

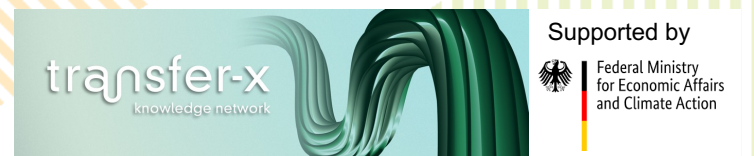


Catena-X 101 - the fundamental building blocks of a live data space

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What are conceptual foundations
of a live data space?

Standards Applicants

Association Catena-X e.V.

Standardization

Certification

Neutral Data Space Governance

Transfer & Activation

Standards Applicants

Governance & Stimulation

Certification

Certification

Development Area

Develop core network foundation, apps, and services for the data space

Service Provider

Developer

Developer

First consortium

ECLIPSE FOUNDATION **GitHub**
Tractus-X
Open Source Code
Repository

Proprietary or
Industrialized
Solution Portfolio

Operating
Companies

License
& Service
Agreements

Operating Area - Data Space

Onboard companies and
derive value through use case -
driven data exchange



Industry Users
Data Provider
& Consumers

Operating
Companies





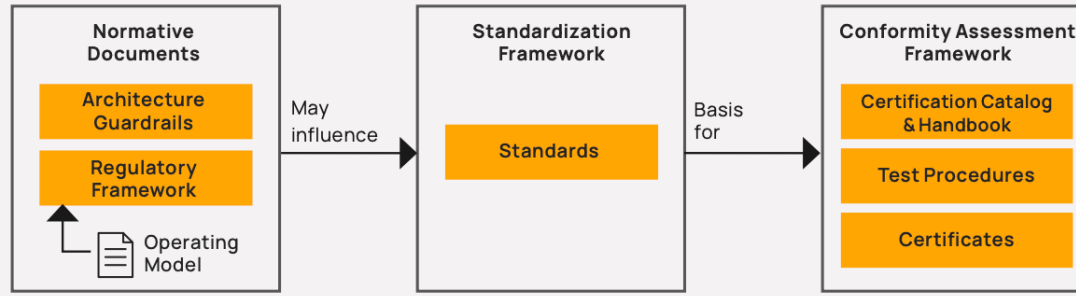
What's required to operate them?



Catena-X e.V.

promotes, coordinates, & manages

Data Space Governance



Life Cycle Management
Ensuring compatibility & applicability

Development Environment

Eclipse Tractus-X Project

Sponsors, promotes, & coordinates

Enables open collaboration & development

Data Space Operating System & Building Blocks
100% OSS

```

    graph BT
      subgraph OSS [Data Space Operating System & Building Blocks]
        subgraph KITs [KITs]
        end
        IC[Industry Core (coming soon)]
        subgraph ES [Enablement Services]
        end
        subgraph COS [Core/ Onboarding Services]
        end
        ES -- Utilizes --> IC
        COS -- Utilizes --> IC
        ES -- Integrate --> COS
      end
      KITs -- Utilizes --> IC
  
```

Sets mandatory Requirements & Standards

Provide feedback & new requirements

Delegates conformity assessment

CAB

Certifies

Adheres to

Operating Environment

The different roles offer:

- Core Services (A/B)
- Onboarding Services
- Commercial Business Applications
- Enablement Services
- Advisory Services

Based on, use

Industrializes, operates, services

Use, integrate, adapt

Feedback, shape

Collaborations



Trust Partners

Gaia-X
Trust Framework/Clearing House

International Data Spaces Association (IDSA)
Data Space Protocol

Eclipse Foundation
Open Source

Scalability/Interoperability Partners

Industrial Digital Twin Association (IDTA)
Asset Administration Shell

World Business Council for Sustainable Development (WBCSD), Global Battery Alliance (GBA) ...



Is there a version for newcomers?

transfer-x
knowledge network

Gefördert durch:



Bundesministerium
für Wirtschaft
und Klimaschutz

aufgrund eines Beschlusses
des Deutschen Bundestages

101

“showing the most basic knowledge about a subject”

Why Industry Core?

The goal of Catena-X is to empower data-driven use cases to address the current challenges of sustainability, resilience, and quality within the automotive industry. These challenges predominantly revolve around optimizing parts, components, and materials. The Catena-X Industry Core serves as the foundation, enabling seamless integration of multiple use cases. It encompasses Enablement (Enablement Service 101) and Core Services (Core Service 101) and supplements them with semantics, standards, and detailed instructions to enable value-driven data chains and use cases in the automotive industry. It will also describe the necessary infrastructure to efficiently operate the data space. This document provides a comprehensive overview of the Industry Core, explaining its benefits and value.

Benefits
Reusability, Scalability & Interoperability

The complexity of automotive industry processes lies in the fact that materials are processed through multiple use cases, transferred into intermediate products, and subsequently into vehicles. These use cases often operate in silos. The Industry Core aims to integrate and connect these silos, enabling a holistic view of the value chain. This integration is achieved through the use of open standards and protocols, ensuring that data can be shared and processed across different systems and organizations. This leads to improved efficiency, reduced costs, and faster time-to-market for new products.

Figure 1 Overview of the Industry Core

Why Enablement Services?

Catena-X drives compliant collaboration along the automotive value chain. Catena-X standards require interactions within the automotive data space that are implemented by open protocols for secure data exchange, usability, and for the enablement of data sovereignty. To support easy implementation of these protocols, the Tractus-X project provides enablement services developed by open source. These are components of the Catena-X ecosystem that implement standards compliantly, enabling a common foundation for individual or commercial realizations.

Figure 1 Overview of the Enablement Services

Why KITs?

A KIT (short for **Keep It Together**), offers open-source resources and comprehensive documentation designed for the Catena-X ecosystem use cases. KITs are an important part of the **Eclipse Tractus-X™** project, which is the official open-source project within the Catena-X ecosystem.

Tractus-X

There are two main customer groups for KITs:

- Adopters:** Companies that are part of the automotive ecosystem and want to integrate Catena-X into their existing systems. These companies require technical support, specific tools, and guidance for integration. KITs provide the necessary technical support and documentation to facilitate this process.
- Solution Providers:** Companies that provide solutions for the automotive ecosystem. These companies need to ensure that their solutions are compatible with the Catena-X standards and protocols. KITs provide the necessary technical support and documentation to facilitate this process.

Achieving network effects in the Catena-X ecosystem is critical to success and depends on the active participation of users and the creation of appealing solution offerings, especially for SMEs, by solution providers. Therefore, it is important to make it as easy as possible to get started. The KITs facilitate this process by supporting both customer groups and simplifying the technical integration with Catena-X.

Why Tractus-X?

The **Eclipse Tractus-X™** project is the official open-source project in the Catena-X ecosystem under the umbrella of the Eclipse Foundation. It follows the Eclipse Foundation development process that encourages open collaboration on open-source software (OSS) to build an **open, scalable, modular, and extensible operating system** for the Catena-X data space. The Catena-X operating system (xOS) is the basis for interoperable and sovereign data exchange.

Tractus-X

Benefits
Transparency, Collaboration & Community

We have chosen an open source approach to enable full transparency into the source code of the software. Differentiating Catena-X operating system provides the means to actively participate through contributions, or as a user, in a living code or dedicated community. By embracing open source, we have already achieved significant milestones and we continue to support Catena-X standards with our implementation, supported by a vibrant community. We want to foster a wider first adopter and established network and enablement capabilities. As mentioned in the publication 'The Open Source Way', we see the following objectives and benefits for the Catena-X ecosystem:

- Transparency** is crucial for effective software development and problem solving for business. Access to information and resources enables developers to collaborate, by building on each other's work, and through collaboration and informed decision-making.
- Open collaboration** drives innovation by encouraging active participation and allowing modification to address user and/or operating system. It enables to tackle complex challenges collectively.
- Community** fosters when diverse organizations and individuals work towards a common goal. Guided by shared values, they promote community objectives over individual interests, promoting consensus decision-making.

Why a Regulatory Framework?

In today's world, establishing data spaces is more of a coordination and a scaling issue than a technology issue. Rules and policies for sharing and using data between stakeholders enable clarification of the potential relationships between each other and defining business models.

The Catena-X Regulatory Framework for data space operators outlines the requirements and responsibilities for all stakeholders involved in our activities. In its governing effort, Catena-X navigates legal, technical, and business aspects in one comprehensive framework. It includes detailed information on data sovereignty, mandatory use case requirements, and other regulatory considerations that are relevant to our activities.

This paper aims to help all Catena-X participants - from newcomers to seasoned Catena-X veterans - gain an overview of their individual and shared responsibilities across multiple levels of operations in our data space.

Benefits
Trust, Efficiency & Scalability

The Catena-X Regulatory Framework for data space operators provides a clear and concise framework that data space operators can rely on to ensure full interoperability and transparency. It provides a clear and concise framework that data space operators can rely on to ensure full interoperability and transparency. It provides a clear and concise framework that data space operators can rely on to ensure full interoperability and transparency.

Figure 1 Overview of the Regulatory Framework

Why Data Space Governance?

The Catena-X data space relies on trusted principles and proven technology not exclusive to the automotive industry for implementation. Our governance elements reflect this by building the following parameters and components:

- **Gate-X** is the basis for an overarching Trust Framework and forms the foundation for a federated, interoperable data space.
- The International Data Space Association (IDSA) provides architecture principles that enable sovereign data exchange.
- The Eclipse Foundation hosts the official open-source development project of the Catena-X ecosystem and follows the Eclipse Foundation's trusted development process.
- The Catena-X Association provides industry-specific governance for the ecosystem that equally reflects the diverse interest groups within the automotive industry to serve common business needs.

The sum of these elements ensures a global data space built by best-in-class experts on trusted principles.

Why Life Cycle Management?

Managing the relevant phases of data space governance and operating systems reflects such as standards, KITs and reference implementations throughout their life cycle in the Catena-X ecosystem is referred to as **life cycle management**. It includes identifying when to prepare for a solution adaptation and subsequent certification phase, including reference implementations in **Eclipse Tractus-X**.

Benefits
Quality Assurance through Consistency

The objective of the life cycle management is to provide and maintain consistent and comparable levels of transparency and compliance open source reference implementations for our stakeholders. This allows them to take advantage of new standardized features and regular security updates, being impacted such as faster time to market, easier mitigation, quality assurance compliance and dependency management, and faster availability for the adaptation and the foundation phase.

Figure 1 Overview of the Life Cycle Management

Context: Standards & OSS Implementation

The life cycle management process supported by the Catena-X Association includes the coordination, planning, publishing, and control of two main artifacts as depicted in Figure 1:

- **Standards and other normative documents** in the Catena-X Association.
- The Catena-X operating system (xOS) including open source reference implementations and KITs in the Eclipse Tractus-X project.

This approach ensures the applicability and compatibility of the Catena-X data space governance and operating system for all data space participants.

Figure 1 Overview of the Standards & OSS Implementation



Example 1

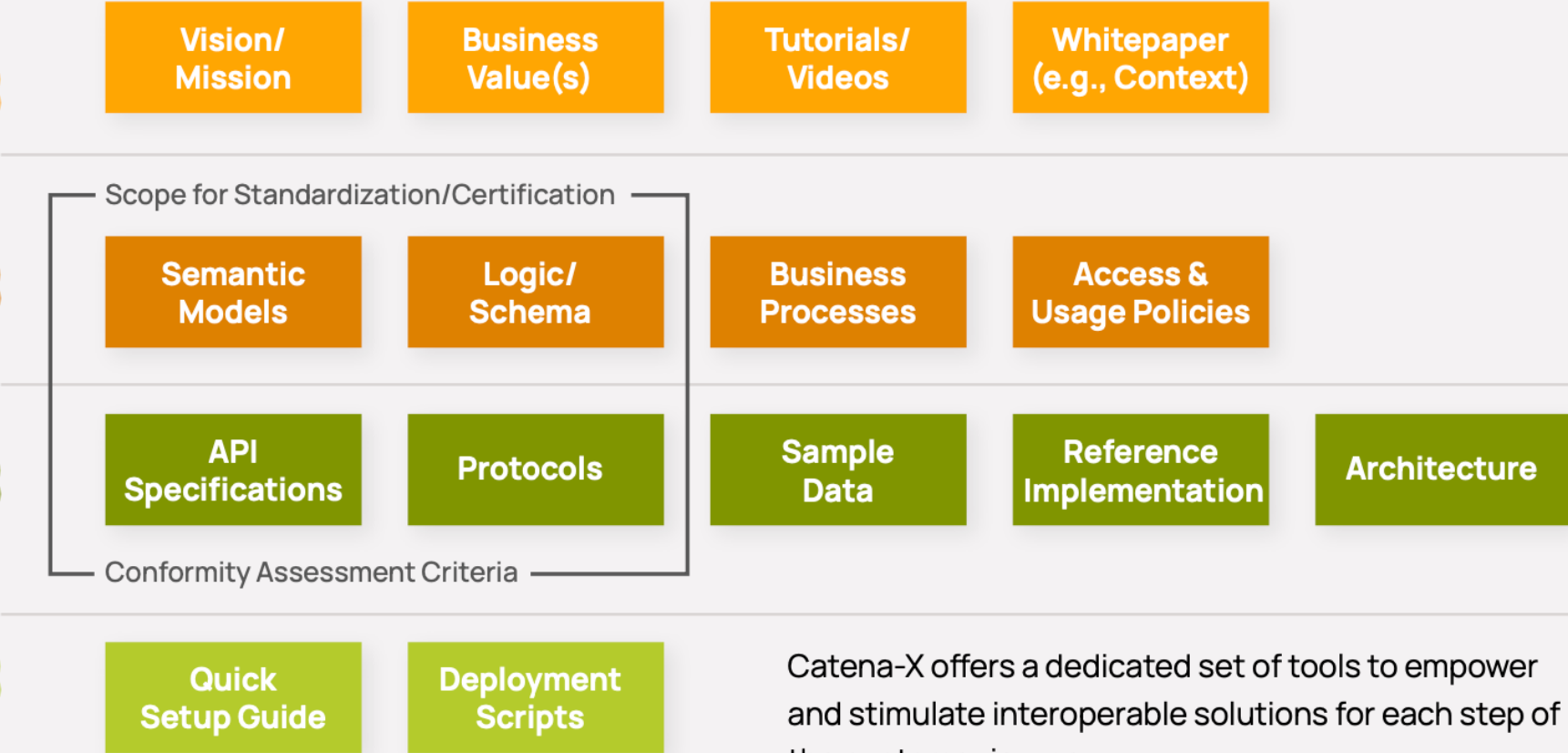
KITs 101

Why KITs?

To build an ecosystem of interoperable business applications, Catena-X consolidates all essential code and non-code artefacts for a use case into a KIT (Keep It Together). This comprises standards, open source developer resources and technical documentation that ensure Catena-X principles such as trust, sovereignty, and interoperability. The KIT structure is standardized to accelerate the adoption by solution providers.



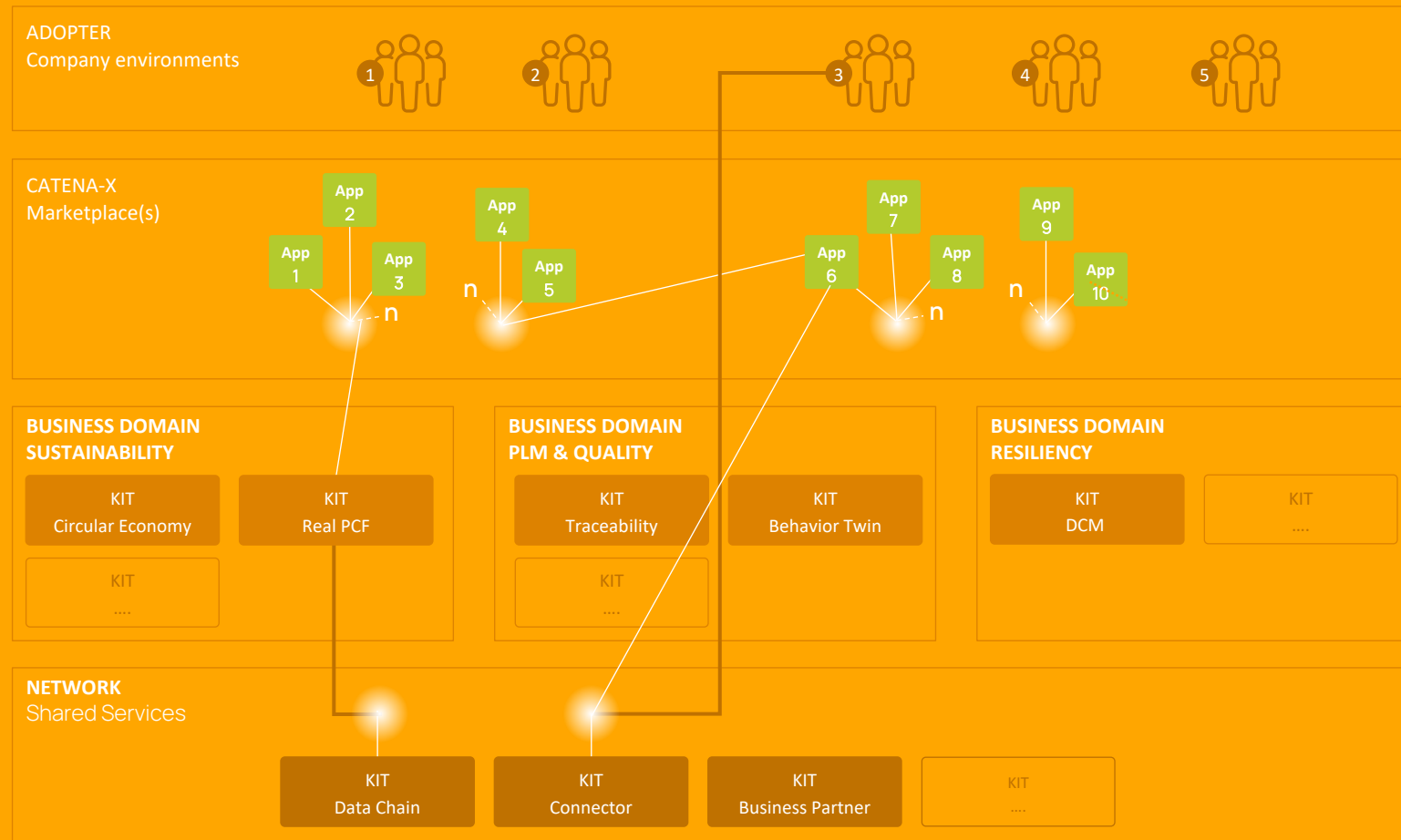
Our KITs Toolbox



Catena-X offers a dedicated set of tools to empower and stimulate interoperable solutions for each step of the customer journey.



KITs in action





Example 2

Data Space Governance 101

Why Data Space Governance?



Providing a reliable, trustworthy, and transparent ecosystem is at the very heart of the Catena-X value proposition, because trust is the foundation of any successful supply chain collaboration. Secondly, stipulating scalability within Catena-X and outside of its own data space boundaries is our goal. Scalability attracts further participants and drives adoption of Catena-X way beyond its original scope. The Catena-X data space governance manifests these declared goals via strategic partnerships with neutral, independent partners.

To ensure that these fundamental principles are adhered to, the Catena-X initiative works with independent governance units:

- **Identity:** Gaia-X partnership for establishment of an overarching Trust Framework.
- **Data Exchange:** International Data Space Association (IDSA) partnership for industry-agnostic foundation of sovereign data exchange.
- **Development:** Eclipse Foundation partnership for proven software development processes, best practices, and management of repositories in open source.
- **Industry-specific logic:** Catena-X Association partnership for driving standards on common business needs of the automotive industry.





Example 3

Enablement Services 101

Why Enablement Services?

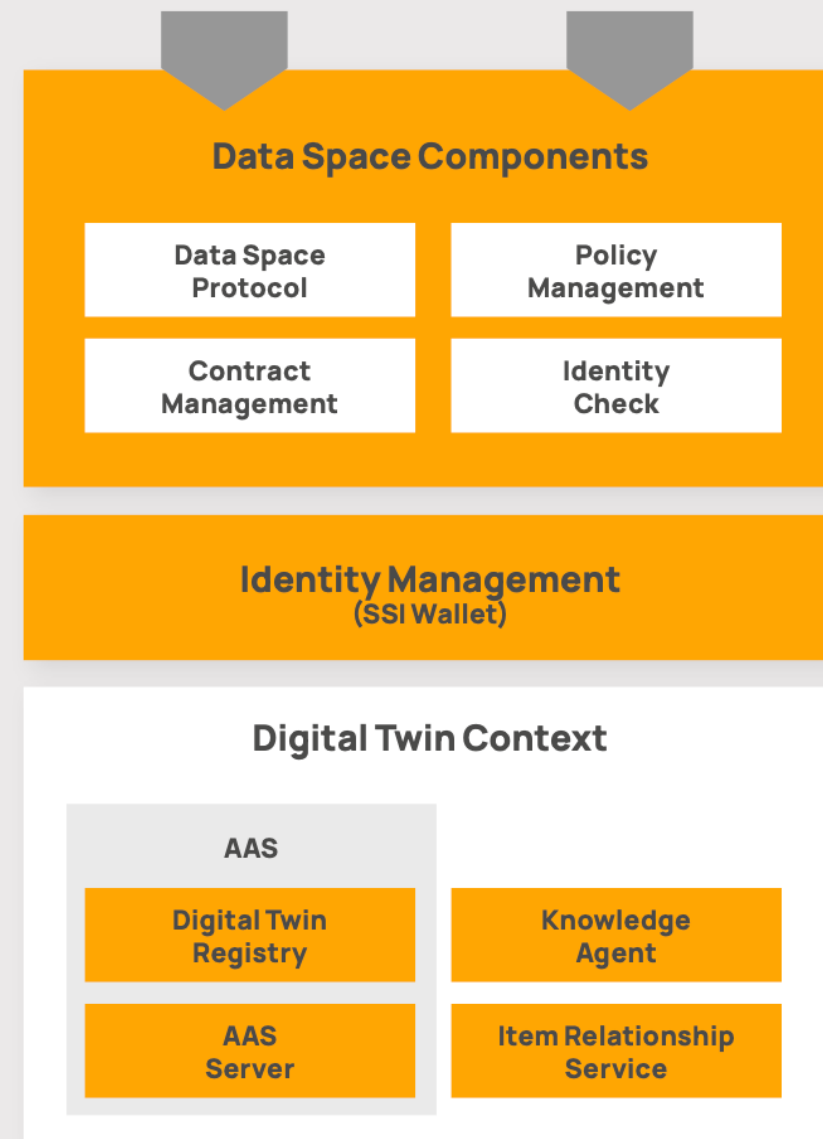
To access a data space like Catena-X, a participant needs standardized connectivity method to ensure interoperability, trust and a compliant usage of common interaction patterns. Therefore the Enablement Services combine the three aspects of Identity Management, Data Exchange via a Connector and access to compatible Digital Twins. These Enablement Services need to be deployed decentrally under the responsibility of each participant and are ensuring harmonized connectivity, trusted identity, and a common language on business



The enablement services are a bundle of decentralized services that **enable** participation in the Catena-X ecosystem as shown in **Figure 1**.

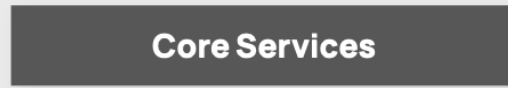
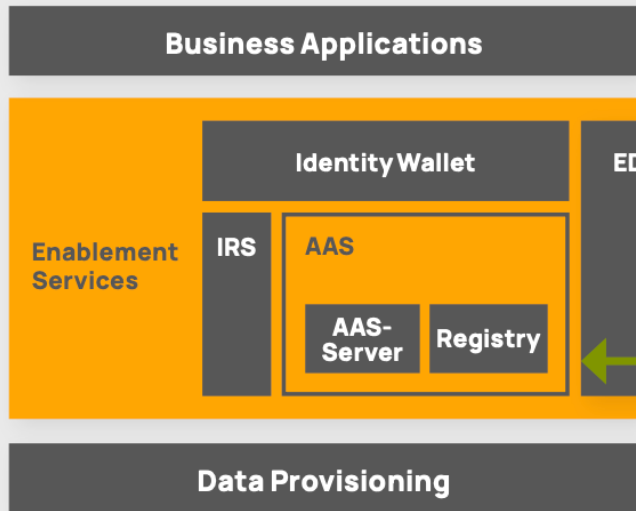
Enablement Services

Contract Negotiation with Control Plane Data Transfer with Data Plane

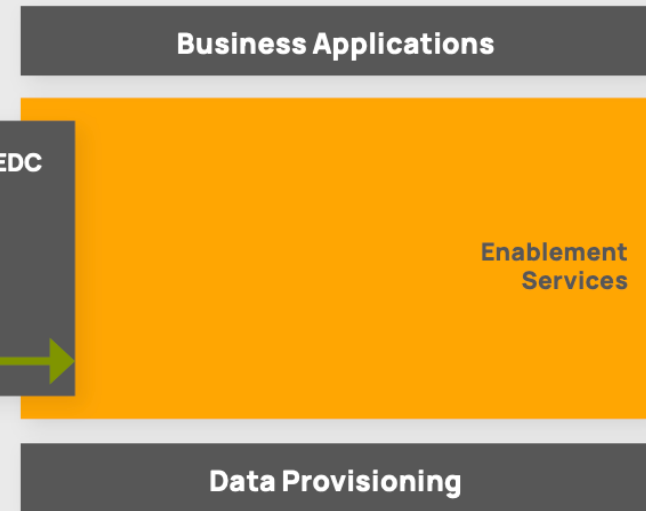




Participant A



Participant B



No Operational Data

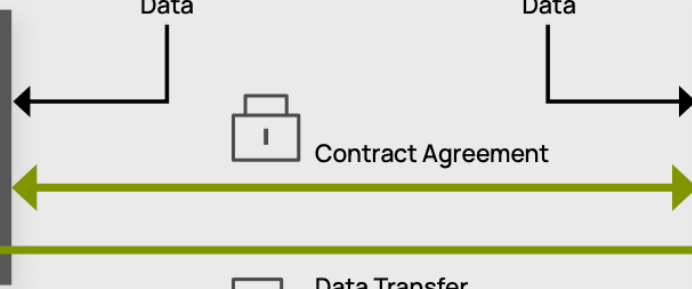
No Operational Data



Contract Agreement



Data Transfer



Visit us:



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Bon courage
ed-x!