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Whitepaper

Data Space Basics

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The Transfer-X project, funded by the Federal Ministry for Economic Affairs and Energy, supports organisations, especially small and medium-sized enterprises, in mastering the transition to data-based value creation. With practical transfer modules and topic-specific learning paths on an open knowledge platform, Transfer-X presents research results in a clear and application-oriented manner – neutrally, scalably and free of charge.

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1. Introduction: Why Data Spaces?

High national and international competitive pressure and new regulatory requirements call for increasingly proactive action. At the same time, the development of sophisticated and inherently complex products with high customer benefits, secure economic growth and the guarantee of economic stability in resilient value creation networks are important fields of action in the industry.

Close co-operation and collaboration between the companies directly involved in value creation in the automotive sector is a key success factor for successfully overcoming the associated challenges. However, this is associated with considerable challenges, whereby the basic challenge is to share data and other digital assets relevant to value creation across company boundaries and to be able to use these as the basis for intensive collaboration or to make them usable.

Federated data and service ecosystems and the integrated Data Spaces provide a common framework to not only support but also enable companies in this area. Data spaces provide the necessary basic concepts and technologies for a digital infrastructure that preserves and strengthens existing value creation. At the same time, Data Spaces open up new opportunities for the development of digital products and innovative, digitally characterised or data-driven business models. Data spaces are an efficient and effective technology for new forms of data-centred collaboration, whereby trust, data and technology sovereignty, the use of open and freely available standards, the traceability of processes and processing steps and compliance with data usage agreements are fundamental aspects that are implemented by design.

This document summarises the concepts and technology modules required to implement a Data Space in a technology-neutral way (see *Foundation Layer*). Building on the Foundation Layer, we discuss how applications can be realised (see *Application Layer*) and offered for use via a marketplace (see *Marketplace Layer*). In addition to providing a basic conceptual and technical orientation, this paper also offers an application- and usage-orientated view of the subject area, which is primarily aimed at application developers and users.

In general, different Data Spaces can have different design features and although the following results and findings are largely attributable to the *Catena-X* and *Gaia-X 4 Future Mobility*[1] Data Space initiatives, all of the following building blocks and the regulatory framework can generally be applied to any Data Space initiative, regardless of the underlying domain and project. As a result,

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[1] *Catena-X und Gaia-X Future Mobility* provide various basic principles and practice-relevant pilot applications largely as open source projects, so that further use can be made possible directly. For example, these are basic software components for instantiating a Data Space as well as individual use case implementations, such as for cross-company CO_2 balancing and partner management with a view to compliance with social and environmental standards.

the building blocks presented in this paper are in line with the DSSC[2]s Data Space Blueprint and form a generally applicable blueprint. This is presented in the following chapters.

[2] DSSC: Data Space Support Centre. Details on the Data Space Blueprint can be found at the following link: https://dssc.eu/

2. Core Principles of a Successful Data Space

A Data Space is the basis for the exchange of data in distributed data and service ecosystems, which ensures trust, data and technology sovereignty, openness via established standards and agreements as well as processes and rules. The operation of a Data Space is based on core services (e.g. connectors, catalogue services and services for verifying digital identities) as well as supplementary support services (e.g. services for assigning digital identities) and other domain-specific services as well as specific applications.

Design principles of a Data Space

In functional terms, a Data Space focuses on the technical, organisational and regulatory facilitation of multi-lateral data exchange between independent and possibly previously unknown organisations (legal entities) – and therefore in particular on its enablement. In this context, various fundamental design principles, concepts and mechanisms ensure interoperability – both within a Data Space and between different Data Spaces – and data and technology sovereignty. They promote trust in the sense of Trust-by-Design[3]:

- *Interoperability* enables and promotes efficient and effective (ICT-supported) collaboration between two organisations on a technical, syntactic, semantic, organisational and regulatory level. Interoperability is considered both between the individual participants within a Data Space and between different Data Spaces.
- *Data and technology sovereignty* is one of the core principles of every Data Space. This ensures that each participant has and retains complete control over their data at all times. On the basis of clearly defined and legally binding user agreements, for example, individual conditions can define who can access which data, when and for what purposes.
- *Trust-by-design* is ensured in a Data Space by implementing so-called trust anchors. For example, verified, legally binding and tamper-proof identities enable clear and reliable identification of each provider and user of data.

All technical, organisational and legal framework conditions and regulations that ensure that the above-mentioned design principles are adhered to and implemented with legally binding force are anchored in the so-called operating model of a Data Space. This model is based, among other things, on various individual regulations, such as rulebooks.

Success factors of a Data Space

The development, operation and scaling of a successful Data Space with global reach is subject to its own success factors. To this end, the *„Data Ecosystem double Helix“* [4] of Plattform Industrie 4.0

[3] „Trust-by-Design“ means that all aspects of ensuring a basis of trust between all participants in the ecosystem have been considered from the outset, continuously and holistically throughout the entire development process and are reflected in all aspects of the underlying architecture.

[4] Source: https://www.plattform-i40.de/IP/Redaktion/DE/Standardartikel/Manufacturing-X-industrielle-Datenoekosysteme.html.

describes an integrated end-to-end target picture for its development, which divides the interlocking stages and success factors into the four interacting building blocks *"Influence", "Build", "Operate" and "Scale"* and harmonises them holistically (see **Figure 1**).

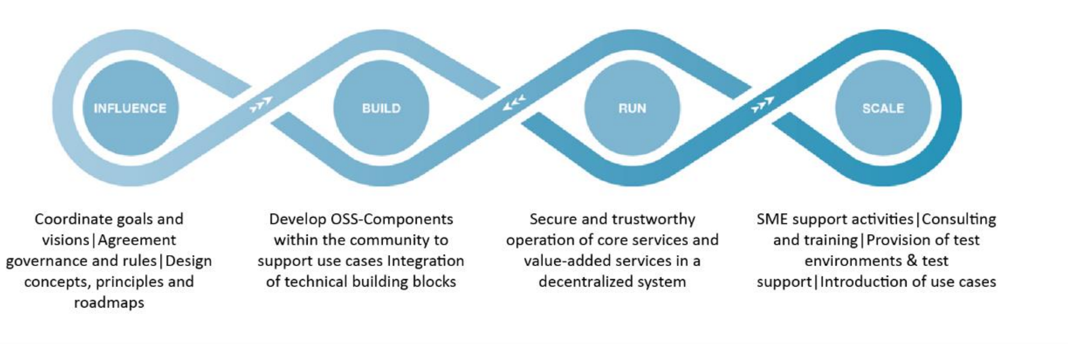

***Figure 1** How do industrial data ecosystems work? (© Plattform Industrie 4.0)*

The *"Influence"* building block ensures that the Data Space is designed efficiently and sustainably as a data ecosystem and, to this end, includes the definition of goals and visions, the coordination and harmonisation of stakeholders and the development and implementation of guidelines and standards.[5]

> Note: The *"Influence"* component is embodied by the role of the governance body, which is responsible for development and implementation as well as strategic steering and control (see chapter 5 Data Space Governance).

The *"Build"* module refers to the actual project initiation and development of the required basic building blocks and industry- and application-specific applications. Although a Data Space is generally subject to domain- and industry-specific requirements, these benefit from common approaches to data connection, interoperable data models, trust frameworks and technical infrastructures.[6]

> Note: The *"Build"* building block is considered below with the aid of the Data Space context-setting framework shown in **Figure 1**, or more specifically through its foundation and application layer, as this is where the basic building blocks for data ecosystems are developed.

The *"Run"* building block defines the secure and trustworthy operation of the core services and the value-added services based on them. In order to enable the interaction of network players, the exchange of data and thus the actual creation of value in the data ecosystem, at least one certified organisation *(operating company)* must establish and guarantee the necessary system landscape for trustworthy operation. In addition to the technical infrastructure, this includes services for

[5] Ibid.
[6] Ibid.

onboarding and enabling, data publishing and discovery as well as for ensuring conformity and trustworthiness, on which commercially usable marketplaces offer applications and services. [7]

> Note: The "*Run*" building block or the requirements for the secure and trustworthy operation of a Data Space building block are usually anchored in an operating model (see chapter 5 Data Space Governance).

The "*Scale*" building block focusses on the national and global expansion of industrial data ecosystems and initiatives. A flourishing data ecosystem thrives on the dynamics and constant exchange between the participants, the resulting mutually enabled innovations and continuous improvements. In order to enable and promote this, the players must ensure the mutual exchange and transfer of knowledge. For example, associations, initiatives and national hubs must work together to transfer visions, concepts and ideas to different countries and sectors and facilitate access to technology and knowledge. [8]

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[7] Source: https://www.plattform-i40.de/IP/Redaktion/DE/Standardartikel/Manufacturing-X-industrielle-Datenoekosysteme.html.

[8] Ibid.

3. Design Framework of a Data Space

A Data Space, the applications based on it and the presentation of market-relevant assets can be viewed as different layers:

- The *foundation layer* forms the technical foundation and provides the necessary IT building blocks to instantiate a Data Space. It can be seen as a kind of "engine room". The foundation layer provides the fundamental building blocks required for trustworthy data exchange, promotes and secures data and technology sovereignty and implements important elements of the trust anchor in a Data Space - including the verification of digital identities and agreed usage contracts.

- The business added value is realised in the *application layer*. This layer provides the specific applications in terms of services and the sub-services required to implement them. The building blocks required to create an application (rulebooks, relevant domain standards, metadata representations, sub-services) can be summarised in the form of KITs *(Keep It Together)* for application developers to enable a quick start to application development.

- The *marketplace layer* is used to provide applications and services, individual sub-services or even data offerings on a marketplace for all participants in a Data Space.

From the user's perspective, the *application and marketplace layers* are the relevant layers. The Foundation Layer, on the other hand, provides "invisible" building blocks for the user, which ensure the basic design principles of a Data Space at all times. This also means that a *business application provider* can focus on the *application layer* without having to deal with the technical details of the *foundation layer.*

This layer-based division allows the various roles in the context of a Data Space as well as in the context of the applications based on it to focus on their respective essential aspects. **Figure 1** categorises the roles that have been identified as relevant so far into three layers: *foundation layer, application layer and marketplace layer*. In addition to the individual layers, **Figure 2** also subdivides these into their internal structure. Basically, three different perspectives are presented in each case, which address the conceptual elements of the layer, the technological foundations required for its realisation and, finally, the specific implementations available. The overarching cross-sectional topics of standardisation and certification are also shown.

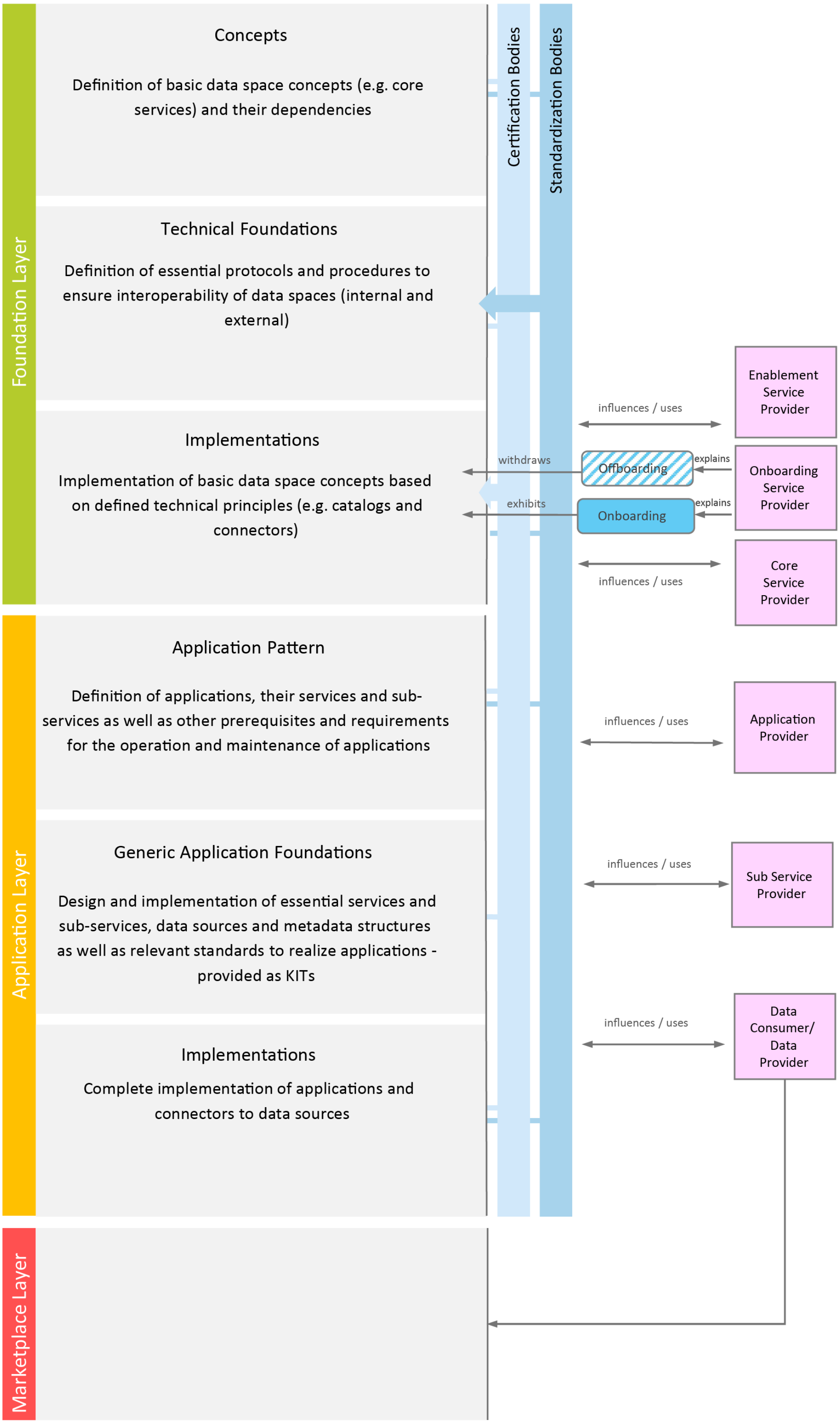

***Figure 2**: "Context-Setting Framework" of a Data Space*

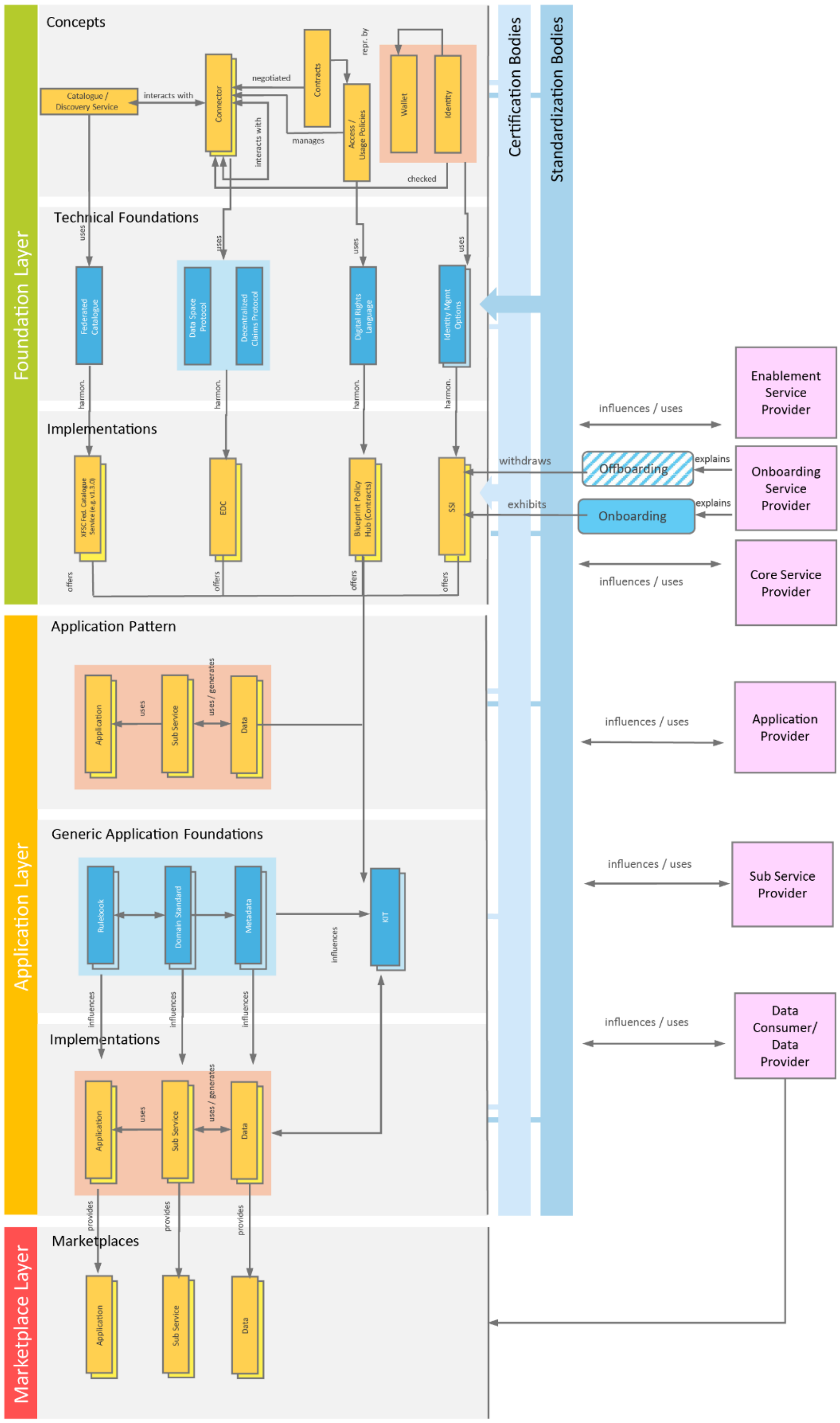

***Figure 3**: Basic building blocks of a Data Space*

4. Basic Building Blocks

Based on the overview shown in **Figure 2**, further essential aspects and building blocks of a Data Space, applications based on it and their representation in the direction of a market can be broken down and depicted including their relationships or interactions – see **Figure 3**.

This detail is explained later in the paper.

Foundation Layer

The basic functionality of the Data Space is based on the *foundation layer.* The *Concepts* subsection presents the conceptual view of the necessary building blocks. The Technical Foundations subsection specifies *technical foundations* in the form of protocols that must be implemented and technologies that should be adopted where possible and that are accepted in the context of data/service ecosystems and Data Spaces. The *Implementations* subsection names individual available implementations.

Concepts

Definition of basic Data Space concepts (e.g. *core and enablement services*) and their interdependencies.

- *Catalogue / Discovery Services* make it possible to identify and search available data sources and their metadata. These enable business application-relevant data to be found and accessed within a Data Space by providing information about the data sources, such as their access address, structure and/or access rights.
- A *Connector* is a generalised interface for actual data access. In particular, the use of the data is also controlled via this module - this means, for example, that the agreed access rights of the requesting users, the scope of use of the data and agreed usage periods in which the data can be accessed are checked before the data is accessed.
- *Contracts* are binding agreements that set out a contract for the collection, storage, sharing and use of data between the participants. These usually include:
  - *Access Policies* define which data a user may access and under which conditions this access takes place.
  - *Usage Policies* define how the data may be used after access, including restrictions and conditions for use, to ensure that the data is used in accordance with the defined rules (contracts) and agreements.
- The unique *Digital Identity* lays a fundamental role in building trust in the context of a Data Space. Digital identities ensure that providers and users of data are clearly identified. In addition, the management of access rights and authorisations is linked to these identities.
- A *Wallet* enables the secure storage and management of digital identities and authorisations, allowing access to various data and services to be controlled.

Technical Foundations

At this level, the essential protocols and procedures for ensuring the interoperability of Data Space are defined - both within a Data Space and for networking different Data Spaces according to federal principles.

- A *Federated Catalogue* is a directory within a Data Space that makes it possible to discover data and other digital assets, such as models, in various sources, such as databases or other storage solutions of the data providers in a Data Space. This is the first step in preparing for data access and utilisation. The data itself and other assets are stored exclusively in the systems of their providers - in the Federated Catalogue, the assets and other technical information for accessing them are characterised exclusively via metadata.
- The *Data Space Protocol* (DSP) is a comprehensive specification that aims to enable secure, trustworthy and interoperable data exchange between different entities.
- The *Decentralized Claims Protocol* (DCP) is a protocol used to manage and mediate organisational identities and trust relationships in decentralised systems through identity tokens, verifiable credentials and the support of multiple trust anchors.
- The *Identity Management* is open to all technologies and allows various basic technologies as long as they ensure that participants can be uniquely identified, authenticated and authorised.

Implementations

Specific implementations are required to instantiate a Data Space, whereby there can be several versions that take up the technical principles mentioned above and must each be interoperable on the basis of common standards (e.g. this applies to catalogue services and connectors).

- The *Eclipse XFSC*[9] *Federated Catalogue* is an example of a concrete technical implementation of a *Federated Catalogue*.
- The *Eclipse Data Space Connector* (EDC) is an example of a concrete technical implementation of the DSP and DCP specifications.
- A *Blueprint Policy Hub* lays a fundamental role in contracting in a Data Space by defining standardised framework conditions and templates for contracts and agreements within the Data Spaces and providing a blueprint for data exchange and use.
- One example of a technical implementation of digital identities is the *Self-Sovereign Identity (SSI)*. The identities provided via this can then be managed in the wallet and made available from it.

Roles

- The *Core Service Provider* is responsible for the provision, operation and maintenance of the core services. Core services refer to functions and services that support the basic operation of the Data Space - in particular, these are the services of the foundation layer. Federated catalogues or discovery services are an example of required core services.
- An *Onboarding Service Provider* integrates users, who must have a unique digital identity, into the Data Space or removes them. If such an identity is not available, the onboarding service

[9] XFSC: Cross Federation Services Components.

provider provides support in obtaining such a digital identity. They also provide documentation, process descriptions and tools that enable new participants to find their way around efficiently and ensure that they comply with all required standards and protocols.

- An *Enablement Service Provider* is entrusted with the provision, operation and maintenance of services that enable data to be offered or utilised from a technical perspective. These are generally decentrally operated individual components, such as a connector or a digital twin registry. These components can be offered for operation in the company's own IT infrastructure or as a service.

Application Layer

Specialist value-added services are realised as part of the *application layer*. Business-relevant use cases and the necessary data, services, documents and software packages are provided here.

Application Pattern

The *Application Pattern* define the blueprint for applications, functional aspects of the services required for this, any necessary sub-services, data sources and other requirements for the operation and maintenance of the application.

- *(Business) Applications* represent the "blueprint" for specific applications. This includes, for example, the definition of syntax and semantics of messages, communication processes and other necessary frameworks to realise interoperability between independently developed applications.
- *Sub-Services* are to be understood here as a collective term for services that support higher-level use cases. These do not represent a complete application but rather supporting (data-processing) functionalities and services, which in turn can be used by the various (business) applications to realise value-added services.
- Depending on the use case, application scope and application context, different applications require different data and in turn provide different data. To ensure (semantic) interoperability between different applications, these are also based on common standards.

Generic Applications Foundation

This is where the specific implementation of key services and sub-services takes place. The necessary data sources are selected, the required metadata structures are described and the relevant standards that need to be considered during implementation are made available. These individual elements can be bundled and provided in the form of KITs - the KITs enable a quick start to application development.

- A *Rulebook* is a comprehensive document that contains all functional, technical, operational and legal agreements required for the establishment and operation of Data Spaces and applications based on them. In particular, it defines binding and optional rules that help to ensure that data offerings in a Data Space and the applications based on them fit together or are interoperable, that the necessary security is provided and, ultimately, that the basis for trusting cooperation/collaboration is laid.
- A *Domain Standard* is a specific set of rules, protocols and specifications that are already established within a specific domain or application framework to facilitate interoperability and data exchange. Different Data Spaces can be subject to different domain standards.
- *Metadata* for example, makes it possible to find and use data by providing structured information that describes the data of an application. They can also help to contextualise data offerings so that, among other things, their scope of validity can be assessed and the data can also be evaluated and checked from a data quality perspective.
- A *KIT* is a bundle of different digital artefacts. These can be, for example, software frameworks or (sub-)services that facilitate the initial implementation steps for an application, as well as

established standards and documents that define operational requirements. These individual elements facilitate and accelerate the development and integration of practical applications.

Implementations

In the implementation block, applications are realised using the previously defined elements, building blocks and, in particular, KITs. The following artefacts are central in this context:

- *(Business) Applications* are fully implemented in accordance with the specifications of the application patterns and Generic Applications Foundations - i.e. on the basis of the standards applicable in the Data Space. One example of this is the recording and processing of the Product Carbon Footprint (PCF) value of products across the entire supply chain or value chain.
- One example of a specific sub-service is the methodically or formally correct calculation of the PCF value based on the machine-readable data provided. This sub-service can be called up by a higher-level PCF application, for example, which prepares the results of the calculation for the end user or places them in a larger context.
- Data represents all the necessary data for a use case, for example all the attributes and values required to describe a PCF value, which are usually collated from different source systems and must be syntactically and semantically interoperable.

Roles

- *A Data Consumer / Data Provider* represents an organisation or legal entity that provides, uses and processes data in order to cooperate or collaborate with other companies on a data basis.
- *A sub-service provider* represents an organisation or legal entity that provides services that can be used to implement applications or parts of applications.
- *A (business) application provider* is responsible for the provision, operation and maintenance of applications in accordance with applicable standards that solve a specific industry problem and generate added business value.

Market Layer

The *Market Layer* focuses on the economic and business aspects of data trading. This layer creates economic incentives and ensures the visibility and discoverability of the data and applications offered between applications and end users.

Accordingly, the marketplace layer provides applications or services, sub-services and data of the application layer for use for a fee or, depending on the business model, free of charge (on a marketplace or on several different marketplaces) and ensures barrier-free and non-discriminatory access to these. This includes, among other things, the necessary cataloguing and indexing of digital artefacts and products.

Cross-Cutting Activities

In order to efficiently implement, operate and scale a structure that is inherently characterised by distributed concepts and building blocks, various cross-layer activities are required. These include, in particular, measures to consolidate best practices and "living standards" as well as standardisation and, if necessary, conformity testing and certification.

- Standardisation is essential to ensure interoperability by establishing common framework conditions and clearly defined agreements. Standards define the necessary requirements for seamless interaction between systems, products or services under clearly defined framework conditions. Best practices and "living standards" from the respective sectors addressed can also be further established, even without striving for formal standardisation.
- Conformity assessment is a process for evaluating and verifying the properties of a product, system or service. Compliance with previously defined standards and regulations is tested and evaluated (see Standardisation). A certificate derived from this guarantees interoperability and promotes user confidence in a service.

5. Data Space Governance

Data and service ecosystems or Data Spaces are not fixed structures. It is part of their concept that they are constantly evolving and can always integrate innovative applications - like any system, they are subject to a certain degree of evolution. To ensure that an operationally usable IT system is available at all times and that interoperability and data sovereignty must be guaranteed at all times, clear framework conditions must also be created and mechanisms identified for its further development. In particular, the needs of a data services ecosystem or Data Space must be harmonised with the interests of the participants at a technical and functional level. Various roles must be implemented for this purpose.

- The *Standardization Body* is responsible for developing and maintaining the standards accepted by all stakeholders. Depending on the form, the areas of responsibility of the standardisation body include, in addition to process ownership, the technical and methodological quality assurance of the standards as well as the definition of overarching rules for the development and interaction of standards.
- The *Conformity Assessment Body* performs auditing tasks and is appropriately qualified to do so. The Conformity Assessment Body is usually accredited by the Governance Body and serves to check the compliance of technical standards within a Data Space, so that compliance with the basic principles or quality characteristics of a Data Space (such as interoperability) is guaranteed.
- The *Governance Body* is responsible for the neutral control of a data / service ecosystem and Data Space. This includes, for example, the initiation of standardisation, qualification and certification processes, the necessity of which must be worked out and checked for plausibility. Requirements for participants must also be defined, e.g. to ensure low entry barriers for participation in a Data Space

The Data Space Governance is usually anchored in an operating model. For this purpose, the operating model describes and standardises the basic organisational interaction of all roles involved, their rights and responsibilities, their relationships to each other and to the environment, as well as the technical, organisational and regulatory guidelines. This includes the definition of all necessary framework conditions that are required for the successful, operational operation of the Data Space. At its core, this includes:

- Fundamental principles or golden rules that ensure the basic quality characteristics and design principles of the Data Space.
- Processes and procedures that are required for the effective and efficient operation of the Data Space. In particular, this includes standardisation, certification and onboarding and offboarding.
- Technologies, such as the connector, as fundamental enablers that support the operation of the Data Space and ensure compliance with the golden rules.
- Role definitions and the associated rights and responsibilities within the Data Space.

To summarise, the operating model enables the active, barrier-free and non-discriminatory participation of companies and establishes the common framework agreed by all stakeholders that ensures the operation of the dataspace and keeps its stakeholders together throughout its evolutionary development.

6. Different types of Data Spaces

Data spaces can be divided into different categories from the perspective of value creation processes or value creation phases - horizontal, vertical and mixed. Each of these categories is based on the same foundation layer but differs greatly in particular in the layer of the application and the associated rulebooks as well as in the contributions/activities that have an impact on governance.

Data Space with horizontal Data Exchange

If a Data Space supports cooperative and collaborative collaboration in a value creation phase, this is a horizontal linking of their individual value creation contributions from the perspective of the network of participants.

Examples:

- Mobility Data Space (MDS): Various mobility providers cooperate/collaborate in a service space to improve the customer experience through a seamless, intermodal mobility offering.
- Smart City Data Space: In this space, different sectors are networked with each other using data technology in order to be able to carry out the planning of transport services, charging infrastructure and environmental zones in an integrated approach, for example.

Data Space with vertical Data Exchange

This is a form of cooperation/collaboration in which the players exchange data from all typical phases of the value chain. This is the case, for example, in many development and production processes in the automotive industry. Here, OEMs work together with Tier 1 and other players in the supplier industry to ultimately create the automotive product, support it on the market or in use and finally utilise it in the sense of the circular economy. In such a case, data can be exchanged according to the *One-Up/One-Down-Principle*[10].

Examples:

- Catena-X in the automotive industry, with use cases such as determining CO_2 emissions along the entire automotive value chain.
- Aerospace-X in the aerospace industry, also to support co-operative/collaborative product creation.

Data Space with horizontal and vertical Data Exchange

This combines elements of horizontal and vertical cooperation, whereby the corresponding value-added relationships must be mapped together.
Examples:

[10] The one-up/one-down principle of parts along the supply chain enables transparency and quick access to information, as each supplier knows the next stage (one-up) and the source (one-down) of a part. This promotes safety, risk minimisation, legal compliance, sustainability and human rights.

- A manufacturing Data Space that combines industry-specific operating data, e.g. from manufacturing, with broader market data from suppliers and customers in order to optimise production and sales strategies.
- In the Gaia-X 4 Future Mobility project family, application situations are of interest that consider both product creation (vertical) and operational fleet management processes in a closely networked manner (horizontal).

7. Summary & Outlook

To summarise, different Data Spaces can have different design features. However, different Data Spaces generally differ less in terms of the question of "what" is to be implemented than in terms of the question of "how" something is to be implemented. The Data Space Organisational Framework and the *Data Space Context-Setting Framework* developed in this paper describe generally applicable building blocks that every Data Space must provide regardless of the underlying domain. However, the content of these building blocks, i.e. the rights and obligations of the various roles, the required trust or confidence level in the processes or even the technological basis, is (at least in part) subject to the respective domain and governance. For example, data-based collaboration can be set up on the same technical basis regardless of its characteristics - horizontal, vertical, mixed - *foundation layer*. However, significant differences only arise at the *application layer* and in the area of rulebooks and governance.

However, many developments have already reached a high level of maturity, particularly in the area of the *foundation layer.* It is already possible to benefit greatly from building on a common technological basis such as the DSP and DCP and the connectors based on them. This not only provides a basis for cross-data space interoperability but also enables direct and focussed work for innovative applications. As a result, the practical benefits of data-based cooperation and collaboration can be realised and demonstrated barrier-free in various application areas and domains. Examples of this are:

- Sustainability: Data Spaces can generate added value that goes beyond purely economic considerations: they include the optimised use and conservation of natural resources, the early detection or even prevention of production errors or accidents and optimised maintenance. The digitalisation of processes enables intelligent, networked action that offers advantages for many stakeholders. The use of artificial intelligence (AI) in particular can enable new, innovative services and open up new potential.
- Improved data integration: Data Spaces enable the seamless integration of different data sources, allowing organisations to combine internal and external data for more comprehensive insights.
- Fostering innovation: By improving access to and usability of data, Data Spaces encourage experimentation and innovation, enabling organisations to develop new products, services and strategies.
- Improved decision making: By providing a unified view of data, Data Spaces enable better analysis and reporting, leading to more informed yet rapid decisions.
- Collaboration across silos: Data Spaces break down data silos within organisations, promote collaboration between departments and improve overall organisational efficiency.
- Scalability: Data Spaces can be adapted to the needs of an organisation and accommodate growing data volumes and new data sources without significant reconfiguration.

- Data management and compliance: Data Spaces have built-in governance frameworks that ensure data management practices comply with regulatory requirements and industry standards.
- Improved customer insights: By integrating different customer data sources, companies can gain deeper insights into customer behaviour and preferences, improving targeting and personalisation.
- Digitisation boost: By joining a Data Space, many of the respective company's processes are digitised and optimised. A fully digitalised company also offers completely new opportunities in other areas, e.g. companies become ready for AI. The use of a Data Space can be particularly helpful for SMEs, which do not have as many resources for digitalisation as larger companies, as many problems can be tackled at once.

Abbreviations

DCP	Decentralized Claims Protocol
DSP	Data Space Protocol
DSSC	Data Space Support Centre
EDC	Eclipse Dataspace Connector
AI	Artificial Inteligence
KIT	Keep it Together
SME	Small and Medium sized Enterprise
MDS	Mobility Data Space
OEM	Original Equipment Manufacturer
PCF	Product Carbon Footprint
SSI	Self-Sovereign Identity
XFSC	Cross Federation Services Components

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