Gaia-X - Zoom-in the Big Picture of the European Digital Ecosystem Future

Francesco Bonfiglio
Chief Executive Officer - Gaia-X Association
Technology Business Vs Digital Economy...
All are impacted! The new Digital Economy is pervasive and driven by **Data Spaces, the digitalization of the value chains**, in economical, social, political, and natural ecosystems.
Are we in Control of, or Controlled by Technology...
The EU Data Strategy
European Digital Ambition

Feb. 2020
European Strategy for Data
aims to build a single market for data

May 2020
Recovery and Resilience Facility
20% Digital EU Flagship “Scale-up”

Oct. 2020
Member States Declaration for European cloud

March 2021
Digital Decade Strategy
sets targets on edge and cloud for 2030
European Strategy For Data

A Common European Data Space, A Single Market For Data

- Data can flow within the EU and across sectors
- European rules and values are fully respected
- Availability of high-quality data to create and innovate
- Rules for access and use of data are fair, practical and clear

Source: European Commission
Digital Decade - computing continuum by 2030

- >10,000 edge nodes by 2030
- 75% of cloud and of uptake by EU enterprises in 2030
How does Gaia-X fit into it
Gaia-X vs. European Data Strategy

<table>
<thead>
<tr>
<th>Cloud: Cloud Rulebook</th>
<th>Data: New legislation (Data Act &amp; Data Governance Act)</th>
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<tbody>
<tr>
<td>Co-Investments in cloud-to-edge services, cloud federation and marketplaces</td>
<td>Co-investments in common European data Spaces</td>
</tr>
<tr>
<td>Member States Declaration</td>
<td></td>
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</tbody>
</table>

**Common European data spaces**

**Data Spaces Support Centre**
- Coordination and governance

**Gaia-X Cloud**
- Transparent
- Controllable
- Interoperable

**Gaia-X DATA SPACES**
- Use Cases
- Data Connectors
- Interoperability

**IPCEI* on Next Generation Cloud**
- (*Important Project of Common European Interest*)

**European Alliance for Industrial Data, Edge and Cloud**

**SMART MIDDELWARE**

**Coordination**

**Federation & interoperability standards**

**Complementing & integrating private and public initiatives, e.g.:**

- Use cases; technical architecture
Why Gaia-X?
Are we in Control of, or Controlled by Technology...?
Cloud enables data economy

Services

Platforms

Data

Business

Things

Education · Mobility · Industry 4.0 · Healthcare ...

Cars · Machines · Smart Phones · Cameras ...

Data spaces

Data services

Data correlation

Data gathering

Data generation
## What are we talking about?

<table>
<thead>
<tr>
<th>Data Business</th>
<th>Situation</th>
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</thead>
<tbody>
<tr>
<td>Data platforms</td>
<td>100B$ TAM (33% AWS) in 2019</td>
</tr>
<tr>
<td>Data services</td>
<td>829B€ EU data economy by 2025</td>
</tr>
<tr>
<td>Data access</td>
<td>40B Smart devices by 2025 (+13%YoY)</td>
</tr>
</tbody>
</table>

Sources: European Commission (2020); Statista (2019); IoT Analytics (2018) | NB: Following depiction and interpretation of German Data by B. Otto
Where Do We Stand?

The European Contribution to the Platform Economy
Platform Economy – Market Capitalisation Value Distribution of Companies

<table>
<thead>
<tr>
<th>Region</th>
<th>Number of Companies</th>
<th>Market Capitalisation Value Distribution</th>
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</thead>
<tbody>
<tr>
<td>U.S.</td>
<td>(20)</td>
<td>74%</td>
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<td>Europe</td>
<td>(9)</td>
<td>4% Adyen, Delivery Hero, Mail.ru, SAP, Scout24, Spotify, Wirecard, Yandex, Zalando</td>
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<tr>
<td>Asia</td>
<td>(16)</td>
<td>21%</td>
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<tr>
<td>Africa</td>
<td>(1)</td>
<td>1%</td>
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Adyen, Delivery Hero, Mail.ru, SAP, Scout24, Spotify, Wirecard, Yandex, Zalando

n = number of platform companies listed on the stock market on 17 November 2019 | Source: Gartner (August 2020)
Cloud market trends

• Globally

Cloud Provider Market Share Trend
(laaS, PaaS, Hosted Private Cloud)

Source: Synergy Research Group

• In Europe

European Cloud Provider Share of Local Market
(laaS, PaaS, Hosted Private Cloud)

Source: Synergy Research Group
Cloud market trends in Europe

Supply

- EU cloud market grows threefold (over EUR 23bn for 2020)
- EU CSPs’ share still declines (from 26% in ‘17 to <16% in ‘20)
- 3 US CSPs hold 66% of the total market share
- The biggest EU provider has 2% of the EU market

Demand

- 36% of EU enterprises use “basic” cloud services
- Large legacy and on premises footprint (>70% of data/apps)
- Strong dependency from ‘proprietary’ models (lock-in)
- Demand for switchable services with more user control
Gaia-X, an urgent move for a European Future!

**EU Digital Market 2025**
- EU CSP Providers Market Share = <10%
- EU TAM on Data Platforms = 8-10% EU GDP
- EU Economy Footprint Largely SME = >80%

**EU Economy 2025**
- Public Services dependency on Digital Platforms = >70%
- Product/Service Value Dependent on Data = 50-70%
- Disjoint Data across Value Chains = >70%

**EU Sovereignty in 2025:**
- No Political Sovereignty w/o Digital Sovereignty
- No Economy Drive w/o Digital Sovereignty
- No Sovereignty with ‘Private’ or ‘Autocratic’ Platforms
What is Gaia-X?

Our story in short
Established as a not-for-profit Association in 2021, Gaia-X brings together a broad range of organisations (large companies and SMEs, developers and users of technology, industrial players, and members of academia) around one common goal: to boost the European data economy by enabling the creation of common data spaces, in full alignment with the objectives of the EU’s data strategy. To this end, Gaia-X focuses on building a common standard for an open, transparent, and secure digital ecosystem that will serve as the basis for a new model of data infrastructure guaranteeing safe and trustworthy data exchange. Open to anyone but aligned with the European values of human-centricity, transparency, openness and sovereignty, Gaia-X’s ambition is to deliver unprecedented opportunities for innovative data-driven business models in the European Single Market, reducing the dependency from non-controllable technologies while reflecting Europe’s need for data and cloud sovereignty.

Want to learn more about Gaia-X? Click here.
Interested in becoming a member of Gaia-X? Click here!
Our Reason - From traditional Cloud to Gaia-X

Users LET Control

Concentrated: Proprietary: Opaque

Distributed: Open: Transparent

Trust & Sovereignty

Users GET Control
From one-way to free & sovereign

Cloud shift fears & expectations

Cloud workload shift in EU @ 20 – 25%
The existing Split X Model

Disjoint Data & Infrastructures Ecosystems

Data
Untapped, fragmented, disjoint, no secure exchange mechanism

infrastructures
Segregated, non-reversible, non-interoperable, closed architectures, private standards
Our X Model

Connecting Data - Infrastructures Ecosystems

**Advanced Services**
New (Cross-) Sector Innovations / Applications build from service composition.

**Data Spaces / Federations**
Interoperable & portable (Cross-) Sector data-sets and services.

**Data Exchange**
Anchored contract rules for access and data usage.

**Gaia-X Compliance**
Decentralized services to enable objective and measurable trust.

**Label framework**
Gaia-X and ecosystem specific Labels to ease market adoption through autonomy and self-determination.
Gaia-X Framework – Logical View Vs Services Vs Projects

LOGICAL VIEW

Gaia-X Framework

COMPLIANCE
- TRUST SVCS
  - REGISTRY...
  - COMPLIANCE...
- LABELLING SVCS
  - LABELS...

DATA EXCHANGE
- DATA EXCHANGE SVCS
  - LOGGING...
  - POLICIES...
  - CONTRACT...

FEDERATION
- IDENTITY SVCS
  - AUTHENTICATION...
  - CREDENTIALS...
- CATALOG SVCS
  - CORE CATALOG...

DEPLOYMENT VIEW

COMP#1 | COMP#2 | COMP#3 | COMP.. | COMP..

PROJ#A | PROJ#B | Sprint#1. | ... | SW COMPONENTS (FILES)

OSS PROJECTS

What Gaia-X Is Or Is Not

Gaia-X Is

- A single point of definition of Gaia-X architecture & rules
- Making available an open implementation to all
- A qualification authority for Gaia-X compliance

Gaia-X Is Not

- A formal standardization body
- A SW or HW product or cloud platform
- A runtime implementation of any Gaia-X service

Gaia-X vs. Association

- Gaia-X project is driven by the Association
- Gaia-X architecture is developed by the Association members
- Gaia-X services will not be operated by the Association

(*) AISBL is an independent single point of truth in the determination of a Gaia-X compliance, but the Association itself will not host or run directly any service. Qualification and compliance will be verified through decentralized mechanisms of digital trust and consensus distributed across the network of Gaia-X nodes (i.e. AISBL stands to Gaia-X like a Registrar to the Internet)
What We Do – Gaia-X Three Deliverable Types

The Gaia-X Deliverables

Specify
- Architecture Document
- Trust Framework
- Policies and Rules, Label Framework Documents

Develop
- OSS framework for community work
- Reference implementation of Federation Services
- Reference implementation of self regulation Services

Qualify
- Service qualification Process
- Service qualification Labelling
- Service qualification

Specs
- Code
- Labels
Gaia-X Roadmap
The 5 Years Outlook

Main focus:

2021-Setup
- Reference architecture
- Initial federation services
- Initial data space services
- Gaia-X infrastructure & automation

2022-Adopt
- Extend federation services
- Edge cloud implementations
- Extended data spaces
- Gaia-x data spaces, AI & edge development

2023-Grow
- Full federation & compliance services
- Data space specific marketplaces
- >50% members adoption
- Gaia-x Supports EU marketplace enablement

2024-Expand
- >40% Europe SME adopted Gaia-X
- >50% Fin/Ps/Hc adopted Gaia-X
- Gaia-X services self expansion
- EU ecosystems economy enablement

2025-Scale
- Gaia-X economy competing at scale WTH hyperscale CSP
- First Gaia-X platform amongst top10 WW
- Europe platform economy >10% WW (now @4%)
- EU plays in global economy of data

Market pull

AISBL push
# Gaia-X Milestones

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<td>Architecture Doc 21.06</td>
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<td>Architecture Doc 22.04</td>
<td>Architecture Doc 22.09</td>
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<tr>
<td>GXFS Spec v1</td>
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<td>Trust Framework 22.04</td>
<td>TechSpec IAM, DEX, FED</td>
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<th>Gaia-X OSS (Community)</th>
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<th>PoC</th>
<th>OSS v1</th>
<th>OSS v2</th>
<th>Gaia-X Toolbox</th>
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<td>Gaia-X Releases “consistent deliverables”</td>
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<td>New releases and components to be planned in</td>
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<tr>
<td>Gaia-X “v 0.x”</td>
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<td>Gaia-X Release Planning and Gaia-X OSS community processes</td>
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<td>Gaia-X “v 0.y”</td>
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<td>incl. contributions from PoC, Hackathons, Evaluations &amp; Concepts</td>
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<td>Gaia-X “v 1.0”</td>
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Gaia-X Ops Model & Projects
Gaia-X New Operational Model 2022

FROM DEFINITION TO VALIDATION

Data Spaces Business Committee
<<define/revise reqs>>
<<feedback>>
<<identify/drive>>

Technical Committee
<<define/revise reqs>>
<<feedback>>
<<define/revine>>
<<validate>>

Gaia-X LAB
<<develop>>
<<identify>>

Gaia-X MVP (MVG)
<<identify>>

Ext Business Projects
<<deploy>>

OSS Gaia-X Projects
<<complement>>

Ext Framework Projects
<<deliver>>

Gaia-X Market Services
<<use>>

Gaia-X Framework

Gaia-X Framework
Gaia-X Federated Services (GXFS)

Coordination led by IMT / TeraLab
12M€ Budget

Lots:
- Identity Access Management (3dsoutscale)
- Self-description (Ovhcloud)
- Security And Norms (Docaposte)
- Testbeds (Imt, Teralab)
- Data Sharing Components (Atos)
- Data Exchanges (Dawex)
- Management (Imt, Teralab)

Coordination led by ECO
13M€ Budget

Lots:
- Authentication/ Authorization (Tsystem, Fraunhofer, Verimi)
- Personal Credential Manager, Organization Credential Manager, Trust Services Api (Vereign, Daasi)
- Core Catalogue Functions, Data Contract Service, Data Exchange Logging Service (Bigchaindb, Smartcontrol, Deltadao)
- Continuous Automated Monitoring (Fraunhofer)
- Orchestration (Xlab)
- Portal (Tsystem, Ultratendency)
- Notarization (Sec, Spherity, Msg)
Gaia-X Data Space Lighthouse Projects started in 2021

- **Agriculture**
  - AG Datahub
    - [https://agdatahub.eu/en/](https://agdatahub.eu/en/)

- **Automotive Supply Chain**
  - Catena-X
    - [https://catena-x.net/en/](https://catena-x.net/en/)

- **Urban Data Cooperative**
  - ELINOR-X
    - [https://eona-x.eu/](https://eona-x.eu/)

- **Mobility, Transport & Tourism**
  - EuProGigant
    - [https://euproigant.com/en/](https://euproigant.com/en/)

- **Manufacturing, Industry 4.0**
  - Mobility Data Space
    - [https://mobility-dataspace.eu/](https://mobility-dataspace.eu/)

- **Mobility**
  - Smart Connected Supplier Network
    - [https://smart-connected.nl/en](https://smart-connected.nl/en)

- **Electronics Supply Chain**
  - Mobility
    - [https://bit.ly/3aJYgZL](https://bit.ly/3aJYgZL)
Gaia-X Compliance

Thursday, 29 September 2022
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 Compliance
https://compliance.gaia-x.eu
https://registry.gaia-x.eu
Gaia-X Rules: Trust & Labelling Framework

TRUST & LABELING FRAMEWORK

Gaia-X Trusted Service (compulsory)

- TRUSTED TRANSPARENT, CONTROLLABLE, MEASURABLE, COMPARABLE ATTRIBUTES.

Gaia-X Labelled Service (optional)

- LABELED LEVEL 1
  - CONFORMANT TO BASIC SET OF GAIA-X LABEL RULES (INCLUDE ENISA BASIC COMPLIANCE)
- LABELED LEVEL 2
  - CONFORMANT TO INTERMEDIATE SET OF GAIA-X LABEL RULES (INCLUDE ENISA SUBSTANTIAL). EU RUN OPTION REQUIRED
- LABELED LEVEL 3
  - CONFORMANT TO HIGH SET OF GAIA-X LABEL RULES (INCLUDE ENISA HIGH). MUST RUN IN EU

Externally Defined Gaia-X Labels
Gaia-X Trust Framework

To ensure Trust the Gaia-X Trust Framework is:

- Automated by Gaia-X specific components part of decentralized technology framework
- Versioned, i.e. bound to a specific version in time of the Compliance rules set
- Applied to the self-description file of all entities implied in the Gaia-X conceptual model (*)
- Aimed to verify the existence and veracity of the attributes and not judging their value

(*) as defined as part of the Gaia-X Conceptual model described in the Gaia-X Architecture document

The content
Verify if the mandatory attributes are filled in and if the values are verified.

Set of claims
attribute: value
attribute: value
attribute: value

The envelop
Verify the keypair issuers and cryptographic signatures

Claims
Machine readable or plain English

Trust Framework example:
- All cars must have a color
- All Datasets must have a location
- All Services must identify their provider with its legal country of jurisdiction.

Label examples:
- cars level 1 are red, cars level 2 are blue, ...
- My dataset must be located in EU
- My services must be non-subject/immune to non-EU laws
Step 1/3: Collect signed claims

Optional

1. GXFS self-description wizard tool
2. Write claims
3. GXFS Notarization Service
4. Text based document
5. Verifiable Credentials
6. Verifiable Credentials Wallet (GXFS Organisation/Personal Credential Manager)

- Self-signing using an identity coming from a Trust Anchors: Ex. eIDAS, ...
- Trust Anchors + Trusted Data Sources: Ex. under evaluation: ENISA, TÜV, LNE, E&Y, Cloud Mercato, ..., CABs
- Steps performed by different Participants than the Notarization officers

Digitalisation

Standalone tool to sign claim. Ran locally or operated by a Federator.
Step 2/3: Create Gaia-X Self-Descriptions

Steps:
1. Verifiable Credential wallets
2. Gaia-X Registry service
3. Aggregates claims
4. Gaia-X Compliance service
5. Gaia-X Self-Description
6. Catalogues
7. For later use in another catalogue or online resolving

Optional:
- GXFS self-description wizard tool

Resources:
- https://registry.gaia-x.eu: List of Trust Anchors, Data Trusted Source, Gaia-X Schemas
- https://compliance.gaia-x.eu: Set of computable rules using measurable and comparable attributes
- https://registry.gaia-x.eu: Array of signed claims
Step 3/3: Federation governance extension

1. Optional Federation self-description wizard tool
2. Gaia-X Self-Description
3. Federation’s governance
4. Federation Registry service
5. Federation Compliance service
6. Verifiable Credential wallet
7. Federation Self-Description
8. Catalogues

Extending Gaia-X Registry information with Ecosystem specific Trust Service Provider

For later use in another catalogue or online resolving

With catalogue intersynchronisation based on self-description owner policies

Defined by the Federation’s federators. Can be manual or automated.

Optional

Claims
Gaia-X Membership and Hubs
The Gaia-X network expands!

- 359+ Members
- 20 Hubs
- 25 Countries
- 19 Working Groups
- 1800+ Contributors
- 563 Active on DCP

One Mission
Gaia-X represents the Most representative alliance of organisations in Europe

- More than 359 companies and organisations

- 3 out of 4 organisations are private companies, *about half* of which are SMEs*

- Organisations from different industries, such as Mobility, Energy, Manufacturing, Finance, including startups and SMEs etc.

- Mentioned explicitly in the **European Data Strategy** and proactively addressing key issues.

Exchange between Gaia-X and the **European Commission** to identify synergies between Gaia-X and initiatives and programs such as the **European Cloud Federation, CEF 2** and **Digital Europe**.
Gaia-X Member Distribution

To date
359 members

OGA22
348 members

EGA21
270 members
An interactive Members Directory with a map!

Indicative Countries:
Membership % increase since 2021

- **DE**: 21% Country membership increase since 2021
- **FR**: 25% Country membership increase since 2021
- **IT**: 36% Country membership increase since 2021
- **BE**: 29% Country membership increase since 2021
- **ES**: 67% Country membership increase since 2021
- **NL**: 38% Country membership increase since 2021
- **LU**: 233% Country membership increase since 2021
- **FI**: 133% Country membership increase since 2021
- **CH**: 250% Country membership increase since 2021
- **US**: 80% Country membership increase since 2021
Encompassed by International Hubs
15 EU, 5 Global

From 7 Hubs to 20 Hubs

- Denmark
- Sweden
- Finland
- Netherlands
- Belgium
- United Kingdom
- Ireland
- Luxembourg
- France
- Switzerland
- Portugal
- Spain
- US Texas
- US California
- US Washington DC
- Estonia
- Germany
- Poland
- Czech Republic
- Slovakia
- Austria
- Romania
- Hungary
- Slovenia
- Italy
- Greece
- South Korea
- Japan
An interactive Hub Directory with a map!

All national Gaia-X Hubs

Become part of our Hub! Gaia-X Hub Belgium is inviting you to participate in the design of a sovereign data infrastructure. Contribute use cases from specific sectors and benefit from the exchange of ideas and best practices.
Gaia-X: New Website. New Content. Same Vision. Exponential Growth in a year

From 4 - 45 Press Releases

From 8 - 104 Videos

From 6 - 45 Events

From 6 - 33 Blog Articles

From 0 - 25 Newsletters

3 consecutive releases of the Gaia-X Specifications

From 4 - 20 Community Publications

From 0 - 17 Podcast Episodes

From 0 - 1 Scientific Magazine Issue over 19 articles

From 0 - 30 Weekly Press Reviews

From 1 mm - to 27.57 mm press value

From 0 - 4K Twitter Followers

From 1K - 10K LinkedIn Followers
Gaia-X: Summit 22 Members Networking Tool

Empowering our members. Increasing their exclusive benefits. Enhancing collaboration.

By joining the Summit#22 social networking platform, our members have the opportunity to work and get to know each other; liaise together on the basis of EU calls.

- Connect with one another
- Stay Informed & up to date
- Collaborate real-time
- Engage in New opportunities

1 more slide to be added – more details – we are working on this but it will need more time for the graphical elements.
Gaia-X Governmental Advisory Board

- **GERMANY** – DANIELA BRÖNSTRUP, Director General Digital and Innovation Policy, German Federal Ministry for Economic Affairs and Climate Action
- **FRANCE** – MATTHIEU WEIL, Head of Digital Economy Department, Ministry of Economy, France
- **ITALY** – STEFANO FIRPO, Head of Cabinet of the Minister for Technological Innovation and Digital Transition
- **SPAIN** – ALBERTO PALOMO, Chief Data Officer, Government of Spain
- **NETHERLANDS** – JOS DE GROOT, Director Digital Economy
- **PORTUGAL** – ANDRÉ DE ARAGÃO AZEVEDO, Secretary of State for the Digital Transition, Republic of Portugal
- **BELGIUM** – JACK HAMANDE, Director General Digital Transformation at FPS Policy and Support
- **LUXEMBOURG** – MARIO GROTZ, Director General for Industry, Technology and Research at Ministry of Economy
- **FINLAND** – ILONA LUNDSTRÖM, Director General at Ministry of Employment and the Economy
- **POLAND** – ROBERTO KROPLEWSKI, Governmental Advisory Board Member (Chancellery of the Polish Ministry)
- **AUSTRIA** - MICHAEL WIESMÜLLER, Head of department for Key Enabling Technologies for Industrial Innovations at Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology
- **GREECE** – MARIA MAVRIDAKI, Legal Officer, European Commission
- **SLOVENIA** – NENA DOKUZOV, Head of Project Group for New Economy and Blockchain Technologies at Ministry of Economic Development and Technology, UNECE expert and Head of Delegation for Slovenia
- **SLOVAKIA** – JURAJ PANKUV, Advisor, Ministry of Investment, Regional Development and Informatization of the Slovak Republic

...more to come...
# Gaia-X Data Spaces

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<th></th>
<th>Health</th>
<th>Manufacturing / Industry 4.0</th>
<th>Mobility</th>
<th>Agriculture</th>
<th>Energy</th>
<th>Geoinformatics / Space</th>
<th>Smart Cities</th>
<th>Finance</th>
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<th>Green / Circular Economy</th>
<th>Media</th>
<th>Skills &amp; Education</th>
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Community Engagement

Status overview of the Gaia-X endeavor

Francesco Bonfiglio, CEO Gaia-X Association
Events

https://gaia-x.eu/events/

Summit Series

Data Space Events

EU Funding events

Hackathon Series

Tech Dives
Intranet & communication material

https://members.gaia-x.eu/

https://gaia-x.eu/press-room/communication-material/
Gaia-X Data Space Use cases & Publications
Gaia-X Useful documents – Check them out!

Important milestones & relevant publications:

• Gaia-X Framework
• Gaia-X specifications

For quick understanding:

• Gaia-X Factsheet
• Gaia-X Infographic
• Hubs Infographic
• Media Kit

Press Releases
An easy & user-friendly comprehension:

• Vision & Strategy
• Latest architecture & Trust Framework
• Policy & Rules/Labelling
• Labelling Framework latest release
• GXFS and SCS begins
• Lighthouses
• Gaia-X Lab
Why should you join?
Check here

Contribute
to a pioneering project that will establish digital sovereignty for Europe.

Shape
how data will be stored, shared, and used in future.

Develop
new data-driven business models and data spaces.

Strengthen
ties to the expert communities in your industry.

How to join?
Check here
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@gaiax_aisbl

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https://www.youtube.com/channel/UCB5WMc2FxKzfd7XIODoMw
Thank you!

Gaia-X Association