# Cloud Computing in Europe: Appendix 15

# GAIA-X Initiative Case Study

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**h-cloud.eu**

| Title | Cloud Computing in Europe. Appendix 15: GAIA-X Initiative Case study |
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# CONTENTS

# 1 GAIA-X: A CONNECTED DATA INFRASTRUCTURE FOR A VIBRANT EUROPEAN ECOSYSTEM

At its digital summit on October 29, 2019, the German Ministry for Education and Research — together with the Ministry of Economics — unveiled its vision for a connected, cloud-based data infrastructure for Europe. GAIA-X has two main goals:

- To win back sovereignty over European citizen and company data, by ensuring that data does not leave European soil unintentionally
- Reduce dependency and risk of lock-in by enabling service and data portability.

By delivering on those two strategic goals, GAIA-X expects to encourage cloud-skeptic European organizations (particularly SMEs) take advantage of cloud while maintaining control of their data. And to foster the creation of an open digital innovation ecosystem in which data can be collected and shared securely while adhering to European privacy regulation. It is not intended to be competitive to global hyperscalers — it will be a layer on top of their services.

## 1.1 Not a new Idea: Foundation Laid in 2014

In 2014, the same ministry launched an initiative for the International Data Space (IDS), which also aims to drive European data sovereignty. IDS created a secure data space that enables organizations from different industries to monetize their data resources through secure exchange and easy combination of data in value chains, which in turn is the foundation for smart services, innovative solutions, and automated business processes. IDS is a critical part of GAIA-X and provides expertise and partners to the initiative. More than 100 organizations, mostly from Germany, but including other countries like Spain and the Netherlands, are already collaborating in the International Data Space (for example, in materials research, pharmaceuticals, and healthcare). IDS use cases are developed collaboratively between end-users and technology companies, like SAP, Siemens and T-Systems. The Fraunhofer Institute plays a key role in developing software components and ensuring that the connectors - data flow policies, application policies – that technology companies make available are interoperable with the standard messaging architecture.

## 1.2 GAIA-X Strategy

GAIA-X plans to connect decentralized infrastructure services such cloud and edge into a homogeneous, user-friendly system. It is planned as a peer-to-peer network in which GAIA-X certified organizations - known as "nodes" - can rent server capacity to each other. It is also intended to offer machine learning and artificial intelligence as a service to organizations, especially to the SMB segment through standardized APIs. The GAIA-X framework will operate at the SaaS and PaaS layers, and, depending on the use cases, at the IaaS layers, where the market does not already offer a solution.

The result will be a connected data infrastructure that enhances the digital sovereignty of cloud services users as well as the scalability and competitive positioning of Europe-based cloud service providers (Figure 1).

Figure 1. GAIA-X Data Infrastructure and Ecosystem[1]

## 1.3   GAIA-X Governance

The GAIA-X program is led by the German Federal Ministry for Economic Affairs and Energy (BMWi), which initiated it with German industry giants like SAP, T-Systems, Siemens and Bosch.

The GAIA-X has proactively involved governments and industry players from other European countries, starting with France, and more recently Italy, Netherlands, Finland, Austria and Spain. The French government and BMWi have already issued a formal joint communication to collaborate on the GAIA-X roadmap.

The participation has quickly grown from 20 companies in October 2019 to over 150 at the end of February 2020. A two-tier governance is emerging:

- Tier-1. There is a central program management office led by BMWi, Fraunhofer Institute, SAP, Bosch, Siemens. This central PMO makes the final decisions about long-term strategy, operating model, business model and rules for other entities to participate in the program and be certified as GAIA-X nodes.
- Tier-2. There are several work streams – technical architecture, use cases, operating model, data sovereignty policy and regulation – in which a larger number of institutions, like regional government data centers in Germany, or companies, including European vendors, like OVH, or global cloud providers, like IBM, are participating.

The central program management office will be transformed into a legal entity, but no information is available at this stage on how this will be organized.

## 1.4   GAIA-X Operating model

The central GAIA-X operating entity does not plan to own physical cloud infrastructure/data centers, but act more as a service catalogue/marketplace, and certification and service interoperability standard definition entity.

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[1] Source: BMWi, 2019

Development and operation of core infrastructure and data services will be left to "certified" industry players.

## 1.5   GAIA-X Milestones

The first GAIA-X milestone after its launch in October 2019 was aimed to be Hannover Messe. At the event, BMWi and other partners were planning to:

Showcase practical use cases in smart living, smart manufacturing and digital government.

Formalize the governance model through the creation of a legal entity.

Communicate a first draft of the technical architecture on how nodes will connect to the federation.

Since the Hannover Messe was postponed from April 2020, to July 2020, the showcase of the use cases will still happen at the conference, while a draft of governance and the technical architecture will be communicated some weeks prior to the conference.

## 1.6   Gaia-X use cases plotted on the demand framework

This section lists the Gaia-X use cases as set out in the Gaia-X paper[2], "Project Gaia-X A federated data infrastructure as the cradle of a vibrant ecosystem" (pages 17 to 44).   It plots them onto the H-CLOUD Demand framework that was created to understand the variety of distinct deployment challenges.

Some use cases are placed in two or more places since they involve multiple aspects.

The twelve "examples from practice" are (With a short summary phrase used in the deployment matrix)

**A: On the path to Industrie 4.0 – how companies can achieve trustworthy cooperation** (Industrie 4.0 cooperation)

**B: Practical implementation of Industrie 4.0? A genuine feat of strength!**

**C: Using synergies in supplier networks** (Supply network synergy)

**D: Secure and multi-functional cloud environment for the housing industry, to generate Smart Living solutions with demanding latency requirements** (Secure Smart living)

**E: Financial Big Data Cloud – strengthening the German and European financial marketplace** (Financial big data cloud)

**F: Artificial intelligence for clinical studies** (Clinical AI)

**G: AI-based e-triage in the emergency room** (Triage AI)

**H: Better preventive healthcare with 'Smart Wearables' – how we can learn from data** (Healthcare smart wearables)

**I: Citizens' service around the clock: the chatbot in public administration** (Citizen chatbot)

**J: Shaping sustainable cities, using Big Data from space** (Smart cities data from space)

**K: Defeating cancer – a research cloud for genome data** (Cancer genome data)

**L: Innovation based on data: High Performance and Quantum Computing 'as a service'** (High performance Quantum Computing)

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[2] https://www.bmwi.de/Redaktion/EN/Publikationen/Digitale-Welt/project-gaia-x.pdf?__blob=publicationFile&v=4

| Organisational complexity | Deployment sophistication | | |
|---|---|---|---|
| | A: Relatively simple cloud deployments | B: High Data protection and security needs | C: Sophisticated deployment of more advance technology |
| **Level 4: Cross sector coordination. Involving multiple organisations and sectors** | D: Secure smart living (Data)<br>H: Healthcare smart wearables | D: Secure smart living (Data)<br>H: Healthcare smart wearables<br>J: Smart cities - data from space | D: Secure smart living (multi-function)<br>J: Smart cities - data from space |
| **Level 3: Multiple organisations collaborating across the same sector** | A: Industrie 4.0 cooperation (Supplier perspective)<br>C: Supply network synergy (Supplier perspective) | E: Financial big data cloud (Data)<br>F: Clinical AI (Data)<br>H: Healthcare smart wearables<br>K: Cancer genome data | E: Financial big data cloud (AI)<br>F: Clinical AI<br>G Triage AI<br>H: Healthcare smart wearables<br>K: Cancer genome data<br>L: High performance & Quantum Computing |
| **Level 2: Single larger, more complex organisations, including their customer networks and supply chains** | A: Industrie 4.0 cooperation (Industry player view)<br>B: Industrie 4.0 networking<br>C: Supply network synergy (Supplier perspective)<br>I: Citizen chatbot | A: Industrie 4.0 cooperation (Industry player data ownership view)<br>H: Healthcare smart wearables<br>I: Citizen chatbot | G: Triage AI<br>H: Healthcare smart wearables |
| **Level 1: Single, simpler, smaller organisations** | (See higher levels) | (See higher levels) | (See higher levels) |