INTERNATIONAL DATA SPACES ASSOCIATION

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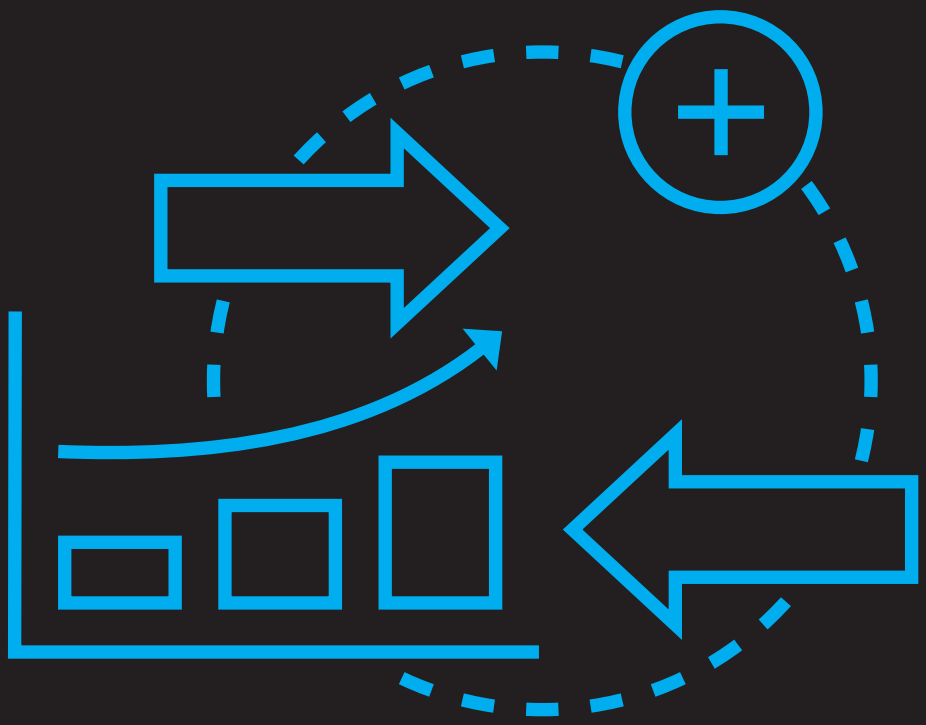
New Business Models for Data Spaces Grounded in Data Sovereignty



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1 Executive Summary

This paper encourages the creation of new business models for new products and services grounded in data spaces and data sovereignty. Data spaces are a key feature of GAIA-X, the pan-European, sovereign data infrastructure initiative. Data spaces have become a C-level topic ever since the German chancellors announced that in 2021, the German government will build the first data space, for mobility as a way to strengthen the German auto industry. More broadly, sovereign data exchange is increasingly viewed as one of the most important drivers of future growth for developed countries.

Data spaces are the key to this future, supporting the creation, promotion and expansion of data-driven markets with new business opportunities and strategic roles. These include new value creation opportunities and answering the question of who is best positioned to assume central roles in the new data economy.

However, when it comes to implementing data spaces, market participants are facing a chicken and egg problem – customers want to see products before they buy, and providers need customers for funding and feedback to develop these products in the first place. Hence, in this early stage, any market can benefit from an initial push. That's where this position paper comes in.

This paper applies frameworks and methods that include the business model and business ecosystem canvases to the IDS perspective . These support a structured approach and a checklist for business planning purposes.

The paper presents a business view and gives some concrete use-case examples of early adopters for governance, participants and support service providers – all derived from key roles in the IDS Reference Architecture Model.

The conclusion is a call to action: Every company facing digitization – and this means every company – should double check its business opportunities and how it will be affected by the future created by data sovereignty-driven markets.

2 Introduction

The good news, for established businesses and entrepreneurs alike, is that the concepts and standards underlying data sovereignty and data spaces are well developed and ready to go to the next level. Meanwhile, at least two megatrends drive the demand for digital sovereignty:

1. Digitization of all processes, assets, and businesses
2. Globalization with volatile or changing interests in the global economy

The result is that companies are increasingly interested in digital sovereignty, which means they demand to stay in control of digital business assets or the digitized business model itself. Risk management in supply chains, distributed production and transparent logistics, mobility, health, critical infrastructures – the use cases are diverse, but the solution is singular: add digital sovereignty.

Data sovereignty, addressed here, is the data half of digital sovereignty. Digital sovereignty as a whole is completely addressed in the GAIA-X concept, which also includes digital infrastructure sovereignty. The concept for data sovereignty is developed by IDSA, an international, cross-industry consortium of 130+ companies and research institutions. Data sovereignty is well documented in the- the Reference Architecture Model (RAM 3.0[1]) and widely acknowledged as a feasible approach. The first official standards have already been published (cf. DIN SPEC 27070[2]).

Digital sovereignty opens a world of new business opportunities and completely new markets. Moreover, it enables and accelerates existing markets with new business capabilities by adding data sovereignty services. This “add on” is valuable anywhere that growth is being stymied by a lack of data or trust or both.

The core services inherent in the technologies and architectures for digital sovereignty, like IDS or GAIA-X, are what enable new, data sovereignty-based business models. This white paper outlines nine IDS business roles that turn technological foundations into striking, new business opportunities.

Role	**Area of opportunity**
1. Data supplier 2. Service supplier	Realizing digital capabilities and algorithms
3. Data intermediary 4. Service intermediary	Bringing the parties together
5. Vocabulary publisher and provider	Semantic interoperability
6. Identity authority 7. Clearing house 8. Certification	Key governance and financial services
9. Software developers, specialized know-how	Support and integrations

[1] https://internationaldataspaces.org/use/reference-architecture
[2] https://www.beuth.de/en/technical-rule/din-spec-27070/319111044

The enabled business models are diverse, as mentioned above. The important point is that they exist in relationship to one another within a data-driven ecosystem based on data sovereignty. By building these sovereign data ecosystems we can generate new smart services and innovative business processes that will drive the future of the global digital economy.

3 Foundations of Business Modeling

Developing business models is an active research domain in management science and taught at leading business schools around the world, but it is also still, in many ways, an art. Therefore, this paper can only provide a brief overview, frame the issue, and provide guard rails for a first, more detailed discussion of emerging business roles and models in Chapter 4. Typically, business modelling proceeds in stages starting with fundamental environmental trends, such as new technology and regulation, and evolves toward a specific concept with a venture's or product's value proposition, infrastructure, customers, and finances. Figure 1 illustrates the process and role of prominent tools or frameworks.

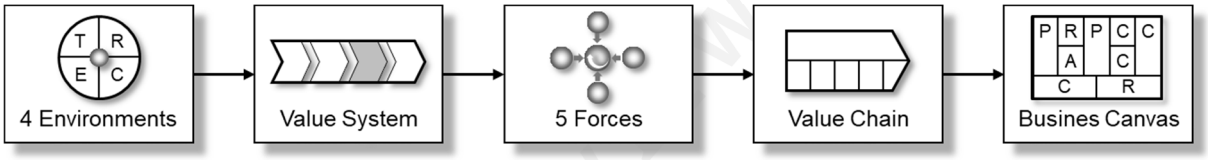

Figure 1: Business modelling process and prominent frameworks

Figure 1 recognizes that, first and foremost, any business opportunity is subject to developments that affect an industry as a whole. They can be categorized into technology (new technology standards, such as IDS), regulation (e.g., The European Commission's GDPR and proposed Data Governance Act), macroeconomics (recession/boom but also societal trends like aging) and culture (e.g., shift toward sustainably). These environmental forces shape industries and their incumbents in their entirety. For example, data spaces would not exist without new technology, such as the IDS standard; and any business model will be affected by the European Commission's proposed Data Governance Act.

In subsequent steps, analysis can evolve from an assessment of an industry's competitiveness (for example, using Porter's value system and 5-forces model respectively; Porter 1985, 1980, 1979) down to a specific company's or product's value chain and business canvas examination. Furthermore, with regard to the megatrend of digitalization there is no need to reinvent the wheel as important lessons have already been learned, conceptualized and codified (for example, Schlueter Langdon & Shaw 2002, 1997). Digitalization started early in a few industries, such as publishing and music, and has been spreading across other industries like the automotive industry's "connected car" services and direct online sales to consumers (DTC).

3.1 Business Model Canvas

Defining business models in the context of sovereign data exchange is not yet an established process. As the roles and interactions within IDS-based ecosystems are still being developed, deployed, and tested, we must often adjust our perspective to find the business opportunities. While there are many new technical aspects to be considered, many aspects of business modelling still apply, and tried-and-true tools can be useful to find a suitable business model. One tool which has already proven itself is the Business Model Canvas developed by Osterwalder and Pigneur (2010)[3].

The canvas comprises nine elements, ranging from the core value proposition for customers to cost structures and value streams. Within this paper, we focus on the value propositions and potential customers of the different roles to show possible interactions of the roles and their ability to form viable ecosystems based on IDS products.

The value proposition tells us the value a customer can derive from the offered products and services based on the offering's ability to solve a certain problem or fulfil customers' needs. Aspects to be considered in the IDS context can include cost reduction, risk reduction, accessibility or convenience and usability for the customer. In that regard IDS is first to market with a solution for sovereign data exchange.

The customer dimension helps us understand the size of the market potential from an IDS perspective. Customers include everybody inside the ecosystem such as service providers. However, the consideration also goes beyond the ecosystem as certain products and services can be offered to companies outside the ecosystem, expanding the number of potential customers.

For further studies, it might be valuable to flesh out other elements of the business canvas as well. Extensive descriptions of the different aspects can be found easily on the internet, e.g., on the official site strategyzer.com/canvas/business-model-canvas.

3.2 Data Ecosystem Canvas

The main purpose of this document is to give specific definitions and examples of possible business models regarding different roles as specified in the IDS Reference Architecture Model. Often it is also beneficial to create a high-level summary of the involved roles, envisioned business models and other business-relevant viewpoints for a specific IDS use case. The Data Ecosystem Canvas developed in the context of Sitra's Fair Data Economy Rulebook4 can be a helpful tool for this purpose.

[3] Osterwalder, A., & Pigneur, Y. (2010). Business model generation: a handbook for visionaries, game changers, and challengers. John Wiley & Sons.

[4] SITRA Fair Data Economy Rulebook (2020), https://www.sitra.fi/en/publications/rulebook-for-a-fair-data-economy/

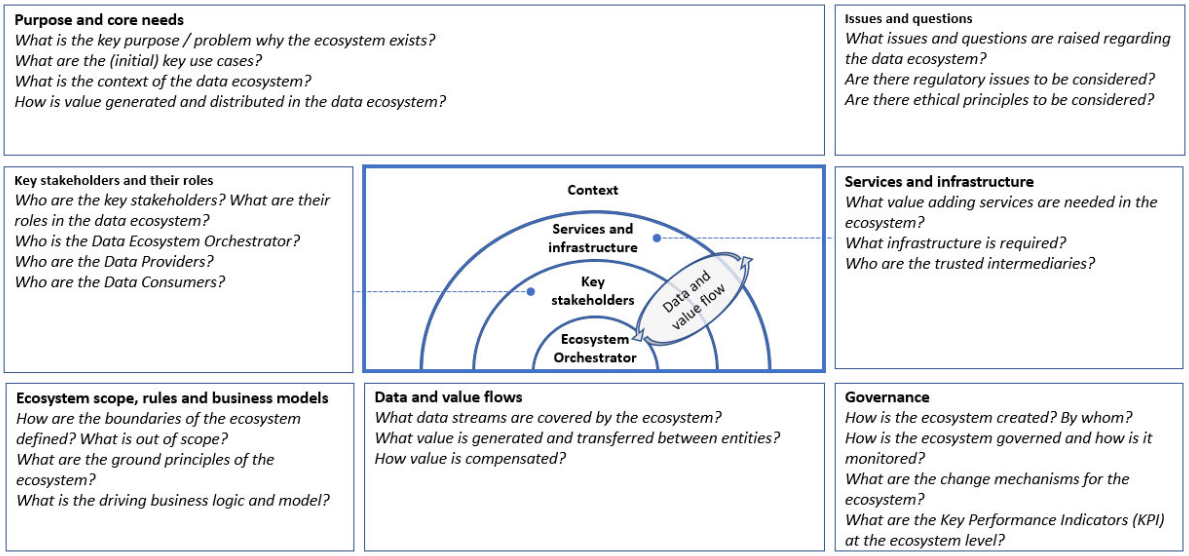

Figure 2: Data Ecosystems Canvas

The Data Ecosystem Canvas provides a condensed overview of the business models in a given data ecosystem. This tool provides guidelines on defining the seven relevant dimensions of the data ecosystem:

- Purpose and core needs
- Key stakeholders and their roles
- Ecosystem scope, rules, and business models
- Data and value flows
- Issues and questions
- Services and infrastructure
- Governance

3.3 Roles according to the IDS Reference Architecture Model 3.0

The business roles described in this white paper are aligned with the structure and terminology of the Reference Architecture Model (RAM) of the IDS. The RAM distinguishes between two sets of roles: basic roles and business roles.

Basic roles represent the technical view and are derived from the combination of seven IDS assets and activities. Assets include the connector, data, services, vocabularies, and apps. Every asset is associated with eight activities (create, own, certify, publish, provide, consume, use, delete). From the combination of the roles and activities, the basic roles result and allow us to describe interaction distinctly on a technical level: For example, the data creator could be an industrial company that is most likely also the owner of this data. The data is provided by the commissioned IT service provided and possibly consumed by a service provider for predictive

maintenance computing. Hence, basic roles fulfill their purpose on a technical level. The basic roles are summarized in table 1.

Table 1: Systematic overview on basic roles derived from IDS assets and activities

	Create	**Own***	**Certify/ Verify**	**Publish**	**Provide**	**Consume**	**Use**	**Delete**
Connector	Connector Creator	Connector Owner	Connector Certifier	Connector Publisher	Connector Provider	(out of IDS RAM scope)	Connector User	(out of IDS RAM scope)
Data	Data Creator	Data Owner	(out of IDS RAM scope)	Data Broker	Data Provider	Data Consumer	Data User	Data Eraser
Vocabulary	Vocabulary Creator	Vocabulary Owner	(out of IDS RAM scope)	Vocabulary Publisher	Vocabulary Provider	Vocabulary Consumer	Vocabulary User	(out of IDS RAM scope)
Identity	Identity Creator	Identity Owner	Identity Verifier	Identity Publisher	Identity Authenticator	(out of IDS RAM scope)	Identity User	Identity Eliminator
App	App Creator	App Owner	App Certifier	App Broker	App Provider	App Consumer	App User	App Deleter
Transaction	Transaction Initiator	(out of IDS RAM scope)	Transaction Clearer	(out of IDS RAM scope)	(out of IDS RAM scope)	(out of IDS RAM scope)	Transaction Participant	(out of IDS RAM scope)
Service	Service Creator	Service Owner	Service Certifier	Service Broker	Service Provider	Service Consumer	Service User	Service Remover

However, basic roles are not very helpful from a business perspective: This detailed technical differentiation is often not necessary on the business level and data-driven business models often cover multiple basic roles. Therefore, business roles cover multiple basic roles. The RAM assigns (1) mandatory and (2) typical basic roles to the business roles. Mandatory basic roles are necessary to operating or participating in the data space, for example, connector provider (a participant in the IDS must use an IDS connector) or identity provider (a participant must have an identity).

Business roles are also built out of typical basic roles. For example, data intermediary would comprise data publisher (promote metadata, for example, in a search engine or knowledge graph), data provider (store the actual data and provide it for download by a data consumer) and data eraser (the data intermediary would delete data according to regulation and contracts both locally and by means of the IDS remotely if required). The exact set of basic roles that is covered by a business role depends on a company's individual business model.

For further information on roles in the IDS, please refer to the RAM document version 4, section IDS roles.

4 Creating Value from Data Sovereignty

The IDS-RAM defines a set of basic roles that are grouped for various business purposes into business roles. As the white paper aims to outline successful business models of companies with digital business, the roles highlighted in Fig. 3 are selected and described in the following sections.

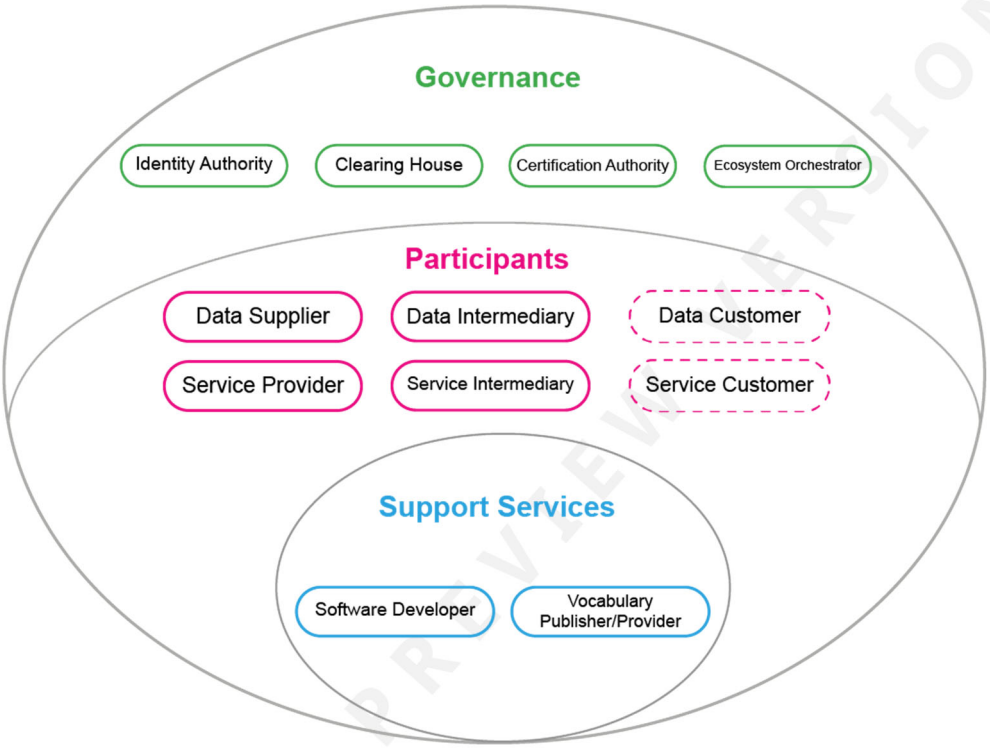

Figure 3: Business roles highlighted in the white paper

4.1 Data Supplier

A data supplier produces/possesses data that may be offered within the IDS ecosystem. Depending on the business and operational model in place, basic roles typically assumed by a data supplier are data creator, data owner, and data provider.

1. **Value Proposition:** Offering of valuable data, data quality, data completion, data aggregation, special data evaluation, ….
2. **Customers:** Data owner, data consumer, broker, clearing house, identity provider, service provider, app provider, app store, vocabulary provider, evaluation facility

Use Cases:

Transparency in Automotive Supply Chains, Volkswagen and thyssenkrupp:

Hardly any sector has a more complex supply chain than the automotive industry. Hence, levelling fluctuations in demand or supply results in time-consuming adjustment processes in demand and capacity management and production scheduling. Increased supply chain transparency regarding available capacities, inventory or even cost-weighted flexibility enables effective and fast adjustments of production program and supplier capacities. However, concerns about data privacy and, in the end, insufficient trust, have often prevented efficient and effective planning processes.

The supply chain partners Volkswagen and thyssenkrupp worked with Fraunhofer ISST to implement a software solution based on the IDS Reference Architecture Model (Burkhardt et al. 2019). It allows both partners to exchange data in a standardized and sovereign manner, ensuring mutual benefits. The manufacturer gives enhanced insight into the production program, and the supplier provides further details on stock and production capacities. The transmission mode (only pull request or frequency of data pushing) and the restriction of usage privileges for particular purposes (demand and capacity management, bottleneck management) can be defined through the IDS meta data and are enforced by the IDS connector at each partner.

Both partners in the data exchange are sharing comparably sensitive data to increase the efficiency of the entire supply chain (faster reaction, less inventory, less express transportation). The participants are motivated by both a win-win situation and the technical capability of the underlying IDS-based architecture that ensures data sovereignty.

Industrial Additive Manufacturing Services, Thyssenkrupp, IBM & Fraunhofer ISST:

In recent years, additive manufacturing technology has experienced double-digit growth rates in various sectors, such as automotive, aerospace, and medical technology. This trend is expected to continue in the coming years. As additive manufacturing and the digitalization of production processes continue to grow, the manufacturing industry will face new challenges in terms of data and IP protection as well as confirmability and traceability. The industry needs a decentralized solution that can ensure data sovereignty and traceability of data usage. The need for this kind of solution is only increasing since manufacturing is becoming more and more decentralized, as it is conducted within global networks and parts are produced where they are needed.

thyssenkrupp and IBM, together with Fraunhofer ISST, have developed a prototype that establishes a foundation for further expansion of an industrial manufacturing platform. The combined use of IDS technology and blockchain is intended to enable a higher degree of automation within the additive manufacturing process, and to provide data security and data sovereignty.

Results:

- Creating a trustworthy ecosystem for transfer of valuable and IP-relevant engineering data
- Processing industrial AM orders in a fast, traceable, and reliable manner
- Protecting IP rights and ensuring product quality

Benefits:

- Secure platform for exchanging trustworthy data and allowing seamless interaction between all parties across the value chain
- Easy access to AM technology and services for small and medium-sized enterprises, unlocking the potential of a distributed manufacturing network that grants access to new sources of revenue
- Intellectual property rights protected, and product quality ensured through provenance and immutability of data

4.2 Data Intermediary

Acting as a trusted data broker, the data intermediary manages data exchange in data ecosystems. The data intermediary knows the participants, it can take on common roles, it routes the data, stores data on request and manages meta data and the data sources available in the ecosystem. An organization acting as a data broker may assume other intermediary basic roles at the same time. Assuming further basic roles means taking over additional tasks and duties for the data broker to execute. But the data intermediary must perform one key role: a data intermediary shepherds the data, but as trusted intermediary it never uses or analyses the data itself.

1. **Value Proposition:** Interface for data suppliers to make their metadata available for data customers. They might offer overviews, a structure, categories, a search engine, quality, and recommendations. They know trusted suppliers and trusted customers. They can play a platform role with potential for exponential growth for all participants
2. **Customers:** All kinds of data suppliers, data customers, identity provider, service provider, evaluation facility

Use Cases:

Meta Data Broker Data Intelligence Hub, Deutsche Telekom:

The product Data Intelligence Hub manages metadata describing the data sets of B2B data suppliers. It provides secure storage of metadata and provides it on a data marketplace. Additional value: Metadata categories, search functions and quality check services. Users are data customers (for example, programmers, data engineers, data journalists and data scientists) looking for data that fits their interests, They get the ability to develop new business models, data-driven products, or services. They get a clear identity from a certified identity function beforehand.

Usage conditions (licences, payment, other) depend on data suppliers. Metadata usage is free. Control point for data supplier: control on who gets the data, some control on data usage. Business Model: Participation fee and/or transaction fees.

Smart Connected Supplier Network (SCSN), TNO:

Smart Connected Supplier Network is an initiative of manufacturing companies and their IT-suppliers in the high-tech manufacturing supply chain. The aim is to facilitate cross-factory communication to ensure supply chain transparency and interoperability. Manufacturing companies can use a single SCSN connection to exchange purchase-to-pay information with all their suppliers and customers. This reduces administrative efforts and human errors while increasing the supply chain agility.

4.3 Service Provider

Services in IDS offer various functions, such as data analysis, data integration, data cleansing, or semantic enrichment of data. The service intermediary is a platform operator providing services (for example. an app, including computing time as a trustee), metadata about services, or both.

1. **Value Proposition:** Offering of valuable services, service quality, support, hotline, service availability, service performance, wide range of payment methods
2. **Customers:** Data owner, data provider, data consumer, data user, broker, app provider, app store, vocabulary provider

Use Cases:

Collaborative warranty and quality management, SAP and Fraunhofer:

In multi-tier supply chains, sharing of quality management data is delayed because of repeated data accumulation before information is passed on to the next tier. As a result, systematic quality defects are uncovered too late, leading to ongoing production of defective assets. Furthermore, due to a lack of incentives, desired data is not always shared. For example, in the automotive context, quality issues discovered in repair shops may reach the manufacturers only when the issues occur in the context of a warranty claim.

SAP wants to make use of IDS data sharing concepts to improve business processes by providing smart data apps that facilitate intercompany collaboration. The example of the “collaborative warranty and quality management apps” illustrates how repair shops are incentivized to share vehicle quality data along the manufacturing supply chain, irrespective of their relevance for warranty claims. Suppliers at any tier gain timely visibility into quality issues accumulating from different downstream branches. When suppliers perform a root-cause analysis of such quality issues, they can integrate downstream or upstream quality and usage data, which is shared subject to usage policies.

Holistic ESG impact and risk assessment, Data Ahead:

Since 2019 European regulators have advised financial institutions to consider climate risks in their investment and financing activities towards corporations. The software-as-a-service solution of Data Ahead offers the analysis of environmental, governmental, and societal (ESG) data. This enables systemic and quantitative assessment of associated ESG risks and business opportunities across whole value chains for risk management, planning and reporting.

The Rest-API is connected to any tier-n supplier and OEMs through secure IDS connectors which can then use the reports in relationship to banks, investors, insurance or rating companies for emission trading, auditors, and authorities.

Smart Parking, Fiware, Hypertegrity and Unity:

The Smart Parking solution offers a digital service that analyses available parking spaces to improve parking within cities, which benefits visitors, the environment and local shops. In addition, visitors can choose to register their preferred shopping and marketing profiles and receive offers from the respective shops which will cover parking costs if a purchase is made.

4.4 Service Intermediary

The service intermediary guarantees the timeliness and allocation of services in the IDS (that is, it's a sort of "Yellow Pages" for services). It manages metadata about new and existing services and provides an interface for data providers to offer metadata about their available services.

1. **Value Proposition:** Overview, structure, categories, search engine, quality, recommendations
2. **Customers:** Data provider, data consumer, identity provider, service provider, evaluation facility

Use Cases:

Metadata Broker DIH of Deutsche Telekom:

Managing the metadata describing the data sets of data providers. Caring and secure storage of metadata and providing them on a data marketplace. Additional value: Metadata categories, search functions and quality check services. Users are data consumers looking for data that interests them. They get a clear identity from a certified identity function beforehand. Payment method depends on data provider for data selling and on metadata broker for metadata usage: free, freemium, opensource, pay once, pay per use etc. Control point for data provider: data ownership, Control point meta data broker: Access and identity of participants.

Smart Connected Supplier Network (SCSN), TNO:

Smart Connected Supplier Network is an initiative of manufacturing companies and their IT-suppliers in the high-tech manufacturing supply chain. The aim is to facilitate cross-factory communication and thus ensuring supply chain transparency and interoperability. Manufacturing companies can use a single SCSN connection to exchange purchase-to-pay information with all their suppliers and customers. This reduces administrative efforts and human errors while increasing supply chain agility.

4.5 Vocabulary Publisher and Provider

Vocabularies can be used to annotate and describe data assets. A vocabulary intermediary technically manages and offers vocabularies (i.e. ontologies, reference data models, metadata elements). Vocabularies are owned and governed by the respective standardization organizations. A vocabulary intermediary typically assumes the basic roles of vocabulary publisher and vocabulary provider.

1. **Value Proposition:** Terminology, ontologies, homogenous wording, ...
2. **Customers:** Data owner, data provider, data consumer, data user, clearing house, service provider, app store

Use Cases:

UMATI:

Universal Machine Tool Interface by VDMA. The UMATI consortium within VDMA drives an OPC Companion Specification defining a common vocabulary for machines across machine building manufactures. It allows users to exchange, use and evaluate data across different machines, for example, across production lines or factories. VDMA already runs a 24x7 demonstrator with partner T-Systems as intermediary which allow all interested members self-onboarding of machine and routing the data to a dedicated dashboard, globally. Adding more data control and data sovereignty are next steps planned for 2021.

Domain-specific vocabularies are essential for scalability and overall success of data ecosystems. Domains are represented in the very common set of Linked Open Data (LOD), for example 'Gene Ontology' is a unified vocabulary for parts of life sciences, 'GAO' for the automotive industry, etc. For automotive supply chains, the respective European organization Odette provides a corresponding vocabulary.

Vocabularies also describe legal terms, such as data usage policies. To enable smart contracting, they must be coded in a machine-readable and -understandable manner. The IDS information model defines the Open Digital Rights Language (ODRL) to describe data usage policies. However, specific IDS communities, such as a (closed) supply chain network or a domain-specific IDS initiative, may define additional, complementary or alternative vocabularies, for example, to depict the International Commercial Terms (Incoterms) as an ontology or reference to the iShare scheme.

4.6 Clearing House

Functional instance that verifies financial/data-based transactions (both in terms of data exchange and monetary transactions) in the IDS. Neutral role for the management of transactional metadata.

1. **Value Proposition:** Enabler of secure payment, transactional transparency
2. **Customers:** Data owner, data provider, data consumer, data user, identity provider, app provider, app store, vocabulary provider, evaluation facility

Use Cases:

Clearing House within the Smart Connected Supplier Network (SCSN), TNO:

SCSN is used to send purchase-to-pay information in a business-to-business scenario, which means that billing and payment information is exchanged. This information can be highly confidential and at the same time it is mission-critical for the connected companies, as it directly affects their day-to-day business. If dispute arises (e.g., a seller claims to receive a different order then the receiver claims to have provided), the clearing house is used as trusted third party to resolve this issue by comparing the fingerprint of the messages and identifying the error.

4.7 Identity Authority

An identity authority offers a service to create, maintain, manage, monitor, and validate identity information of and for IDS participants. This is imperative for secure operation of IDS and to prevent unauthorized access to data. Hence, every participant in an IDS ecosystem must own an identity (describing the respective participant) and use an identity (for authentication). Without an identity authority, sovereign data exchange is not possible within the IDS ecosystem. It is an essential component of the IDS ecosystem that can be provided by one company to all participants of the ecosystem.

1. **Value Proposition:** Security, certification, handling of identities (directory)
2. **Customers**: Applies to all the IDS-Roles

Use Cases:

PKI service, Deutsche Telekom:

The Deutsche Telekom Trust Center, operated by Deutsche Telekom Security GmbH, provides a Public-Key-Infrastructure (PKI) service that supports automated issuance of machine certificates to computers, servers, VoIP systems, printers and IoT / M2M devices. This ensures that each IDS participant can be definitively identified. In order to determine certificate validity, the certificate's status can be queried using the Online Certificate Status Protocol (OSCP). Access to the services is supported by a wide range of standard protocols. In order to live up to the importance of identity

services in IDS, the PKI services are operated to a high standard of availability and performance, fulfilling a wide range of security requirements.

4.8 Software Developer

A software developer may assume the role of an app developer, or connector developer. An app developer develops data apps to be used by IDS participants in connection with an IDS Connector. An app developer typically assumes the basic roles of an app creator and – if the data app is not created on behalf of another IDS participant – of an app owner. A connector developer provides software components for implementing basic IDS functionality. Unlike data apps, IDS Connectors are not provided by the app store. They are delivered over the connector developer's usual distribution channels. Their use is based on individual agreements between the connector developer and the user (e.g. a data customer, data supplier, or data intermediary). This procedure implies that the agreements (for example, licenses) for deployment and usage of an IDS Connector remain outside the scope of IDS.

1. **Value Proposition:** Offering valuable services/apps, service quality, support, hotline, service availability, service performance, wide range of payment methods
2. **Customers:** Data owner, data provider, data consumer, data user, clearing house, service provider, app provider, vocabulary provider

Use Cases:

Trusted Exchange for Aeronautics, Engineering:

The scenario for trusted data exchange for aeronautics includes data exchange between engineers, design and testing centers, and aviation companies across national borders. This means that different data protection laws apply. IDS connectors ensure that data can be managed in a safe and standardized manner, allowing for better condition monitoring and detection of anomalies for quality assurance. The development of connectors plays a crucial role in this scenario as cost reductions for quality assurance become possible.

4.9 Certification Body and Evaluation Facilities

Certification establishes trust for all participants within the IDS ecosystem by ensuring a standardized level of security for all participants of the ecosystem. Certification needs to be applied in two areas: the certification of the operational environment and the certification of components. This procedure is conducted by two roles, the certification body and an evaluation facility. As the name suggests, the evaluation facility conducts the certification testing and process while the certification body monitors the process, manages quality assurance, and provides guidance throughout the process.

These roles ensure that only IDS-compliant organizations are granted access to the trusted business ecosystem. In this process, the certification body is responsible for setting up the certification scheme, which includes specifications of supported components and profiles, criteria catalogues, test specifications and certifications processes. Additionally, the certification body approves evaluation facilities and supervises their actions and decisions. At the time of publication, the IDSA head office acts as the first certification body.

1. **Value Proposition:** IDS security, proven authenticated identities, interoperability, access control
2. **Customers:** All IDS roles

Use Cases:

There are several contenders for becoming official IDS evaluation facilities. As of November 2020 Fraunhofer FOKUS, SICK, SQS and Tecnalia are contenders to become evaluation facilities for components, while PwC is a contender to become an evaluation facility for the operational environment.

The example of SQS describes generically which services can be offered by an IDS evaluation facility.

Evaluation Facility, SQS:

The SQS Testing & Evaluation Facility provides commercial grade assurance evaluation services of industrial data sharing components, platforms, equipment, and infrastructures according to DIN 27070 security profiles and the IDSA Reference Architecture.

The facility offers independent validation services of different commercial IDSA components for trusted data sharing applications, support to developers and European companies in service certification across different sectors (logistics and transport, development of medical and pharmaceutical products, etc.), and evaluation report preparation for IDSA certification. Depending on the required service, a fee may be charged by the evaluation facility.

4.10 Data Ecosystem Orchestrator

A data ecosystem can have an entity that acts as a data ecosystem orchestrator within the network of organizations. However, such a named coordinating entity does not need to exist in all data ecosystems and their use cases. Currently, the data ecosystem orchestrator role has not yet been described in the IDS Reference Architecture Model.

1. **Value Proposition:** Coordinate the development of rules for the data ecosystem, administer the memberships, and audit the proper functioning and adherence to common rules in the data ecosystem

2. **Customers:** data owner, data consumer, broker, clearing house, identity provider, service provider, app provider, app store, vocabulary provider, evaluation facility

Use Cases:

iSHARE:

has developed a data sharing scheme for logistics data ecosystem in The Netherlands. In the context, the data ecosystem orchestrator is a named scheme owner that manages the rules and agreements. The relationship between the scheme owner and the participants in the scheme, is defined in terms of an accession agreement, and associated terms-of-use, ensuring the legal liabilities of parties in the data sharing scheme. Such liabilities can cover both the relationship between the scheme owner and the participants, and among all the participants mutually, notwithstanding the ability of participants to make additional agreements. Participants can choose to adhere to these agreements and innovate their business models and practices accordingly, with data as a crucial enabler.

5 Conclusion and Recommendations

Conclusion and recommendations will be included in the final version of this document. It will available here:

www.internationaldataspaces.org/publications/papers-studies

6 References

Burkhardt, U.; Borrmann, K.; Opriel, S. (2019): IDS@BKM – Gaining Transparency in Automotive Supply Chains. IDSA Winterdays. Paris, 11/20/2019.

Osterwalder, A., & Pigneur, Y. (2010). Business model generation: a handbook for visionaries, game changers, and challengers. John Wiley & Sons.

Otto, B.; Steinbuss, S.; other authors: Reference Architecture Model. Version 3.0.

Porter, M. E. 1979. How competitive forces shape strategy. Harvard Business Review (March–April): 137–145.

Porter, M. E. 1980. Competitive Strategy: Techniques For Analyzing Industries and Competitors. The Free Press: New York, NY.

Porter, M. E. 1985. Competitive Advantage: Creating and Sustaining Superior Performance. The Free Press: New York, NY.

Schlueter, C., and M. J. Shaw. 1997. A Strategic Framework for Developing Electronic Commerce. IEEE Internet Computing 1(6): 20-28

Schlueter Langdon, C., and M. J. Shaw. 2002. Emergent Patterns of Integration in Electronic Channel Systems. Communications of the ACM 45(12): 50-55

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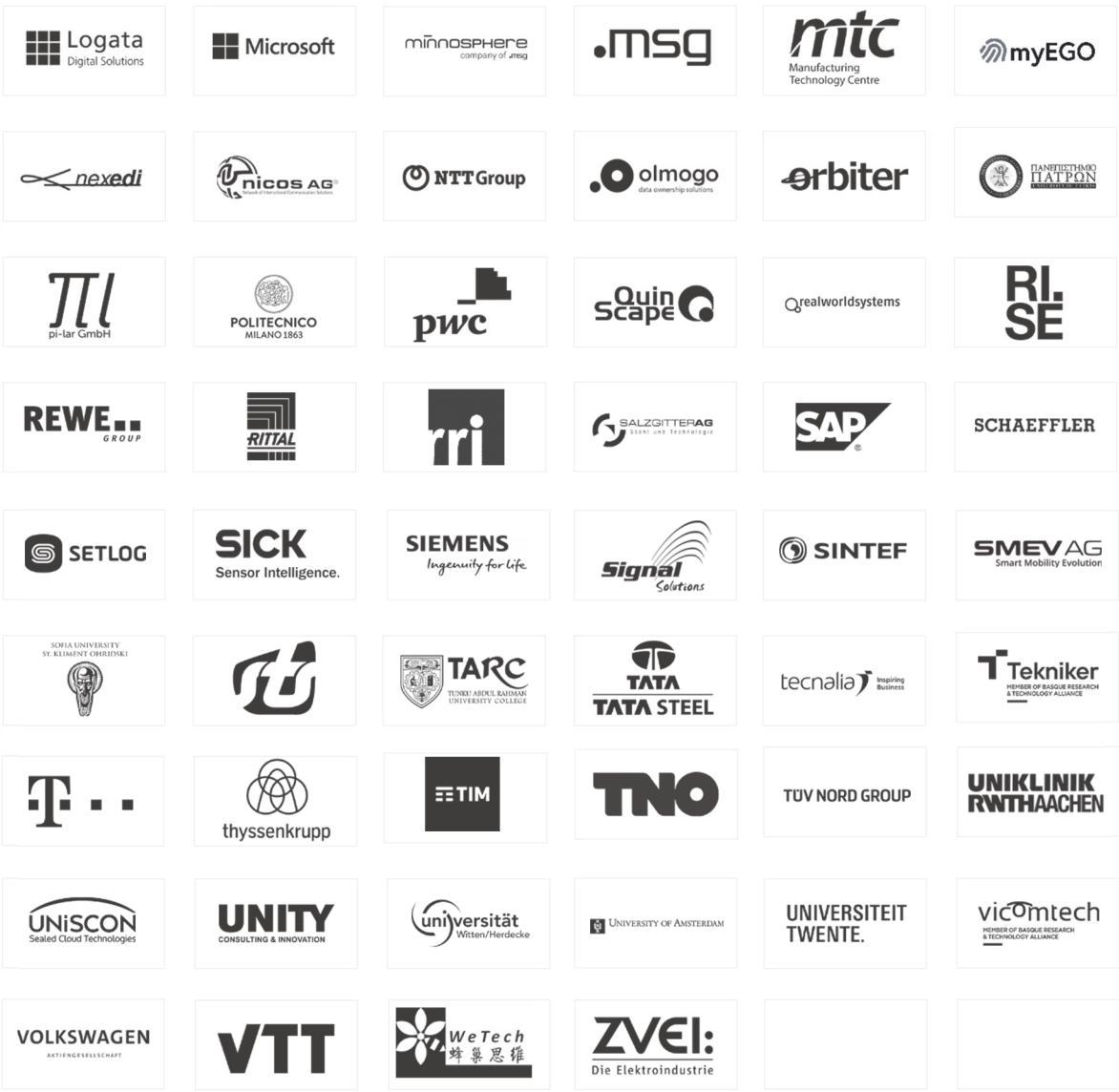
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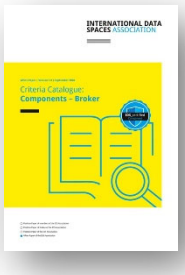

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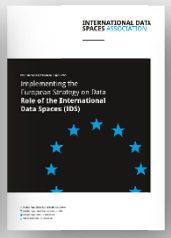

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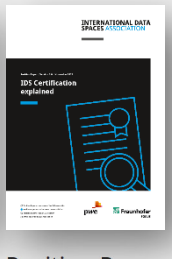

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