

THE ROAD TO EUROPEAN DIGITAL SOVEREIGNTY WITH GAIA-X AND IDSA

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Digitalization is chewing the world with strong economic and social impacts. Recently, the management of the COVID 19 crisis highlighted the power of digital tools and their impact on stakes such as privacy, surveillance, transparency, and censorship. How nations deal with massive digitalization and master the technologies, and applications that are deployed and used on their soils by their companies and citizens is vividly raised by the U.S. ban on Huawei enforced by the “clean network” strategy. This ban could have set the ground for a technology war between “2 blocks: the digital democracies and the techno-authoritarian regimes” [1][2].

In Europe, Th. Breton the European Commissioner for Internal Market and Services declared that the war for industrial data begins now and Europe will be the main battlefield. Anyhow, the future platforms for harnessing data as close as possible to their place of production, notably at the edge, remain to be built. They will be far different from the ones GAFAM and BATX have developed for private data so far taking into account European regulatory rules [3][4].

The EU launched GAIA-X whose origin stems from the German Federal Government to create the next generation of data infrastructure for Europe, its companies and its citizens. This infrastructure needs to meet the highest standards in terms of digital sovereignty and aims to foster innovation. The targeted infrastructure is regarded as the cradle of an ecosystem, where data and services can be made available, collated and shared in a trusted environment. The goal was to establish a more robust framework in 2020 and to launch the very first use cases by 2021 [5].

The International Data Spaces Association (IDSA)[6] had earlier in 2019 defined a reference architecture and a global standard for creating and operating virtual data spaces. The IDS Architecture is based on commonly recognized data governance models facilitating secure exchange and easy linkage of data within business ecosystems. This architecture and components answers very well the requirements of GAIA-X.

WHY

Exchanging data, even within a single company, is often not straightforward since data is scattered and “siloes” per business process. Exchanging data between partners is even more delicate. The main purpose of a data space is to allow the sovereign and secure exchange of data within a “trusted ecosystem” involving multiple players.

A key capability is to ensure data sovereignty [5], i.e., providing data owners with full control over their data and their digital identities. This requires the definition of data usage constraints: defining who is allowed to do what in which context with the data shared by the data owner [7].

From a business perspective, a data space aims to allow the building of data-driven ecosystems in which independent partners (from different sizes, ecosystems and financial power) have trust in how their data are handled while allowing the innovative data services to be constructed in a cooperative manner, thereby breaking the information silos.

HOW

Europe’s plan for digital sovereignty uses two main axis. The first one is cloud sovereignty, in order to have cloud services that comply with European regulation. The solution for this sovereign cloud infrastructure hinges on the federation of European cloud services along the GAIA-X association [8]. The second one is

data sovereignty with the goal of being able to safely share data among participants in a consortium, the foundation of which will be the IDSA’s reference architecture model [9].

IDSA is an initiative driven by the German Industry 4.0 companies and firmly backed by the German federal government. The goal is twofold: avoid GAFAM and BATX data hegemony and rely on a sovereign exchange of data to develop relational competition. “Against the idea that competition erodes rents needed to build trust and sustain relationships, trust and competition tend to go hand in hand.” [10].

IDSA’s Reference Architecture (RA) provides an abstract “business view” description of the roles a participant can play in the Data Spaces [9]. “Core Participant” roles are roles assumed by organizations that own, provide and/or consume or use data in the data space. These roles include Data Owner, Data Provider, Data Consumer and Data Application Provider.

They also issue certificates to core software components (e.g., Connectors) that are to be deployed in the data space. To securely exchange and share data in an IDSA-compliant data space, any participant deploys a technical component called the Industrial Data Space Connector. A Connector can be an Internal Connector that runs within a participating organization or an External Connector that executes data exchange between participating organizations. The requirements to be met by a Connector for cross-company exchange of industrial manufacturing data are specified in [11].

GAIA-X focuses on providing a trusted infrastructure to allow secure and sovereign data exchanges by certifying its nodes and actors and by relying on verifiable claims done by nodes. A high-level overview of the GAIA-X architecture [12] with its major elements and functions is provided in Fig. 1.

The GAIA-X ecosystem as a whole is structured into:

- The Infrastructure Ecosystem in which activity is focused on providing or consuming infrastructure services that are primarily represented by the Asset called Node in GAIA-X. It includes infrastructure components to store, transfer and process data. Stakeholders involved in this ecosystem include cloud service providers, network providers, and (edge) cloud providers.
- The Data Ecosystem that supports Data Spaces and the building of smart services in industry verticals. The main Asset is Data.

In short, IDSA defines a federated technical architecture that aims to guarantee data security and protection for all involved participants. It establishes mutual trust among them and ensures data sovereignty for all data providers. Therefore, the data space concepts and components proposed by IDSA are used to support the federated and interoperable infrastructure that the European project GAIA-X aims to address.

The European Digital Single Market intends to ease the transfer and exploitation of data within the Union. In many aspects, the COVID19 pandemic reveals how dependent Europe is on a globalized economy and that a digital infrastructure is central for the continuity of Europeans’ social, economic and health-care activities. Obviously, a place of confidence to exchange data health was critically missing. Simultaneously, the European Union has acknowledged that data are not simple merchandise and that personal data belong to their data subjects who have fundamental rights to control if and how their data can be used. On the business side, 5G Verticals like Energy, Smart Cities, as well as the Industry 4.0, should leverage on a diverse ecosystem of actors by relying on a digital space of trust where data can

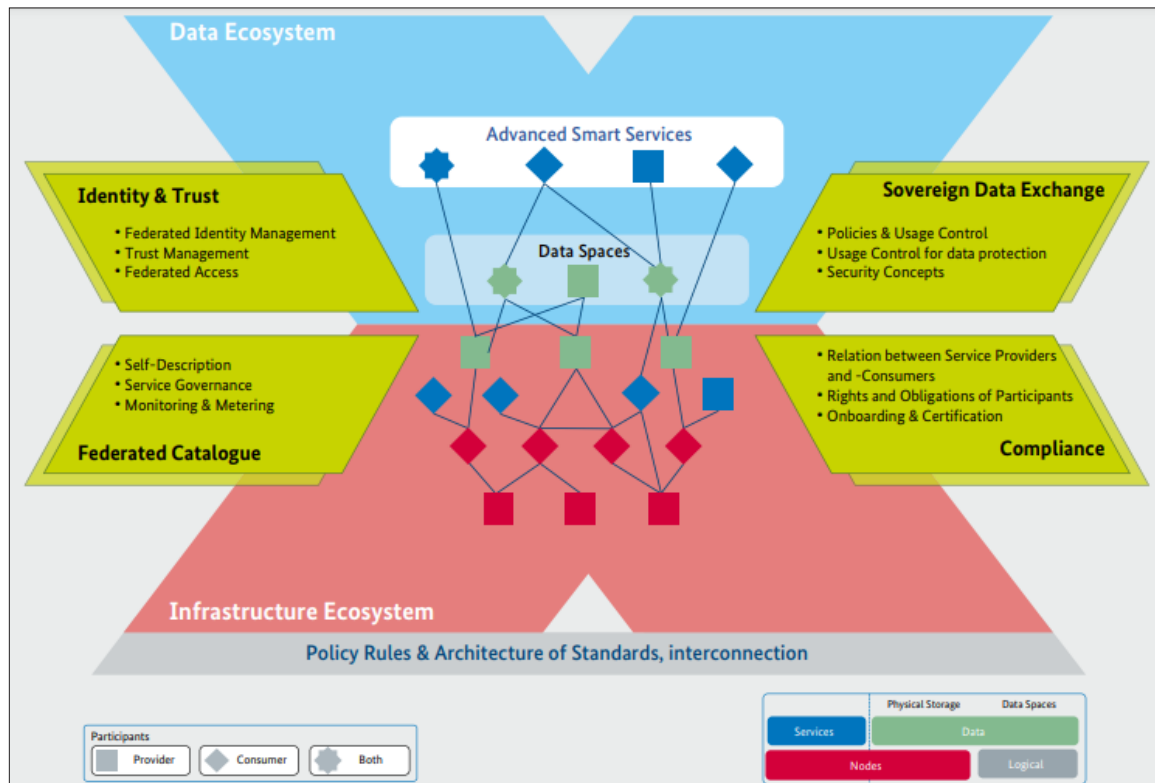


FIGURE 1. High-level view of the GAIA-X architecture.

be collected and processed in full confidence and transparency.

The European Union data strategy affirmed in 2020 has two main streams: data and cloud. The data regulation is set in the Data Governance Act and Data Act. GAIA-X is at the heart of the coordination: to provide use cases and technical architectures for European common dataspace for the data stream; to supply federation and interoperability for the European alliance for industrial data, Edge and Cloud for the cloud stream. Whether it is GAIA-X or IDSA, both approaches rely on a federation approach; as such they are heavily based on current standards that are still being chosen as we write these words. For interested IEEE members, this would be a fantastic opportunity to disseminate standards developed within the organization.

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BIOGRAPHY

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