INTERNATIONAL DATA SPACES ASSOCIATION

International Data Spaces

Trustworthy and sovereign data sharing enable the data economy

The significance of data spaces

Data is the lifeblood of modern business processes and digital ecosystems, driving economic growth and delivering significant benefits to both companies and society. Its widespread use is setting the stage for a future where the data economy and artificial intelligence redefine how we innovate and succeed. Organizations can uphold the quality and trust of internally generated data, but a substantial portion of new value comes from sharing data with external sources.

To overcome the alleged contradiction of creating data value while at the same time maintaining—this is the value proposition of data spaces. Data spaces provide trust across ecosystems, offering both multi-organizational, multi-policy agreements and technical infrastructure to facilitate trusted data sharing between two or more (even unknown) participants, forming a value-creating ecosystem.

In a data space, data providers can trust that their partners will handle the data responsibly and that they get value for the shared data, all based on usage conditions that they define. Consumers, on the other hand, can trust that the data they utilize comes from a trustworthy source—and this can be observed in the whole value chain.

The International Data Spaces Association (IDSA) is committed to establishing standards for data spaces, ensuring that the features mentioned above are indeed built into every data space by design. Within a defined governance framework, these standards guarantee self-determined, secure data sharing between participants.

The International Data Spaces Association (IDSA) is a non-profit, consensus-based, member-driven organization focused on establishing and promoting standards for data spaces.

IDSA's core contributions are the IDS Reference Architecture Model (IDS-RAM), the IDSA Rulebook, and the Dataspace Protocol. Together, these resources support the creation of interoperable and scalable data spaces that enable trustworthy data sharing across industries and borders.

Since its inception in 2016, IDSA has grown to include over 170 members from 30 countries, all collaborating to advance the development and adoption of data spaces globally.

Advocates for data sovereignty

IDSA is transforming the data economy and realizes its promises, advocating for a world where every individual and organization retains control over their data. Our goal is to drive innovation, awareness, and global adoption of International Data Spaces (IDS), creating guidelines that guarantee data sovereignty for all participants.

Our focus is on the technical foundations of data spaces. We ensure that all participants adhere to the rules of the game by fostering interoperability—from technical and semantic to organizational and legal interoperability. We define a reference architecture, based on functional requirements elicited from our ecosystem all over the world, and technical standards for creating data spaces.

Data sovereignty refers to who has control and responsibility over the data along a secure end to end data supply chain—and the rules to be accepted and enforced. Data sovereignty is a spectrum, meaning there can be different degrees of control. To ensure data sovereignty, the rules of data management (data usage policies, data contracts, usage rights etc.) need to be clearly expressed and understood by everyone involved.

IDSA does not create these rules but provides a reference framework to describe and enforce them. The responsibility for defining the rules lies with the data space governance authority, such as the operator, or higher-level entities like governments and regulatory bodies. Moreover, it is the data holders who set the rules for its usage. The tool that IDSA offers to make this happen is the concept of the data space connector. The data space connector is capable of understanding, process and support these rules to ensure that all participants comply with them.

Whether you're a "User" leveraging data spaces as a participant for business value or a „Maker" creating data spaces and providing services within them, we invite you to join us in advancing data space practices and technology. Our goal is to push for trustworthy data spaces that empower every industry to use data in a sovereign manner.

- If you are a Maker, becoming a member of our association is compelling. You will join our 170+ members across businesses, organizations and government institutions from over 30 countries worldwide. Members are at the center of our work, creating the knowledge and assets we make available to industry and the public. Membership gives you access to all our activities.

- If you are a User, you can subscribe to our User Group instead of becoming a member. Launching in May 2025, the User Group gives you access to the subset of activities designed specifically for your needs and offers streamlined access to essential IDSA assets.

How to build data spaces

To build data spaces across industries and national borders, interoperability is a critical factor. The European interoperability framework outlines a strict mandate: seamless communication across four layers—legal, organizational, semantic, and technical—is essential for all data space instances. This is the guideline for our work.

IDS Reference Architecture Model

At the heart of data spaces lies the IDS Reference Architecture Model (IDS-RAM). This architectural framework is a conductor, making sure that data spaces operate seamlessly.

The IDS RAM outlines the key components and requirements to build a data space. It provides a common language and structure for designing and implementing data spaces, and it ensures technical and semantic interoperability between different data space implementations. This includes specifications for data space connectors, data models, and security mechanisms, as well as guidelines for data governance.

The IDS-RAM guides stakeholders through the decision-making process when building data spaces, considering their individual requirements and perspectives. Therefore, the IDS-RAM is modular, enabling different patterns of data spaces.

It helps from establishing business rationale and functional requirements to structuring information models, implementing processes, and determining which systems to build. This document assists in understanding the common ground between participants, where barriers to implementation might exist, and which design to choose.

IDSA Rulebook

The IDSA Rulebook serves as a foundational guide for organizational interoperability within data spaces. It offers detailed recommendations that enable organizations to harmonize their business processes—for seamless collaboration and data sharing across different entities.

The IDSA Rulebook serves as a guide for implementing the IDS Reference Architecture Model, provides a foundation to create data spaces and helps data space initiatives define their rules, governance, and legal basis for data sharing. The goal is to clarify: How do you set up a data space? What is mandatory to include? How can it be made trustworthy?

By following these guidelines, all players can together reach our shared goal of unlocking the full value of the global data economy.

IDS Certification

IDS Certification plays a paramount role in realizing trust and interoperability in the data economy. All data endpoints adhere to a common trust framework which mandates the use of data space connectors. Certifying these connectors and the user environments, based on strict security criteria ensures that all participants can share data confidently.

IDS offers two complementary certifications: IDS Component Certification and IDS Operational Environment Certification, both based on a detailed criteria catalog that includes proven security measures and innovative IDS-specific requirements. With the completion of the standardization of the Dataspace Protocol, the IDS Certification Scheme will evolve to assess interoperability modules based on automated testing.

By enabling adopters to choose from a series of certified data space connectors, we will ensure that their efforts are focused only where they are needed: on identifying the best use cases for data sharing that support their objectives and entrepreneurship. Stay tuned for updates.

Data space connectors

To share data, the participants of a data space need a data space connector. This software transfers data between different systems, applications, or platforms. It enables trusted and secure data sharing between participants, allowing data to flow seamlessly across different systems and devices.

The data space connector fulfills two important roles: providing Data Exchange Services and safeguarding trust enforcing usage policies and cybersecurity measures. Employing various methods such as management services, cloud orchestration, lightweight APIs, and IoT gateways, data space connectors serve as the bridge enabling the utilization of data for concepts such as digital twins, AI, and federated learning.

However, due to diverse data and sharing requirements, different connector variants are necessary. For instance, IoT device connectors may differ significantly from those for data marketplaces or industrial cloud platforms, though they must seamlessly integrate open data.

To achieve reliability in a data space, the interoperability of connectors requires verification. To achieve this goal, we already have a set of usable standards but additions are required. For this reason, IDSA developed the Dataspace Protocol.

The key to data spaces is the connector

- **Connects participants in a data space** – to share, utilize, benefit from data.
- Ensures **trust through IDS Certification** and **cyber security** assessment.
- Connects to **trust frameworks** and **identity management.**
- Includes **identity & policy management**, ensures **data usage control**.
- Guarantees **interoperability**.
- Understands and enforces **data usage policies**.
- **Master** for other connectors of diverse feature sets.

Dataspace Protocol

The Dataspace Protocol (DSP) is at the core of the technical implementation of every data space component and guarantees interoperability between data space participants. It establishes standardized protocols and mechanisms for data sharing, ensuring smooth communication between systems and devices.

Additionally, the Dataspace Protocol promotes the adoption of common vocabularies and ontologies, enhancing semantic interoperability and enabling shared interpretation of data across different environments.

The protocol specification follows the functional requirements of the business processes described in the IDSA Rulebook based on mutually agreed industry requirements. To fulfill our mission to build standards for data sovereignty one of the IDSA's goals is to make the Dataspace Protocol (DSP) an ISO standard.

IDSA has released in the beginning of 2024 the stable version 2024-1 of the Dataspace Protocol. The Dataspace Protocol specifications will be associated with a Technology Compliance Kit (TCK), which will serve as an automated test suite for developers to ensure compliance with with this protocol. This framework is set to become the foundation for testing procedures and will be integrated into the IDS Certification scheme. This integration is set to take place within the Eclipse Dataspace Working Group (EDWG).

Eclipse Dataspace Working Group

To support the development of open-source software for data spaces we founded the Eclipse Dataspace Working Group (EDWG) with the Eclipse Foundation. Together we will build a robust open-source ecosystem for secure data sharing. This collaboration leverages the Eclipse governance framework to speed up the creation of universally accepted standards and software components for data spaces.

IDSA's work sets the organizational and technical foundation for data spaces, ensuring trust, interoperability, and data sovereignty. The Dataspace Protocol (DSP), central to this framework, facilitates interoperability and is moving towards an Eclipse Specification Project to expand participation and ensure high-quality standards.

This partnership signifies a strategic move to harness global developer contributions, making code sustainable and facilitating the creation of trusted data sharing frameworks. IDSA's goal is to make the DSP an ISO standard.

By working with the Eclipse Foundation, IDSA accesses a vast network of open-source developers, accelerating the development of data spaces and contributing to a global scale of trusted data sharing and digital sovereignty.

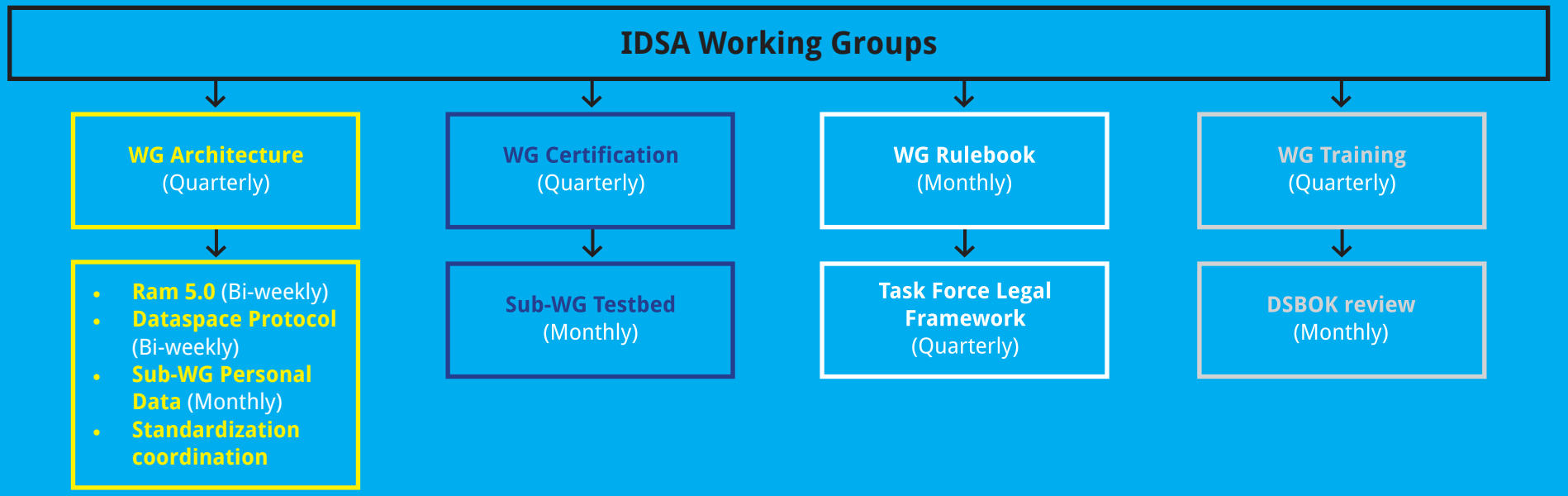
Join the IDSA Working Groups— Shape the future of data sovereignty

Our working groups are where IDSA members come together to drive real progress in data sovereignty. By joining, you'll collaborate with industry leaders, contribute to key deliverables, and help shape the future of our standards and frameworks.

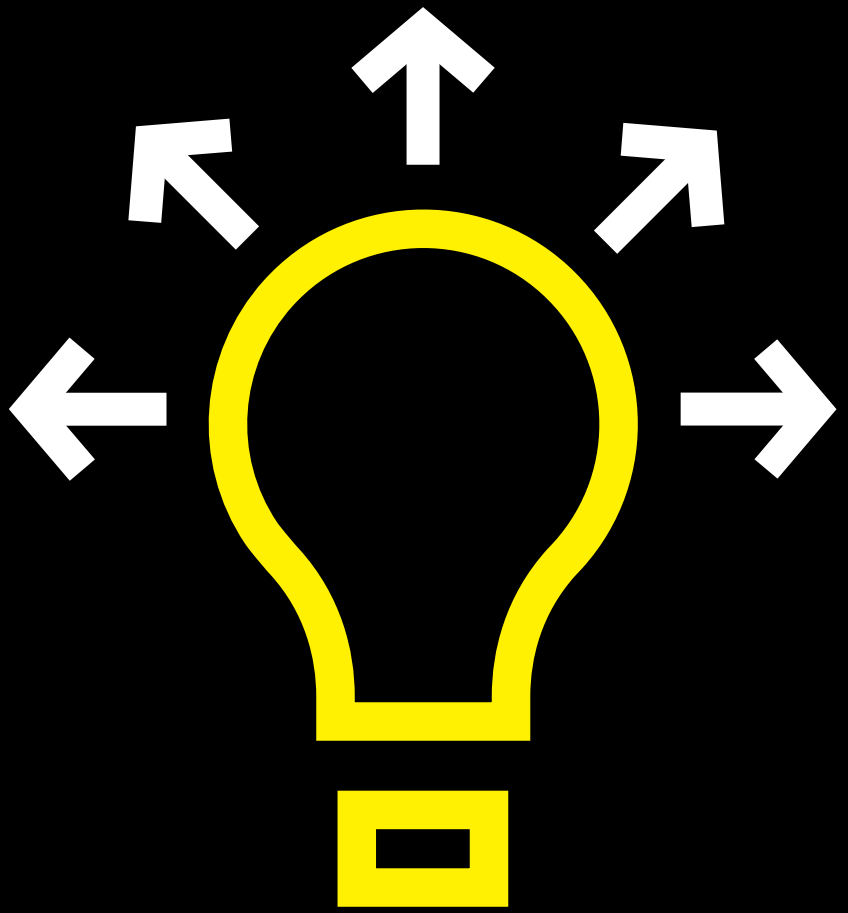
Each group follows a structured schedule, ensuring productive discussions and clear outcomes. You can engage at the level that works for you—whether it's active participation in meetings, reviewing documents, or providing insights along the way.

Our four working groups focus on key aspects of data spaces: Architecture (technical frameworks and interoperability), Certification (trust mechanisms and compliance), Rulebook (governance and policies), and Training (knowledge transfer and enablement). Whether your expertise is technical, strategic, or regulatory, there's a place for you to contribute.

Be part of the change—become a member and join a working group today and help shape the future of data spaces!



Standardization— the key to interoperability



Standardization is crucial for a thriving economy of global dimension because it enables interoperability, reduces technical barriers, and enhances trade. It helps businesses reduce costs, enter global markets, and ensure quality products for consumers. It facilitates innovation, minimizes R&D risks, and supports environmental protection. Additionally, it allows companies to influence regulations and stay competitive by adapting to market trends.

Given the established position of IDS concepts as de facto standards, it is vital to improve go-to-market strategies and increase maturity by aligning IDSA resources with relevant standardization bodies.

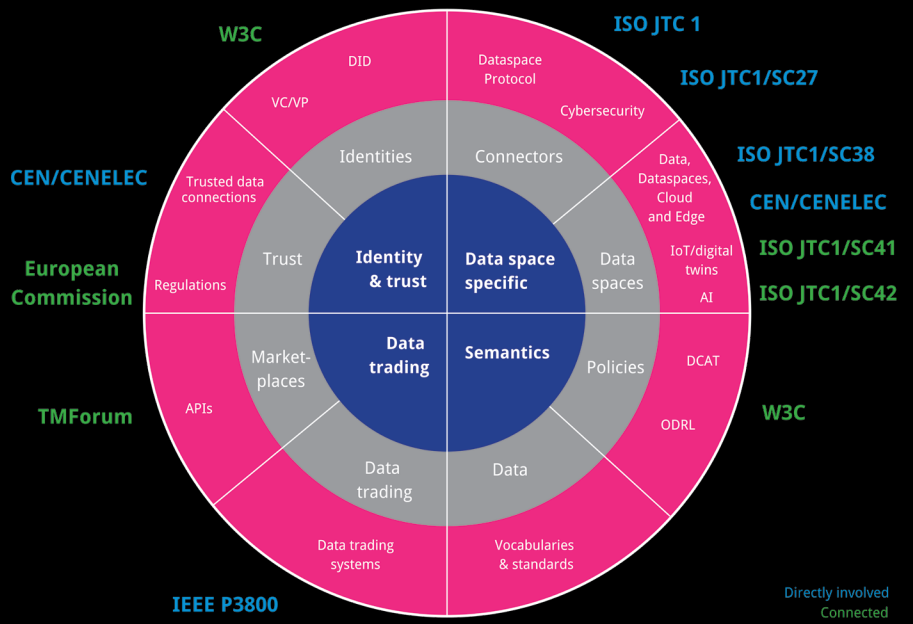
This effort is at the forefront of everything we do at IDSA. Our members, the IDSA working groups and the standardization coordination group, as well as the IDSA technical team, work diligently with key bodies at ISO, CEN/CENELEC, IEEE and W3C and advise the European Commission on advancing global standards for data spaces.

How it all comes together

Our commitment is driven by the dedicated efforts of IDSA members and technical staff who serve on standards committees in various capacities. Their roles range from observation to leadership of these committees—building strategic alliances.

At the heart of our standardization endeavors are our main assets: the IDS Reference Architecture Model (IDS RAM), the IDSA Rulebook, and the Dataspace Protocol. These are instrumental in developing technical specifications and implementing data spaces, crucial components of the standardization lifecycle.

ISO, IEEE, CEN/CENELEC



IDSA's engagement in European and international standardization bodies

International & European standardization activities

Data spaces are increasingly significant in global standardization efforts, highlighted by initiatives in IEEE P3800, ISO JTC1/SC38, ISO JTC1/SC41, and ISO JTC1/SC42. These are crucial to enable international collaboration in industrial sectors.

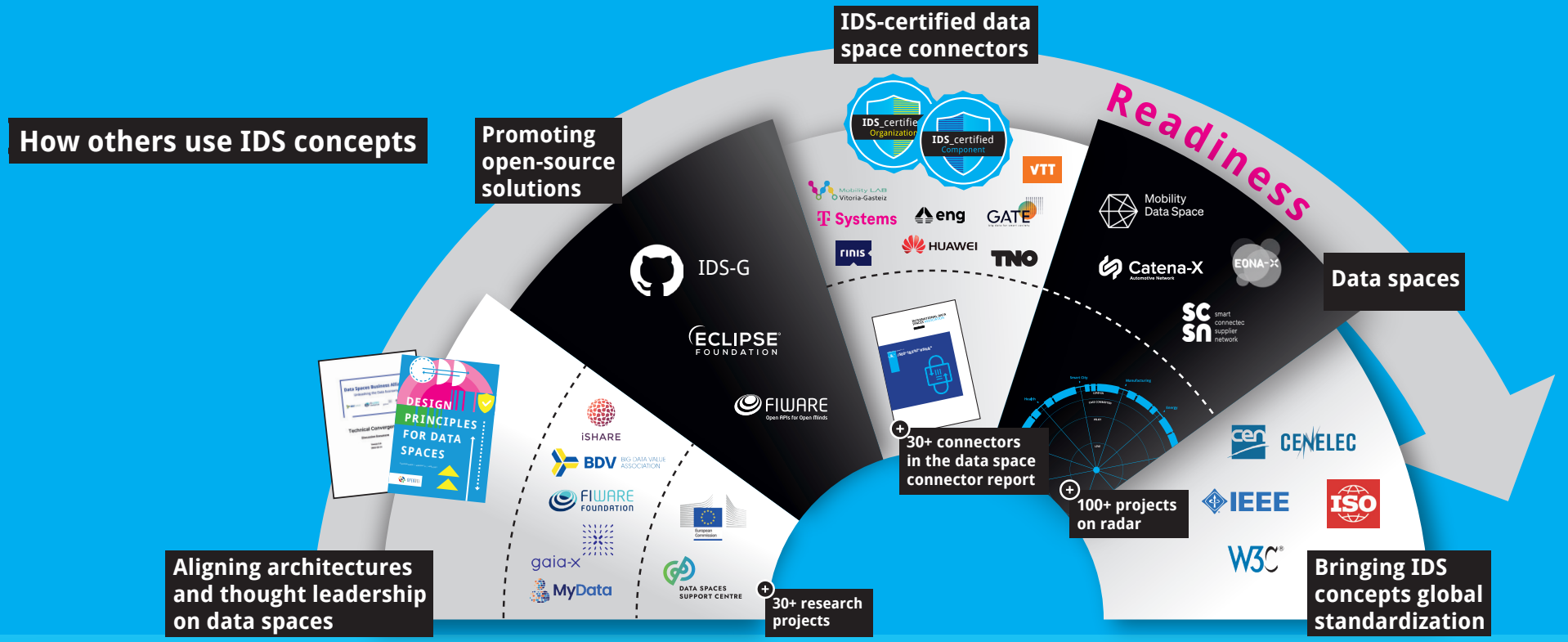
However, European regulations such as the Digital Markets Act (DMA), Data Governance Act (DGA), and AI Act necessitate tailored standardization within Europe. Collaborative research with CEN/CENELEC is essential to identify and address these specific standardization needs.

To this end, CEN-CLC/BTWG 6 "ICT Standardization Policy" has established a CEN & CENELEC Focus Group on "Data, Dataspaces, Cloud and Edge" and presents a proposal to establish a Technical Committee on Data, Data Spaces, Cloud, and Edge Computing as well. These groups will take a leading role in the identification of standardization landscape and provide recommendations for developing standards that support Europe's digital economy, aligning with European regulatory standards.

European Commission (EC) – Regulation state of the art

The Annual Union Workplan for Standardisation 2024 and the Rolling Plan for ICT Standardisation 2024 drafted by the EC in collaboration with the European Multi-Stakeholder Platform (MSP) on ICT Standardization identifies the topics for EU policy priorities. The Data Spaces Support Centre (DSSC) is collaborating closely with the European Commission. This effort complements the initiatives of the European Data Innovation Board by recommending guidelines for unified European data spaces. Furthermore, it aims to improve data interoperability and the sharing of services across various sectors and domains. This collaboration ensures adherence to the EU's existing data protection regulations. Additionally, the IDSA will enhance data interoperability by implementing the Data Space Protocol and related semantics.

IDSA on its way to international standards



IDS assets

- Scope and responsibility of IDSA
- IDS RAM
- IDS Certification
- IDS Testbed
- Dataspace Protocol
- IDSA Rulebook
- Professional Qualification Program

IDSA as part of data space ecosystems in the edge-cloud-continuum

IDSA does not address all aspects of data spaces. IDSA collaborates with other leading data associations and supports the notion of complementary but consistent standard-setting by equal partners.
Derived from the needs of its stakeholders (data space authorities, cloud service providers, user organizations), IDSA pursues the following distribution of work:

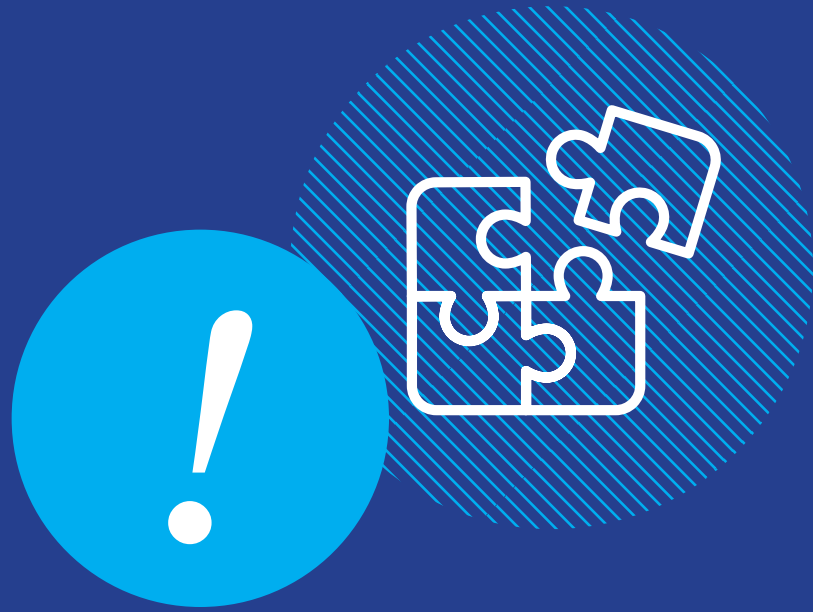
- **Gaia-X and iShare deliver specific trust frameworks for data space participants.**
- **Fiware, OPC-Foundation, Industrial Digital Twin Association (IDTA) and other prominent players deliver semantic models for data sharing.**
- **MyData and Solid add a perspective on sharing of personal data.**

These initiatives share the goal of cross-domain application and provide a baseline for individual data space initiatives.

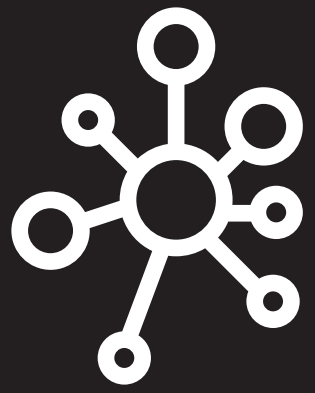
Joining forces – DSBA and DSSC

We have teamed up with Gaia-X European Association for Data and Cloud AISBL, the Big Data Value Association (BDVA) and FIWARE Foundation to build the Data Spaces Business Alliance (DSBA)—converging the best skills, assets, and experience in Europe into a one-stop-shop for data spaces, from inception to deployment. Together our organizations represent 1,000+ leading key industry players, associations, research organizations, innovators, and policymakers worldwide. With DSBA we are accelerating business transformation in the data economy. It is the first initiative of its kind, uniting industry players to realize a data-driven future in which organizations and individuals can unlock the full value of their data.

The Data Spaces Support Centre (DSSC) of the EU provides the forum to combine and approve consistent and user-friendly building blocks and blueprints for data spaces. All members of the DSBA are actively involved in the DSSC, dedicated to leveraging existing architecture and pooling expertise from key industry players, research institutions, and policymakers worldwide. This collaboration naturally extends into the DSSC's efforts.



Fostering global collaboration: IDSA hubs, competence centers and labs



To promote collaboration on a global scale, we have broken barriers and crossed borders. IDSA's network of disseminators to advances the mission of sovereign data sharing.

Our internationalization efforts are based on three key multipliers: hub facilitators, competence centers and research labs.

Hub facilitators act as knowledge centers in their country and coordinate the activities of the entire IDSA network there. 15 hubs across Europe and Asia are established, each orchestrating the collaborative efforts of IDSA members and partners.

Competence centers, the second pillar, focus on data spaces in specific domains, and bring expertise and skills to the IDSA ecosystem. With five competence centers now operating across Europe and Asia, IDSA has created a network specializing in various aspects of data sharing.

The third pillar, research labs, are projects hosted by scientific organizations. These labs develop IDS-based components and technologies that can be adopted by the market. The first research labs were launched in Shanghai and Tokyo.

The growth of data spaces around the world reflects our commitment to collaboration and data sharing across languages and cultures. Our expansion extends beyond Europe and establishes a presence in key regions such as Shanghai, Tokyo, Beijing and Malaysia.

In addition, last year the IDSA Ambassador program was launched. This program comprises data space experts and enthusiasts who champion sovereign data sharing principles. These ambassadors are spreading the message of IDSA wherever they go, contributing to the global dissemination of data space concepts and practices.

As IDSA continues to expand its reach and influence, the organization anticipates exciting developments in collaboration with stakeholders, governments, and ecosystems.

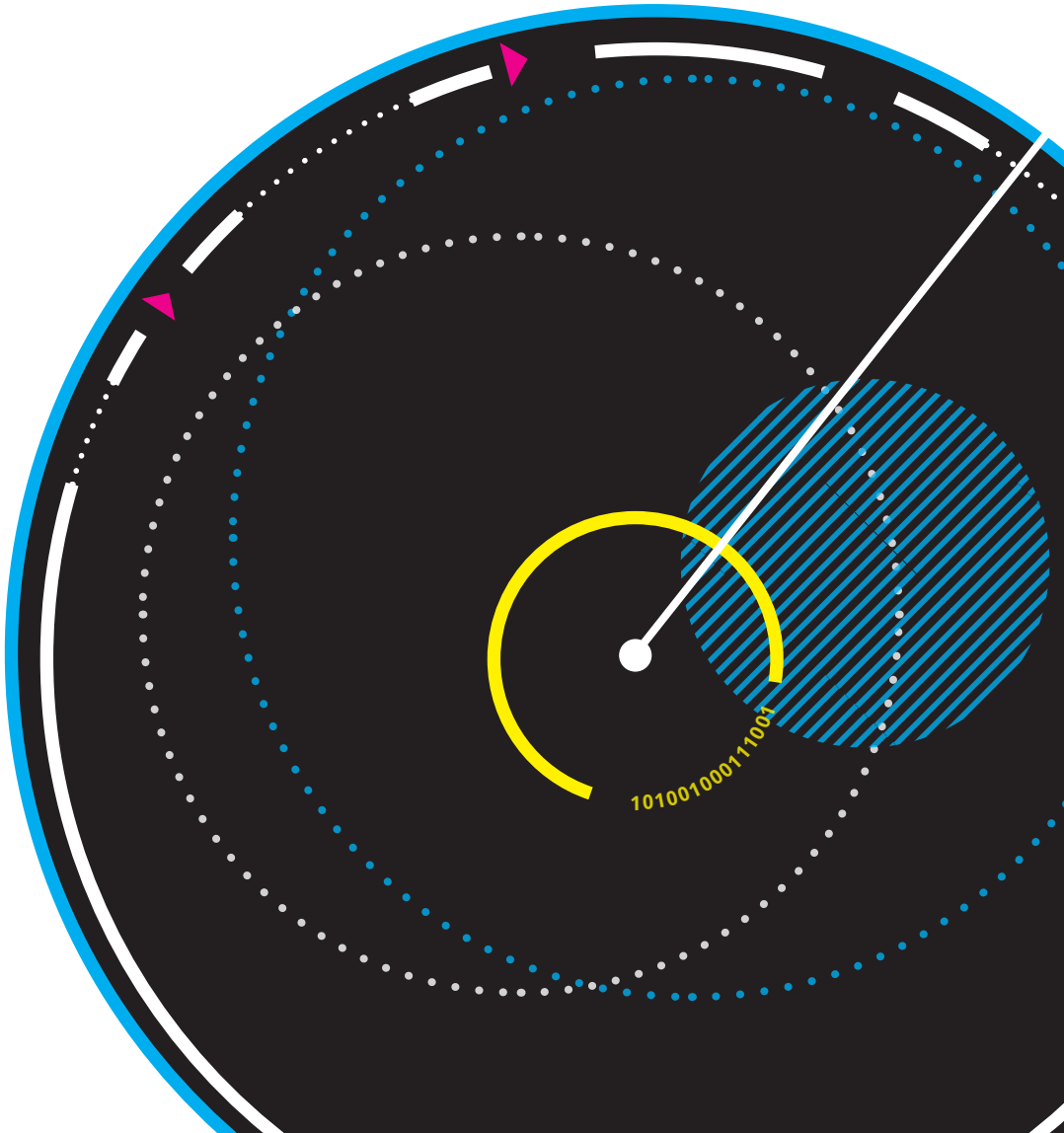
Driving impact with the Data Spaces Radar

More than two years ago, we introduced the Data Spaces Radar, a tool that quickly gained attention and adoption in the data space world. The radar has been instrumental in collecting and cataloging diverse data spaces—with over 100 entries recorded.

This publicly accessible tool offers a panoramic view of data spaces initiatives worldwide. It provides insights into sectors, locations, and the development stages of these initiatives, ranging from initial use cases to fully operational data spaces in production.

By showcasing real-life success stories collected through a user-friendly online form, the Data Spaces Radar aims to inspire. But it also serves as a guide for project teams, aiding them in selecting the most suitable technologies for their data space endeavors. It fosters a platform for sharing knowledge and experiences, encouraging reflection on technology decisions.
The Data Spaces Radar assesses the development stage of each initiative, categorizes them into business, organizational and technical aspects, forming the foundation for a comprehensive evaluation.

The business and organizational categories include business models, governance, and legal frameworks. The technical categories cover aspects such as access control, trust, identity management, and data interoperability.



Impressive success stories in the data economy

The IDS standard has led to impressive impact stories across industries worldwide. By fostering secure and sovereign data sharing, IDS has unlocked new opportunities for innovation and collaboration. Here are some examples.

Mobility Data Space

The Mobility Data Space (MDS) addresses the pressing issue of mobility, both as a widely used service and a contributor to climate change. It aims to foster sustainability in transportation. Initiated by Germany's federal government in 2019, today over 200 stakeholders from various sectors create an open data space which enables the use of mobility data in real time.

The MDS goes beyond the use of traditional vehicle data. It covers a wide range of information, including mobile network data, insurance data, weather data, and administrative data. This comprehensive approach allows for holistic solutions in mobility management, from optimizing traffic flow to improving public transport services.

The data space is built upon the IDS Reference Architecture, which enables data providers to specify and control conditions for data usage, fostering confidence regarding origin and quality of the data. Through IDS-based data space connectors, the MDS seamlessly integrates both open and private data, becoming a digital distribution channel for innovative, data-driven mobility solutions.

Deutsche Bahn's forthcoming provision of parking occupancy data is an example of the practical applications of the MDS. Such mature use cases highlight the platform's versatility. The IDS standard underpinning the MDS ensures data remains with the participants while enabling collaboration through standardized connectors.

Crucially, the MDS operates on the principle of community-driven data sharing. Working groups establish rules and standards for its sharing, allowing a collaborative environment where participants share insights and success stories. This community-centric approach not only strengthens the MDS but also contributes to the wider adoption of IDS standards across industries.

Catena-X

Catena-X signifies a shift towards a more connected and data-driven future for the automotive sector. It embodies IDS core principles, emphasizing data sovereignty and collaboration to drive industry-wide progress.
Leading companies such as Daimler, BMW Group, Volkswagen, Volvo, SAP, and Siemens AG have endorsed this initiative, signaling a move towards collective action in an industry known for its intense competition.

Catena-X prioritizes responsible, transparent, and sustainable supply chains, which are critical for navigating disruptions that can impact global supply networks.
The adoption of the Eclipse Connector underscores Catena-X's commitment to sovereign data sharing, empowering companies to maintain control over their data while participating in a multi-cloud environment. This approach allows businesses

of all sizes, including SMEs, to equally integrate into the network, providing access to the benefits of data sharing.
Catena-X shows the potential of data sharing guided by IDS principles. Through an open ecosystem approach, it fosters industry-wide collaboration, beyond conventional boundaries. As emphasized by Hagen Heubach of SAP, interoperability and openness are key elements of this transformation, laying the groundwork for collaboration to drive innovation and resilience across the automotive sector.

SCSN

The Smart Connected Supplier Network (SCSN) emerges as a resilient and productive solution for high-tech manufacturing vulnerable to delays in supply chains. The delay of a single component can halt production, resulting in significant losses.

TNO, in collaboration with KMWE, Brainport Industries, and Batchford, responded to this need by conceiving the SCSN. This initiative fosters collaboration and resilience.

Traditionally, manufacturers operate distinct systems, which hinders seamless communication throughout the supply chain. SCSN, built upon IDS architecture, bridges this gap by facilitating communication among partners. This system of systems empowers stakeholders to track critical information, forecast deliveries, and share technical product data with ease.

SCSN's benefits are manifold, promising productivity increase while avoiding vendor lock-ins associated with conventional supply chain software. Leveraging IDS standards, SCSN ensures instant data access and transparent communication.

The success of SCSN in the Netherlands sparks plans for an European expansion under the banner of „Market 4.0." Collaborations with partners in France, Spain, and Japan signify a global embrace of SCSN's transformative potential.

Eona-X

Eona-X is set to transform mobility, transport, and tourism through sovereign data sharing. With a focus on driving collaboration and efficiency, this initiative marks a big shift in how these sectors operate in the digital age.

Eona-X addresses a wide range of means of transportation such as airplane, bus, train, car, and bicycle, but also hospitality and tourism points of interest as museums, natural sites, local events and services and activity spots. The key is to ensure data sovereignty and nurture trade. The creation of a large data and services catalog will allow new use cases - to improve the travel experience and the processes of the stakeholders.

Key industry players, including Amadeus Group, SNCF, Air France, and KLM, are leading the way alongside newcomers such as Echo and Help. Together, they form a diverse consortium committed to leveraging data for the collective benefit of the ecosystem.

The goal is to build a trusted data space to improve services for users and stakeholders in mobility, transport and tourism and create new business opportunities.

As Eona-X gains momentum, efforts focus on practical implementation and tangible impact. Through prototype demonstrators, the initiative showcases the potential of data sharing in enhancing travel experiences and security measures.

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