ECLIPSE®
FOUNDATION

Building a Future of Digital Sovereignty and Innovation at the Eclipse Foundation

Positioning Paper

ECLIPSE DATASPACE

Introduction

In today's digital landscape, data has become one of the most valuable assets, driving innovation and growth across industries. However, the complexities of data sharing—ensuring trust, safeguarding privacy, and enabling interoperability across systems—pose significant challenges. As organisations increasingly seek to leverage data for competitive advantage, dataspaces have emerged as a critical framework for secure, sovereign, and collaborative data sharing.

Trust is crucial for effective data exchange, as it forms the foundation of any successful data-sharing ecosystem. As data becomes increasingly valuable, akin to the new oil, digital sovereignty has become a vital global asset. Just as modern systems incorporate identity and user management by design, future systems will prioritise data sovereignty as a fundamental feature for secure and trusted data sharing.

Dataspaces empower organisations to securely share and access data across boundaries, driving informed decision-making, enhanced collaboration, and accelerated innovation. By providing a controlled and trusted environment for data exchange, dataspaces minimise risks such as data breaches and misuse while ensuring compliance with regulatory requirements. This ability to balance seamless data sharing with robust protection of sensitive information is essential for building a secure, efficient, and sustainable data economy.

Open source software plays a pivotal role in achieving digital sovereignty, as it establishes common standards and reference

implementations for secure and interoperable data processing and exchange. The European Union, with its 2030 vision for sovereign data exchange and portable cloud services, is at the forefront of this movement. Legislative frameworks like the Data Act, Digital Markets Act (DMA), and Digital Services Act (DSA) provide the necessary regulatory support, while open source communities, such as the Eclipse Foundation, are crucial to delivering standardised frameworks and reference models.

Why dataspaces?

Data Discoverability

Data is everywhere but often hidden. We need an simple way to find quality datasets while understanding their policies and usage restrictions.

Automation

The data sharing process is slow and requires legal and security reviews. We need a simple and automated process.

Regulation

New data-sharing regulations are expected, especially in the EU. We must be prepared with the right processes and technology.

What are Dataspaces?

Dataspaces are collaborative ecosystems that enable secure, interoperable, and trusted data sharing across organisations and systems. They provide a framework for participants to publish and discover data and data-related services in a controlled environment, ensuring trust, compliance with regulations, and the enforcement of data usage policies while maintaining data ownership and sovereignty.

The Eclipse Foundation: A Cornerstone of Sovereign Dataspaces

The Eclipse Foundation has emerged as a leader in dataspaces and European digital sovereignty. With the launch of the Eclipse Dataspace Working Group (EDWG) and the successful integration of Eclipse Tractus-X into production as part of Catena-X in 2023, the Foundation continues to strengthen its position. These initiatives build on a foundation of existing Eclipse ecosystem projects, such as Eclipse Dataspace Components and Eclipse Cross Federation Service Components (XFSC), which have already achieved significant industry adoption.

At the forefront of this movement, the **EDWG** is driving the development of open source ecosystems that empower organisations to adopt and implement dataspace technologies. By providing the tools, governance, and community support needed for trusted and sovereign data sharing, the Eclipse Foundation has become the go-to platform for organisations seeking innovative, secure, and interoperable data solutions.
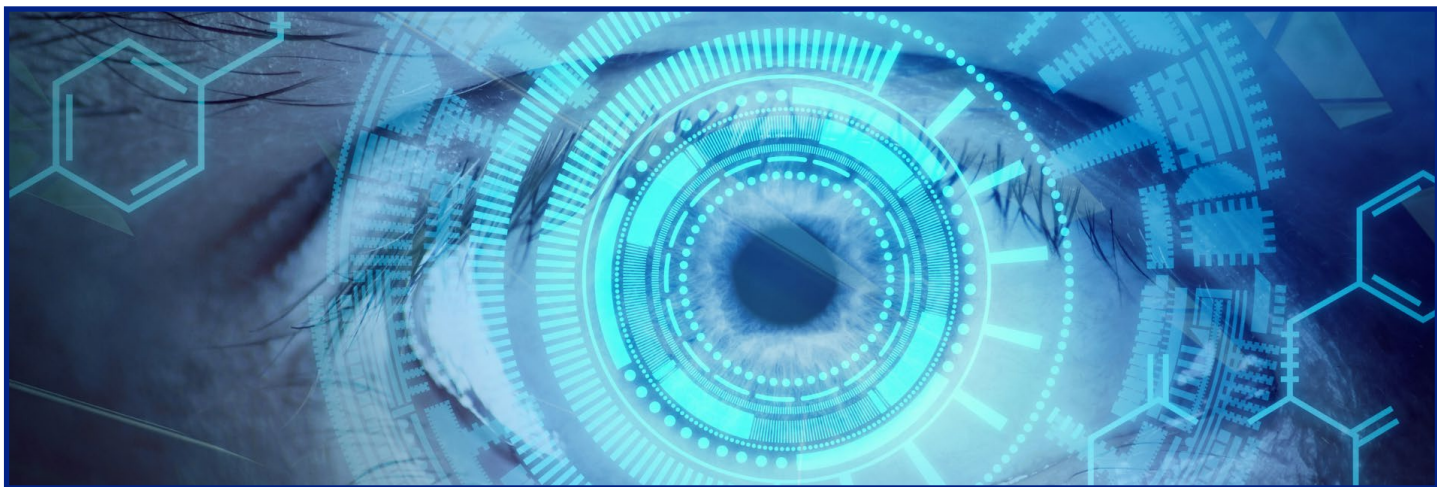
A Vision for Trusted and Sovereign Data Sharing

The EDWG envisions a world where organisations of all types and sizes can participate in trusted data sharing ecosystems through scalable, modular, and extensible open source components based on open standards. The primary objective is to encourage, develop, and promote solutions that enable the development and participation in dataspaces, fostering global adoption without favouring specific industries or organisations.

The **Eclipse Dataspace Working Group** envisions a world where organisations of all types and sizes can participate in trusted data sharing ecosystems through scalable, modular, and extensible components based on open standards. Its mission is to:

- **Develop Open Source Solutions:** Create scalable, modular, and extensible components for dataspaces.

- **Define Standards:** Promote protocols and frameworks for interoperable and sovereign data exchange.

- **Enhance Interoperability:** Ensure compatibility across

dataspace implementations.

- **Build a Thriving Ecosystem:** Support the adoption of dataspace technologies through vendor-neutral marketing, governance, and sustainability.

To achieve these objectives, the EDWG offers governance, guidance, and support for open source solutions that facilitate the development and use of dataspaces. By remaining industry-agnostic and inclusive, the working group is committed to promoting global adoption of dataspace technologies and fostering trusted, scalable data-sharing ecosystems worldwide.

Standardisation: Driving Interoperability and Trust

The Eclipse Foundation's acceptance as a **Publicly Available Specification (PAS) Submitter** to ISO/IEC JTC 1 is a significant milestone that enables fast-tracking the approval of specifications as international standards. This ensures that dataspace standards built within the Eclipse ecosystem align with the highest levels of quality and interoperability, fostering trust and global adoption.

The Big Picture

Policy, Regulation and Legislation

Usage Specs and Requirements

Open Source Implementation
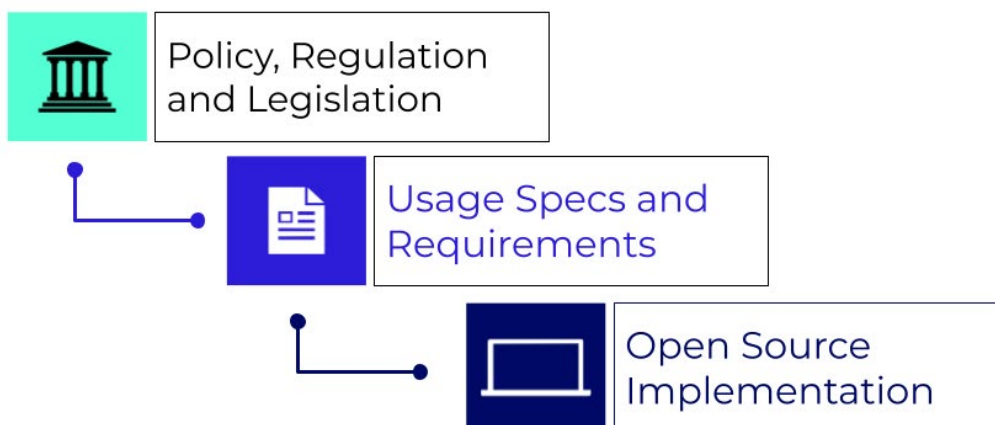
Eclipse Dataspace activities are positioned in the lower layer of this dataspace ecosystem diagram, producing actionable outputs for OSS adoption and standardisation.

Eclipse Dataspace Working Group (EDWG) Initiatives

The EDWG is at the forefront of developing and standardising key specifications to enable secure, interoperable and trusted data sharing across organisations and systems.

- **Eclipse Dataspace Protocol**
  The Eclipse Dataspace Protocol builds on the pioneering work of the International Data Spaces Association (IDSA), which introduced the IDS Reference Architecture Model and Rulebook. Recognising the need for standardised dataspace fundamentals, the Eclipse Foundation developed this protocol to ensure secure, interoperable data sharing across diverse systems.

- **Eclipse Dataspace Decentralised Claims Protocol**
  The Eclipse Dataspace Decentralised Claims Protocol (DCP) addresses the critical need for conveying organisational identities and establishing trust in a decentralised manner. Unlike the base Dataspace Protocol, which leaves identity management to individual dataspaces, DCP offers an interoperable overlay that enhances privacy, reduces disruption, and builds trust.
  Developed as part of the Eclipse Tractus-X open source project, DCP is implemented in tools like the EDC Identity Hub and the Tractus-X Managed Identity Wallet. Widely adopted by dataspaces such as Catena-X and EONA-X, DCP plays a key role in enabling robust, decentralised, and trust-based data sharing.

- **Eclipse Conformity Assessment Policy and Credential Profile**

  The **Eclipse Conformity Assessment Policy and Credential Profile** provides a standardised framework for expressing and verifying data-sharing policies. By leveraging verifiable credentials and conformity assessment vocabularies, it ensures accurate and secure data exchanges. This specification underpins the Gaia-X compliance framework and is implemented in projects such as Catena-X, EONA-X, and Agdatahub. It combines W3C standards for verifiable credentials and cryptographic trust, ensuring robust policy negotiation and verification.

- **Eclipse Data Rights Policies Profile (DRP)**

  Trust is crucial for data exchange, and the control and transfer protocols must connect to trust frameworks. The Eclipse Data Rights Policies Profile establishes requirements for organisations to use these profiles with underlying protocols, facilitating trusted data exchange. Through these profiles, organisations can establish trust and ensure compliance with diverse trust frameworks, promoting secure and reliable data exchanges.

Through these and future initiatives, the **Eclipse Dataspace Working Group** is delivering the tools, protocols, and frameworks needed to build trusted, interoperable, and sovereign dataspaces. By setting open standards and fostering collaboration, the EDWG is paving the way for secure and scalable data sharing across industries and geographies.

A Component-Driven Model for Dataspaces

The EDWG employs a component-driven model to foster a broad, interoperable ecosystem of dataspaces, organised into three distinct areas:

1. Dataspace Core & Protocols (DCP)

This group defines and standardises core protocol specifications to ensure alignment across open source projects implementing essential dataspace functionality. By establishing these foundational components, the EDWG promotes seamless interoperability, trust, and reduced complexity in data sharing.

Key initiatives:

- **Protocol Specifications:** Develop abstract message protocols for catalogues, contract negotiation, and data transfer.

- **Interoperability:** Provide minimum viable interoperability among different projects.

2. Dataspace Data Planes & Components (DDPC)

DDPC aligns projects implementing data planes and optional components to enable advanced dataspace use cases. These modular tools enhance functionality, deliver business value, and provide the flexibility to scale and adapt to evolving needs.

Key initiatives:

- **Data Planes:** Develop components for data transmission and processing.

- **Optional Components:** Add specialised tools that improve dataspace capabilities and business value.

3. Dataspace Authority & Management (DAM)

DAM delivers tools and frameworks for managing dataspaces, including policy, member management, and starter kits for authorities. This delivers robust governance tools to safeguard the integrity and security of the dataspace ecosystem. With a structured approach, the EDWG simplifies data governance and ensures compliance with complex regulatory requirements.

Key initiatives:

- **Management Tools:** Equip dataspace authorities with effective ecosystem management solutions.

- **Policy Implementation:** Develop frameworks for governance and compliance in data sharing.

Based on the regulatory trigger of the EU data act, the EDWG is working on OSS modules and standards to create a Dataspace OSS community of use.
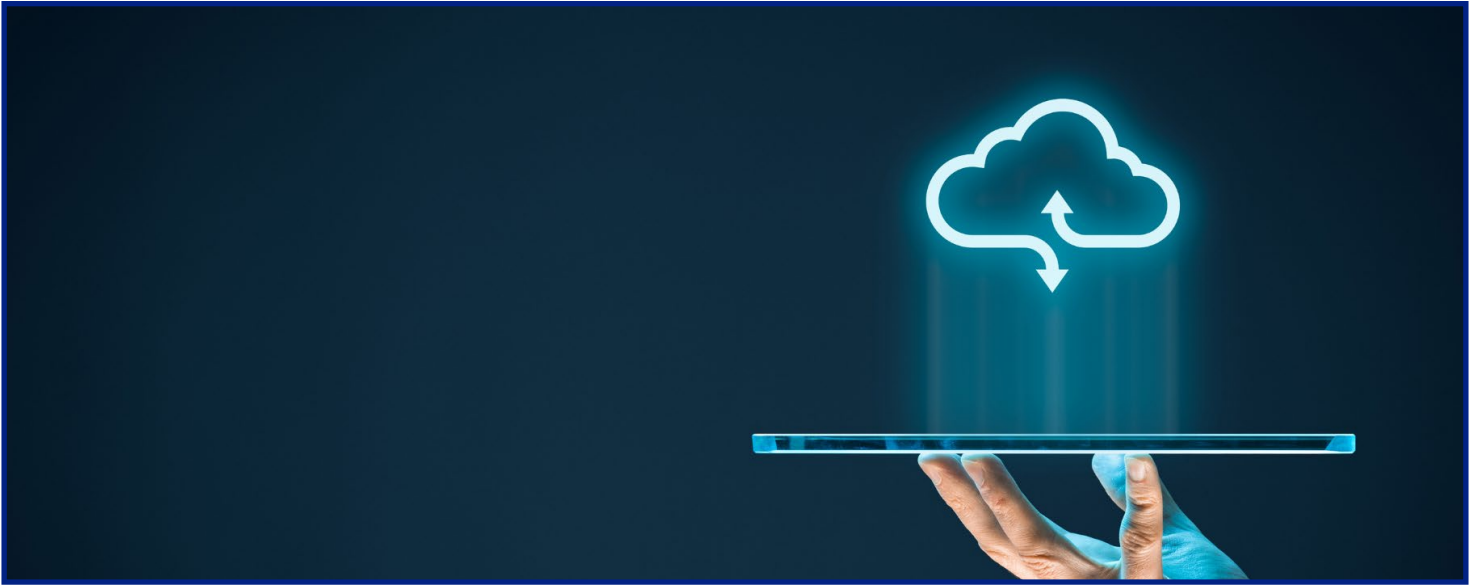
Beyond Dataspaces: The Eclipse Cloud Interest Group

While dataspaces are pivotal to achieving digital sovereignty, creating a fully federated and interoperable environment requires robust support from the underlying cloud infrastructure.

To address this, the Eclipse Foundation has established the Eclipse Cloud Interest Group. This initiative fosters innovation and drives the development of open source cloud technologies, protocols, and specifications to enable multi-cloud interoperability. The group's efforts align with the EU Data Act's switching requirements, relevant regulations, and the overarching goal of strategic autonomy.

Key focus areas:

1. Emergence of Critical Cloud Components

Facilitate the creation of essential cloud components to support the development of autonomous and federated cloud infrastructures.

2. Cloud Services Portability and Autonomy

Develop technologies and processes that enable seamless switching between cloud providers, promoting autonomy and fostering a competitive, open market.

3. Multi-Cloud Managed Services Interoperability

Leverage open source technologies to achieve service portability and interoperability across diverse cloud platforms.

4. Conformity and Quality Assurance

Ensure cloud services meet interoperability, quality, SLA, and performance standards across multiple providers through conformity assessments and robust quality assurance frameworks.

The Eclipse Cloud Interest Group is supported by innovative open source projects, including:

- **Xpanse:** Enables managed services for any cloud platform, focusing on portability.

- **Biscuit:** A decentralised authentication token backed by an active, thriving community.

- **Verifiable Credentials & Linked Data:** Leverages Gaia-X and other approaches for secure and verifiable data management.

- **Conformity Assessment Profile:** Ensures compliance with established standards to maintain interoperability and reliability.

- **XCP-ng:** A high performance enterprise-level virtualisation platform with a rich ecosystem that supports stack management and backup.

The Eclipse Cloud Interest Group empowers organisations, developers, and service providers to collaborate on building a sovereign, interoperable, and competitive cloud ecosystem. By collaborating on open source innovation, the group ensures the infrastructure needed to support digital sovereignty and the seamless portability of cloud services becomes a reality.

The EU Data Act

The EU Data Act is a key legislative initiative aimed at fostering a fair and open data economy. It establishes clear rules for data access and usage within the European Union to enhance availability, promote responsible sharing, and improve interoperability across sectors, driving innovation and growth.

Data Availability: Ensure data is accessible for innovation and economic growth.

Data Sharing: Encourage voluntary data sharing while protecting privacy and intellectual property.

Interoperability: Enable seamless data exchange across systems and sectors.

Data Sovereignty: Ensure data usage in compliance with EU regulations and safeguard the rights of individuals' and organisations.

Aligning with the EU Data Act

The Eclipse Foundation's work on dataspaces, cloud and related protocols aligns closely with the goals of the EU Data Act, providing the technical frameworks and tools needed for compliant, secure, and efficient data sharing:

- **Enhancing Data Availability:** The **Eclipse Dataspace Protocol** ensures that data is not confined to silos but can be discovered, accessed, and used across various applications. By respecting ownership and control, it enables data to be available when needed while supporting its responsible use.

- **Promoting Secure Data Sharing:** The **Eclipse Decentralised Claims Protocol (DCP)** facilitates secure and trusted data sharing through decentralised identity verification and trust establishment. By removing reliance on centralised third

parties, DCP aligns with the EU Data Act's emphasis on secure, voluntary, and privacy-respecting data exchange.

- **Ensuring Interoperability:** Eclipse protocols are designed to be interoperable with existing standards and technologies. For instance, the **Eclipse Dataspace Protocol** leverages widely accepted web technologies and ISO standards, ensuring efficient data exchange across diverse systems and industries.

- **Supporting Data Sovereignty:** Through tools like the **Eclipse Data Rights Policies Profile,** Eclipse frameworks empower data owners to define and enforce usage policies. This ensures compliance with EU regulations while safeguarding the rights and control of data owners.

- **Cloud interoperability:** the Eclipse Cloud Interest group will work in this topic in the future including Interoperability of data processing services and for the purposes of in-parallel use of data processing services, as described in the Data Act chapter VIII articles 35 and 36.

By providing these robust solutions, the Eclipse Foundation plays a pivotal role in advancing a secure, interoperable, and sovereign data economy that aligns with Europe's regulatory priorities.

Conclusion

The **Eclipse Dataspace Working Group** is leading the way in creating secure, interoperable, and sovereign dataspaces, empowering organisations to share data with trust and efficiency. As data volumes grow exponentially, dataspaces will play an increasingly critical role in addressing the challenges of privacy, security, and interoperability.

Complementing this, the Eclipse Cloud Interest Group empowers cloud providers, users, and cloud industry vendors to build, manage, operate, and consume the cloud services of their choice, while ensuring operability across providers of their choice.

By fostering open source solutions, fast-tracking standards, and aligning with key initiatives like the EU Data Act, the Eclipse Foundation is paving the way for a thriving, data-driven economy.

Join us in shaping the future of dataspaces and building a secure, interoperable, and sovereign data ecosystem.

Learn more about the Eclipse Foundation initiatives on Digital Sovereignty (EDWG and Eclipse Cloud)

Contact us to learn more about membership

About the Eclipse Foundation

The Eclipse Foundation is the largest global open source organisation based in Europe. Headquartered in Brussels, we provide the world's leading environment for collaboration on open technologies, empowering millions of software developers and driving significant impact on the global economy. We host over 420 high-impact projects and 20+ industry collaborations, including Adoptium, Eclipse Dataspace, Eclipse IDE, Jakarta EE, Open Regulatory Compliance, and Eclipse Software Defined Vehicle.

We are an international non-profit association supported by more than 385 members, including organisations such as Robert Bosch GmbH, CEA LIST, Deutsches Zentrum für Luft- und Raumfahrt e.V. (DLR), the European Space Agency, Fraunhofer-Gesellschaft, Mercedes-Benz Tech Innovation GmbH, and OBEO. To learn more, visit eclipse.org.