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HIGHLIGHT

Why Trust Matters

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3.2.1

The Data Transfer Agent - Bringing Data Spaces to a New Era

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As Gaia-X specifications have matured and Gaia-X Digital Clearing Houses are operational, it's time to move on from specifications to reference implementations, by delivering practical, interoperable components that support trusted data exchange. One such enabler is the **Data Transfer Agent**.

The Data Transfer Agent is a **modular, open-source** component that enables compliant, verifiable, and seamless data transactions between participants. It supports the **Gaia-X architecture** by automating trust enforcement, usage control, and interoperability—ensuring data can flow securely and responsibly across organisational, sectoral, or geographic boundaries.

Laying the Foundation for trusted data transaction

Let's take a look at the context in which data exchange is made possible within the Gaia-X Trust Framework. At the core of this framework,

a set of well-defined specifications have been created that establish the structural and policy backbone of Gaia-X. This includes the technology agnostic Gaia-X Compliance Document and, more importantly for our topic, the Gaia-X Architecture Document laying the foundation for Gaia-X technical compatibility.

Complementing the generic, rule agnostic technical foundation, the **Gaia-X Data Exchange Document** provides a conceptual model for data exchange encompassing Data Producers, Data Consumers, Data Products and Data Usage Agreements forming a trusted pipeline for data exchange.

This is also aligned with the principles set out in the **CEN/CENELEC Trusted Data Transaction standardisation** and in the European **Data Act** regulation.

Through Gaia-X principles and specifications, every interaction—from publishing data, to

cataloguing, negotiating and consuming it—is formalised through agreements and anchored in transparency, trust, and governance. This ensures that data flows securely and responsibly across different domains, in a standardised approach, ensuring trust, traceability, and legal clarity across the full lifecycle of a data transaction.

Introducing the Data Transfer Agent

With these specifications in place, the question remains how to actually implement Gaia-X-based Data Exchange in the real world. This is where the **Data Transfer Agent** comes into play.

The **Data Transfer Agent** is a key software component that handles the transfer of data between two parties once these parties have agreed on a data transaction. Its primary role is to handle and secure the exchange of data between these parties: verifying the conformity and validity of the credentials, agreeing policies for example contract duration, usage restrictions, etc. Once the verifications are complete, the transaction is executed (file transfer, API, events, real-time stream, and more).

The **Data Transfer Agent is a collective effort**, with the initial contribution from IMT Transfert Teralab, Dawex and in close alignment with the Gaia-X CTO Office, to bring **efficient, secure, resilient, and scalable agents for decentralised data transfers** fully technically compatible with the Gaia-X architecture.

What makes the Data Transfer Agent especially powerful are its core design features:

- It's **lightweight**. This means it has an uncluttered, modular, and scalable architecture — which allows it to be easily integrated into different environments without heavy overhead or complexity.

- It's **containerised**. Deployment is simple and quick—essentially one-click deployment through container technologies like Docker or Kubernetes. This ensures ease of installation and portability across different infrastructures.

- It can be **deployed as a service**. That means the DTA can run alongside any existing component or software, integrating seamlessly into your current data architecture.

The **Data Transfer Agent** is built in accordance with the Gaia-X Architecture Document specifying Gaia-X technical compatibility. It leverages the **OID4VC** standard to ensure a decentralised and verifiable identity exchange. Additionally, the Data Transfer Agent is conceptually and functionally aligned with the CEN/CENELEC Trusted Data Transaction reference model. Note that using the DTA does not require a full-fledge data space to be in place: consent between Data Provider and Data Consumer is all that is needed.

Modularity is at the heart of the **Data Transfer Agent**, making it easy to integrate standardised protocols such as DSP **(Data Space Protocol)** for Data Space **interoperability**.

The Data Transfer Agent in Action: A layered approach

Data Transfer Agents are by design focused on the aspects of the Data Plane (e.g., performing the transaction), and the Control Plane such as verifying usage and access policies. It is a very important component, particularly for establishing trust, so it must be easy to use, by everyone, especially SMEs, and its code must be verified, validated and certified.

The Data Transfer Agent fits into the Gaia-X architecture across three layers:

1. **Trust Plane** – Receives and validates credentials from services like the Gaia-X Wizard and Clearing House. This ensures that only authorised, verified parties can participate in the data exchange.

2. **Usage Plane** – Facilitates the actual data transfer between provider and consumer. They interact with storage systems and handle the mechanics of the exchange.

3. **Management Plane** – Interacts with the Data Space Federated Services that provide essential governance and ecosystem functionality, including Governance and use case management, Traceability and data transaction monitoring, Service Catalogs and data exchange tools, and participant management with business model support.

Ultimately, the Data Transfer Agent is not a standalone piece, but rather an integrated component that operates across trust, usage, and management layers to enable secure, trusted, and modular data sharing.

Summary of the key characteristics of Data Transfer Agents:

- Implement OpenID4VC and OpenID4VP protocols, which are central to verifiable credential exchange.

- Interact directly with Gaia-X Digital Clearing Houses and wallets.

- Run as standalone components, giving more flexibility in architecture.

- Interact not just with similar components, but also with broader Gaia-X participants and delegations.

- Natively use the Gaia-X ontology to verify constraints across various domains like data products, service offerings, infrastructure, and labels.

What's next?

We're at an exciting moment. The Data Transfer Agent code is :

- Shaping up to be a seamless solution for decentralised data transfer, fully aligned with the Gaia-X de facto standard.

- Released as open source under Apache-2 license on Gaia-X GitLab, which means accessible, transparent, and open to contributions from the community.

- Designed to be run as a managed service delivered by cloud providers, easy to deploy even for a department within a group, a public institution, or a small or medium-sized enterprise (SME).

We invite you to **join the collective effort to bring Data Spaces into a new era**—one that's open, trustworthy, and interoperable.
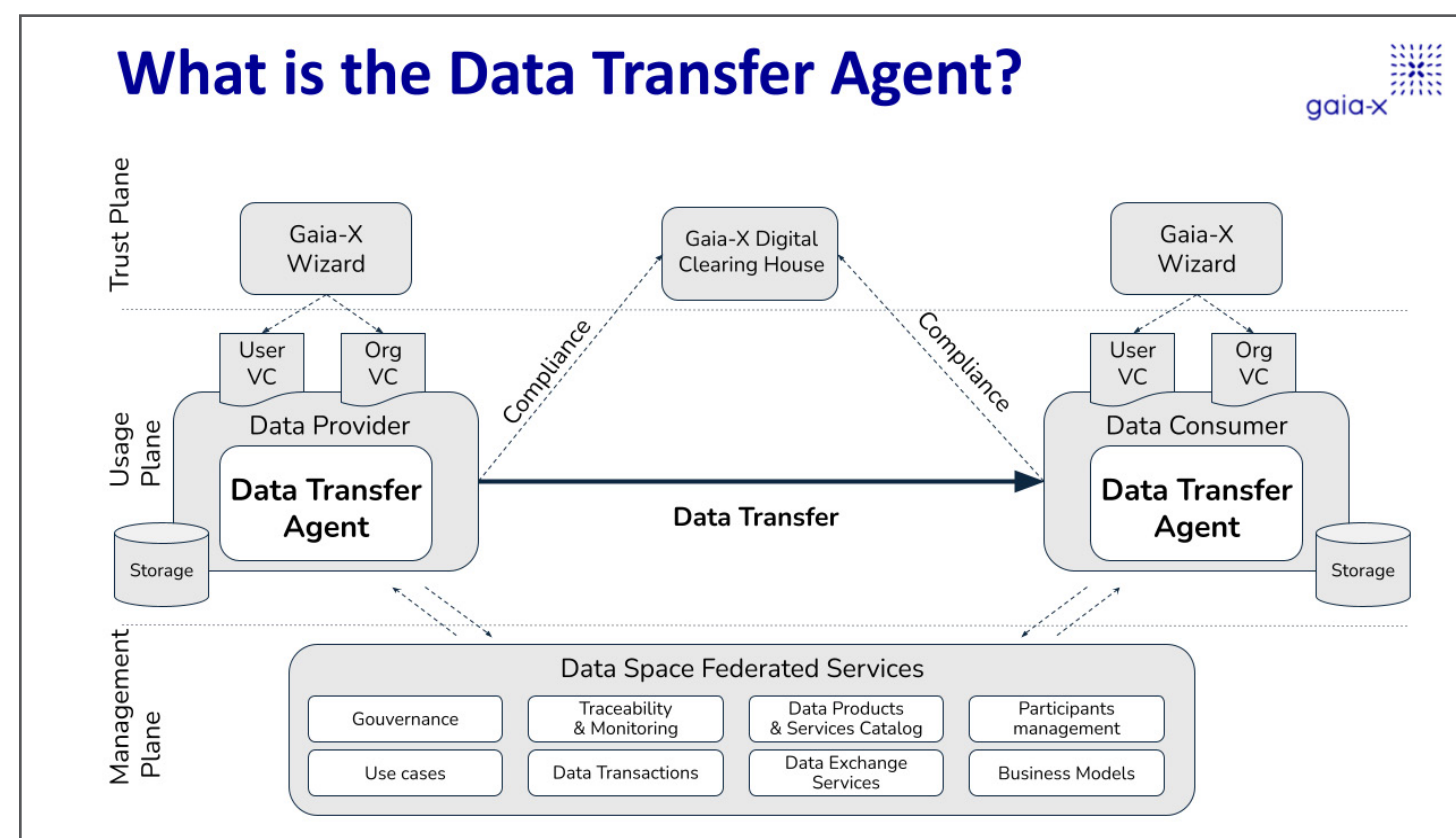
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What is the Data Transfer Agent?

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