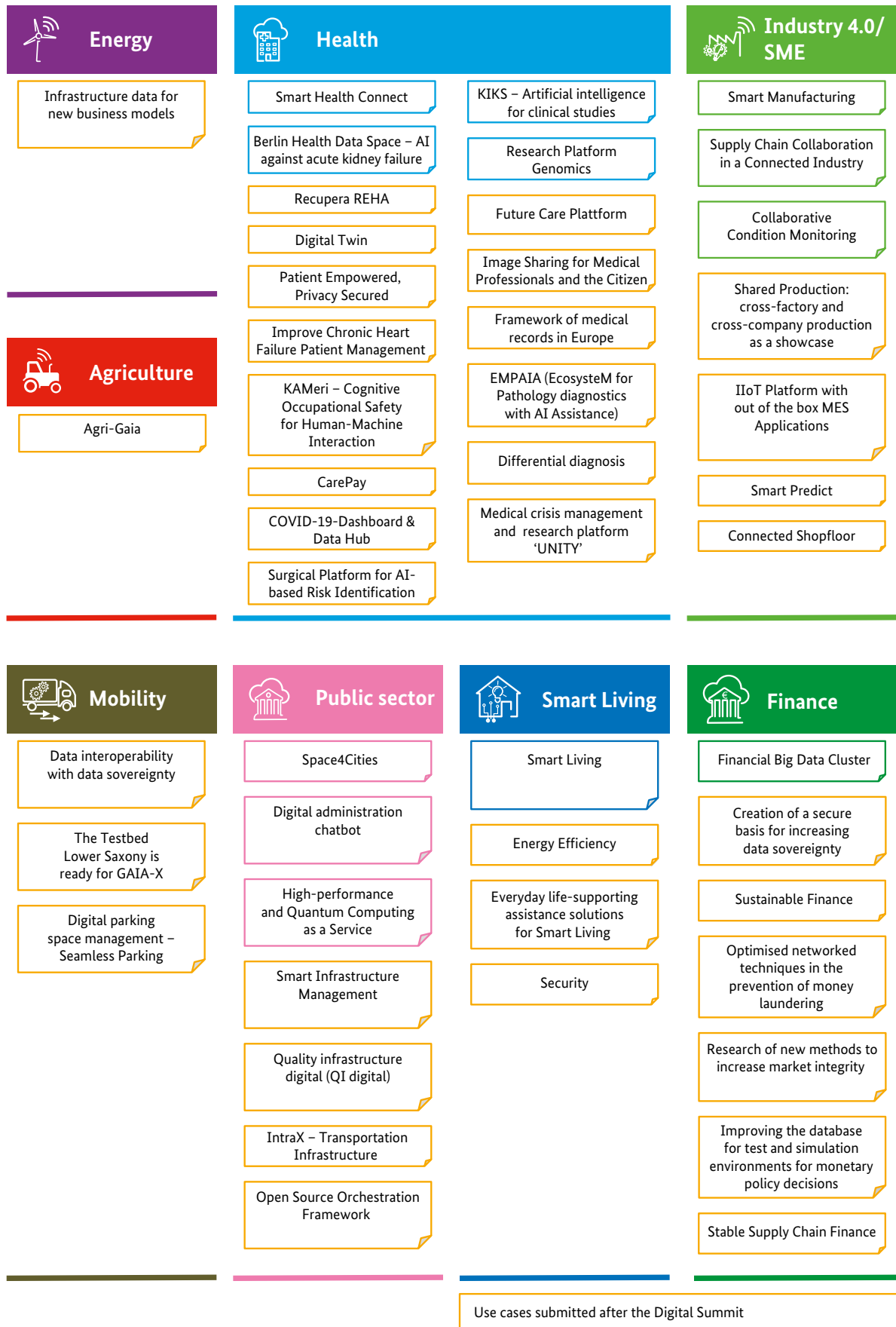
## User focus

Thanks to GAIA-X, there are unprecedented opportunities to create new data spaces and to develop innovative data-driven business models and new solutions for the benefit of society, for example in the areas of health, mobility and smart cities. Predominant data silos, a lack of standards and the limited transparency of data infrastructure offers are today major obstacles to the application of artificial intelligence. To overcome these obstacles would be very costly and for this reason, the diverse know-how available in Europe is not pooled and used efficiently.

In the last few months of our GAIA-X process (see Figure 2), we have identified exemplary requirements from more than 40 use cases<sup>5</sup> from seven economic sectors, which underline the enormous potential of GAIA-X across all user domains and data spaces. The collection of use cases ([www.data-infrastructure.eu/gaia-x-from-the-user-perspective](http://www.data-infrastructure.eu/gaia-x-from-the-user-perspective)) will be continuously expanded.

5 Currently use cases are rooted in Germany, France, The Netherlands and Spain.

Figure 2: Compilation of use cases (not final)



Source: BMWi

We have specified the cross-sectoral requirements for GAIA-X from this perspective (see Box 2 below). These are directly incorporated into the work on the GAIA-X technical concept.

#### Box 2: GAIA-X requirements

GAIA objectives linked to cross-sectoral requirements from the user perspective

- Openness, low barriers for SMEs, modularity, user-friendliness
- Decentralisation, fair competition between all market participants, no digital oligopolies
- Creation of a marketplace (respective incentives) for data exchange across different actors in the ecosystem
- Data sovereignty as a basis: GAIA-X users should be able to decide which of their data is to be provided with which access rights for which other users and for which purposes
- Secure data exchange, e.g. via a uniform, standardised and open identity management, trustworthiness
- Uniform definition of protection classes for data and services
- Interoperability across domains and applications

The next step will consolidate and detail the domain use cases with the target of developing domain-specific demonstrators that map individual basic and sub-functionalities of GAIA-X.

In order to reflect the diverse regional economic structures in Europe, we would like to see the Europe-wide emergence of GAIA-X hubs and anchor centres as crystallisation points for GAIA-X. There is already a variety of initiatives in the EU and its member states (see also Box 3) which are driving the development of new business models and data spaces. Together they will form a network that drives the implementation of GAIA-X regionally, nationally and internationally. Within this network, national or sectoral specifics can be addressed on the one hand, and cross-border cooperation can be organised on the other. The integration of small and medium-sized enterprises into the GAIA-X ecosystem will be facilitated. The “GAIA-X foundation” will benefit from this network.

Detailed results can be found in the document ‘GAIA-X: A Pitch Towards Europe – Status Report on User Ecosystems and Requirements’.

Link: [www.data-infrastructure.eu/gaia-x-a-pitch-towards-europe](http://www.data-infrastructure.eu/gaia-x-a-pitch-towards-europe).



### Box 3: Overview of initiatives relevant for GAIA-X

Europe and its member states operate many initiatives and organisations that create relevant foundations for GAIA-X through codes of conduct, rules, standards or community building. GAIA-X is not a greenfield project – it will build on existing results and activities. A governance process will be established.

The following, non-exhaustive list provides an exemplary overview and may be added to.

#### **Data sharing and data sovereignty**

**IDS**A (International Data Spaces Association) governs a reference architecture describing fundamental design principles for data sovereignty based on open standards, which can serve as a kick-start for GAIA-X and contributes to global standards itself.

**BDVA** (Big Data Value Association) is the private counterpart to the EU Commission to implement the Big Data Value Public Private Partnership programme. The vision of BDVA is to ensure that Europe remains the leader in the research, development and application of value-oriented and trusted artificial intelligence, data and robotics.

**UMATI** is a world language for interoperability at the machine level.

#### **Codes of conduct**

**CISPE** (Cloud Infrastructure Services Providers in Europe) is a trade association that gathers infrastructure as a service (IaaS)-cloud providers governing the CISPE Data Protection Code of Conduct.

**EU Cloud CoC** is hosted by SCOPE Europe BVBA and is a XaaS Code of Conduct for cloud services demonstrating adherence to the European data protection requirements.

**SWIPO** (Switching Cloud Service Providers and Porting Data) is a multi-stakeholder group which governs codes of conduct to enable the proper application of Article 6, 'Porting of Data' of the EU Free Flow of Non-Personal Data Regulation.

#### **Policies, certification, compliance**

**AUDITOR**: (European Cloud Service Data Protection Certification) develops an EU-wide data protection certification according to Article 42 of the GDPR.

**BSI C5**: The cloud computing compliance controls catalogue (C5), published by BSI (German Federal Office for Information Security), defines the requirements for information security for cloud computing and can be a basis for information security attestations.

**Trusted Cloud** is a competence network that issues the Trusted Cloud label for cloud services and is active in setting European standards for Cloud labels and certifications.

**CSPCERT** (European Cloud Service Provider Certification) is a private and public stakeholder group, which has worked to provide a recommendation in relation to the security certification of cloud services.

#### **Open-source frameworks**

**OS** (Open Source Business Alliance) is committed to anchoring the central importance of open-source software and open standards for a digitally sovereign society in the public mind.

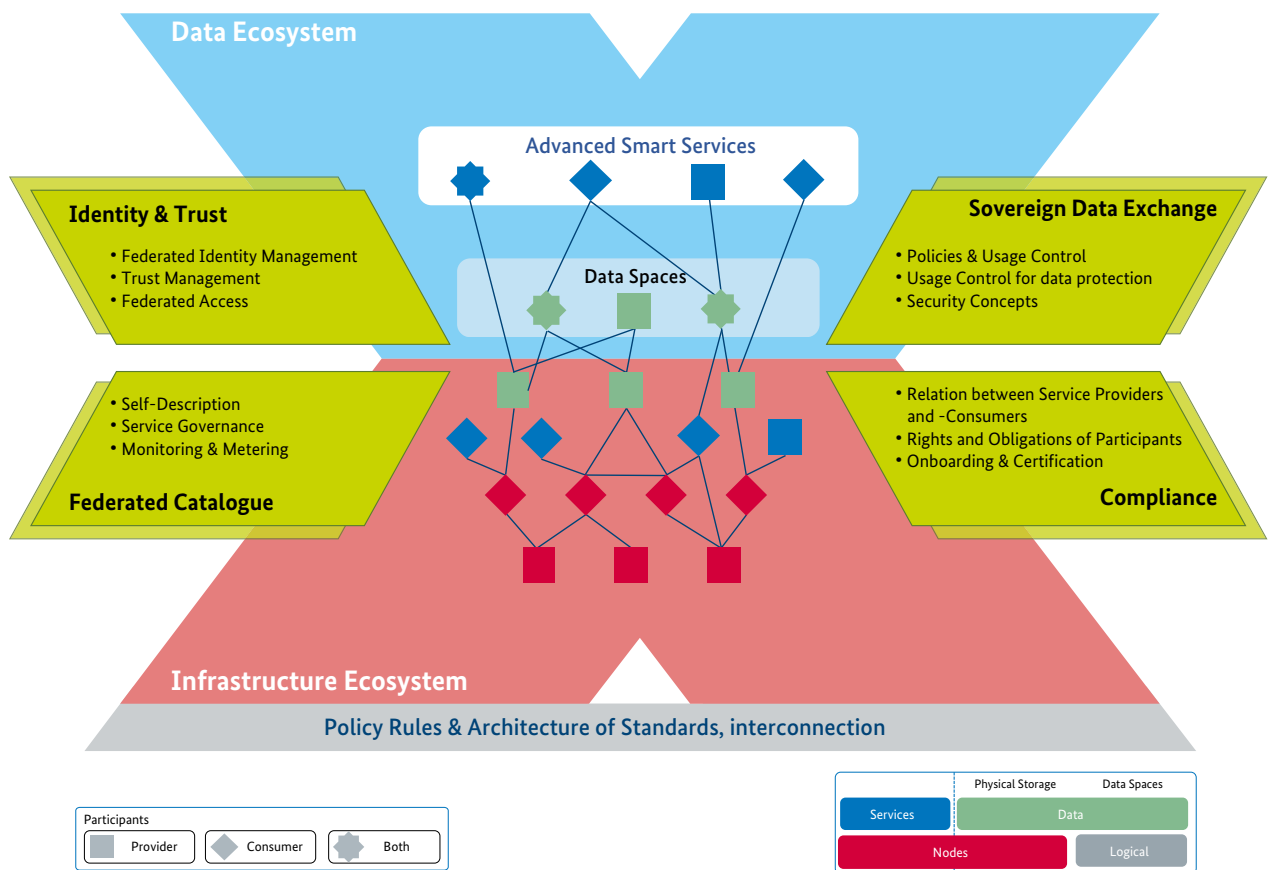
**FIWARE** is a curated framework of open-source platform components to accelerate the development of smart solutions in various domains.

## Design of a technical architecture concept for a federated data infrastructure

Below is a first architectural concept with the essential elements that are present in the current state of its development. This concept implements the European rules (see document ‘Policy Rules and Architecture of Standards’ – PRAAS and Box 2) and the high-level user requirements for GAIA-X. The core of GAIA-X is being continuously developed. The future “GAIA-X foundation” will gradually take over control of this process.

The architectural concept also presents in detail a role concept for the participants in the GAIA-X ecosystem (Figure 3).

**Figure 3: Architectural point of view: overview of various roles (participants) and their interaction with GAIA-X assets and federated services**



Source: BMWi

The architectural concept defines the individual roles in the GAIA-X ecosystem which can be taken – also simultaneously – by the different participants. Therefore it demonstrates the interaction with various GAIA-X components (assets), in particular with ‘services’, ‘data’ and ‘nodes’.

To guarantee this interaction, the GAIA-X federation services that have a central role in the architectural concept are defined (see Figure 3). They provide the required supporting services to enable providers and users to connect in an interoperable and legally watertight manner. They are thus creating the foundation for an open ecosystem.

These services include, above all, federated identity and access management, a federated catalogue with a directory of all providers and services, specifications and solutions for the sovereign exchange of data, as well as certification and compliance. The development of these services is the core task of the “GAIA-X foundation”.

Detailed results are available in the document ‘GAIA-X: Technical Architecture – Release June 2020’.

Link: [www.data-infrastructure.eu/gaia-x-technical-architecture](http://www.data-infrastructure.eu/gaia-x-technical-architecture).

## European companies and institutions take on responsibility – formation of the “GAIA-X foundation AISBL” – outlook

Right at the start of the project, it was our goal to establish an organisation that would make the process more reliable in the coming weeks, the “GAIA-X foundation” will be founded as an international non-profit association under Belgian law (*association internationale sans but lucratif*, AISBL) with its headquarters in Brussels. The choice of this legal form underlines the commitment to a transparent European process, openness and broad participation. The rapid broadening of the membership base – across borders and across sectors and interests – is our next goal.

- This organisation is to be set up in such a way that it stabilises and facilitates work and cooperation within the GAIA-X community, develops the necessary concepts, guidelines, regulatory frameworks, open-source software, platform and tool specifications, documentation and architecture definitions, etc., and provides the necessary central facilities and services (in particular a service/data/provider directory).
- Such an organisation should only offer facilities and services to the extent necessary for the functioning of the network and that cannot be offered by the companies affiliated to the network itself.
- We want the organisation to also act as an global ambassador for GAIA-X, taking over the administrative tasks of the network and promoting international cooperation in the areas of digital sovereignty, cloud, high-performance computing, edge computing, cyber security and standardisation. To this end, it will work closely with other initiatives in this field.

The creation of a vital ecosystem of innovation remains our overarching goal for GAIA-X; data sovereignty and data availability remain our guiding principles. The documents presented here are the first milestone. It is flanked by a large number of contacts in other European member states, the European Commission, organisations and institutions, and companies of all sizes. Together, we now want to continue on the path we have chosen with a steadily growing number of European and international partners. We expressly invite you to participate, to work constructively with us, and to fight for the best way forward.

Europe’s companies, its people and its ideas have tremendous potential in the data economy. GAIA-X is the key to unlocking this potential.

# Appendix



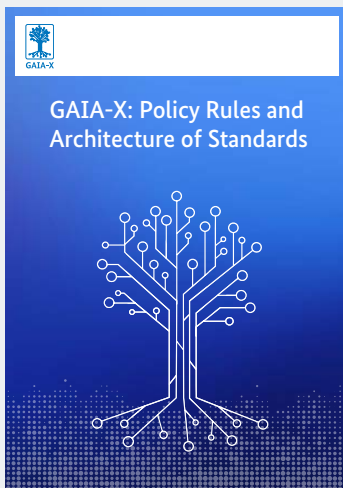
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