

Catena-X Operating Model

Released October 16, 2023
Released Version 2.1



Table of contents

01 Why: Introduction	04
1.1 Relevance	04
1.2 Executive Summary	04
1.2.1 Introduction	04
1.2.2 Objectives	04
1.2.3 Scope	05
1.3 Document Updates	05
02 Why: Understanding the Catena-X Data Space	06
2.1 Conceptual Foundations of the Catena-X Data Ecosystem	06
2.2 The Catena-X Data Ecosystem Architecture	07
03 Who: Roles in the Catena-X Ecosystem	10
3.1 Overview of Roles	11
3.2 Detailed Description of Each Role	11
3.2.1 Core Service Provider A	12
3.2.2 Core Service Provider B	13
3.2.3 Onboarding Service Provider	14
3.2.4 Enablement Service Provider	15
3.2.5 Business Application Provider	16
3.2.6 Advisory Provider	17
3.2.7 Data Provider/Consumer	18
3.2.8 Catena-X Association	19
3.2.9 Conformity Assessment Body	20
04 What: Service Map	21
4.1 Enablement Services	22
4.2 Core Services	22
4.3 Onboarding Services	23
4.4 Use Cases	23
4.4.1 KITs – Keep It Together	23
4.4.2 New Use Cases and Direct Collaboration	25
05 How: Data Space Operations	26
5.1 General Onboarding	26
5.2 Gaia-X Compliance	27
5.3 SSI Issuer Concept	27
5.4 Data Exchange based on SSI	28
5.5 EDC Deployment and Usage Premises	30



06 How: Data Space Governance	31
6.1 Standardization	31
6.1.1 Why do we standardize?	31
6.1.2 What do we standardize?	31
6.1.3 How do we standardize?	31
6.2 Conformity Assessment	32
6.2.1 Why do we certify?	32
6.2.2 What do we certify?	32
6.2.3 How do we certify?	33
6.2.4 Catena-X Labels	34
6.2.5 Exceptions & Timeline for Release 23.09	34
6.3 Nomination Process for unique Roles (e.g. CSP-B)	36
6.4 Qualification Process	37
6.4.1 Why do we qualify?	37
6.4.2 Who do we qualify?	38
6.4.3 How do we qualify?	38
6.5 Regulatory Framework	39
07 How: Life Cycle Management	40
08 Outlook	41
8.1 Industry Core	41
8.2 Increase Decentralization of Core Services	41
8.3 Further Integration of SSI Technologies	43
8.4 Data Space Interoperability	43
8.5 Backward Compatibility	43
8.6 Sanctions	44
09 Glossary	45
10 Appendix	46
10.1 Role Relationships	46
10.2 Data Exchange based on SSI - Next Steps	48
11 Change Log	49



01 – Why: Introduction

1.1 Relevance

The Catena-X Operating Model Whitepaper is a normative document of the Catena-X Association. Normative documents outline rules, guidelines, and characteristics for activities and results for all participants within the Catena-X ecosystem. The Catena-X ecosystem includes Governance, Standardization, Certification, Development and Operations. These are established by consensus

among the working groups and approved by the executive board of the Catena-X Association. As part of the Catena-X regulatory framework, this document is binding for all participants of the Catena-X ecosystem. This normative document is a foundational building block, allowing all participants to collaborate within a global ecosystem.

1.2 Executive Summary

1.2.1 Introduction

With Catena-X, the automotive industry is creating targets a trustworthy, collaborative, open, and secure data space to enable a data-driven value chain for their relevant business processes. All participants can be connected in business process-centric end-to-end value chains, where everyone operates on an equal playing field, has sovereign control over their data and no lock-in

effects occur. Thereby, the digitalization of intercompany processes and value chains, especially those of small and medium-sized companies, can be performed on a cost effective, timely and lasting basis. Further, it secures that market participants and competitors collaborate in a compliant and trusted way.

1.2.2 Objectives

This document defines the operating model and processes required within the Catena-X ecosystem. The operating model is linked to the concepts and values of Gaia-X and the International Data Space Association (IDSA) to create the first open and collaborative data ecosystem for the automotive value chain. Thereby, Catena-X applies these concepts and extends them by integrating automotive-specific

requirements for compliance, interoperability, and security. The operating model lays the foundation and is the prerequisite for further standardization, certification, implementation, and operations of software components and partners in the Catena-X data space. The operating model is continuously updated to reflect the evolution of business and regulatory requirements, as well as emerging technologies.



1.2.3 Scope

The Catena-X operating model describes the entire Catena-X ecosystem, focusing on the operating environment and its roles, processes, and solutions, and how they interact. Since Catena-X is under continuous

development, the document refers, where appropriate, to dynamic content that can be found on the website of the Catena-X Association.

1.3 Document Updates

The Catena-X Association releases updates to its operating model in regular intervals to always guarantee a well-functioning, up-to-date framework for its data space operations. Updates are developed within the framework regulations of the Catena-X Association and require approval from the Association's executive board.

Every update of this operating model will automatically be applied to all Catena-X initiatives, existing participants, as well prospects, without further notice and individual approval. An update will be communicated in due time via the Catena-X Association.



02 – Why: Understanding the Catena-X Data Space

2.1 Conceptual Foundations of the Catena-X Data Ecosystem

To comprehend the components that comprise the Catena-X operating model, it is necessary to have a basic understanding of the fundamental concepts that make up the Catena-X data ecosystem (see [Figure 1](#)).

The Catena-X data ecosystem consists of three areas: the Catena-X Automotive Network e.V., the development environment, and the operating environment.

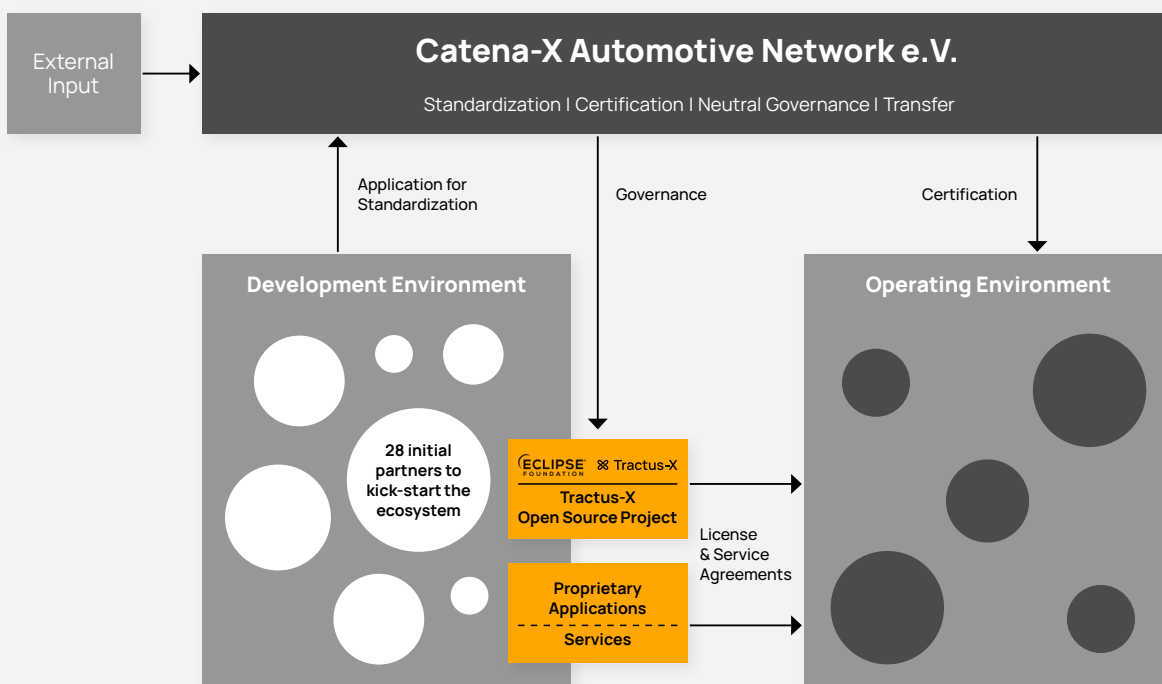


Figure 1 Catena-X Data Ecosystem



The **Catena-X Automotive Network e. V.** (in the following called “Catena-X Association” or “the Association”) is responsible for standardization, certifications, and governance of the Catena-X ecosystem. Members can participate in committees, working groups, and expert groups to actively shape the Catena-X ecosystem. The Catena-X Association publishes standards with the goal of enabling interoperability, data-sovereignty, and security for all participants in the data space. The ecosystem participants must comply with the standards published by the Catena-X Association to work with the data space. Catena-X standards build on Gaia-X/International Data Space Association (IDSA) concepts and principles, industry standards, and best practices, among others, and extends these by automotive domain and use case-specific requirements. By certifying ecosystem participants and software components, the Catena-X Association ensures transparency and trust in the ecosystem. A certification testifies, for example, that a

software component is interoperable, data sovereign, and safe to use in the Catena-X data space.

The Association is complemented by the **development environment**. The focus of the development environment is on the one hand on the creation of standardization candidates that can be submitted into the standardization process of the association. And on the other hand, the development of open-source reference implementations and other implementations for the data space.

In the **operating environment**, the various open-source and commercial services and business applications are operated by different providers. A detailed description of the provider roles and the associated software components can be found in **Chapter 3** and **Chapter 4**. All three components jointly make up the Catena-X data ecosystem. In the following chapters, the roles, responsibilities, and functions of these components are described in detail.

2.1 The Catena-X Data Ecosystem Architecture

Underlining the Catena-X data ecosystem’s conceptual foundations are its individual data space components. Together, these building blocks serve as the architecture of the Catena-X data space, where each building block

serves a dedicated purpose in one or several of the above-mentioned conceptual elements. An overview is depicted in **Figure 2** followed by a short description of the main building blocks.

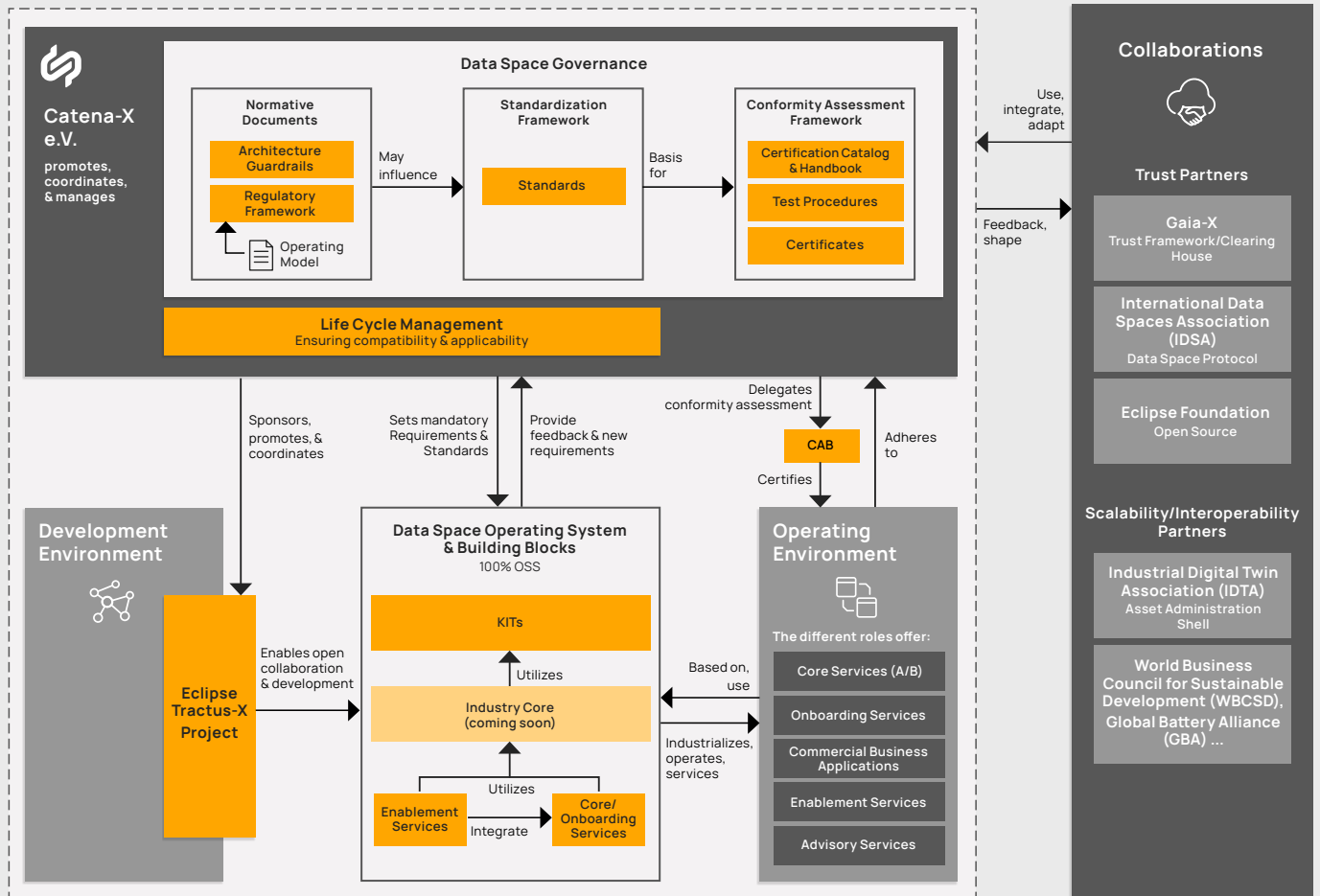


Figure 2 The Catena-X Data Space

The global Catena-X data space is built on 5 mission-critical pillars:

- a dedicated **role concept** covering all data space participants (see **Chapter 3**),
- a Service Map of foundational software services, building blocks, and standards that form the **Catena-X Operating System** and **Business Foundation** (see **Chapter 4**),
- procedures, processes, and building blocks for a trusted, scalable, and compliant **data space operation** (see **Chapter 5**),
- effective **data space governance** incl. standards, legal frameworks, (flight models) and certification (see **Chapter 6**)
- an integrated and holistic **life cycle management ensuring compliance, interoperability, and compatibility** (see **Chapter 7**).



To promote adoption and collaboration, the Catena-X data space is built upon open-source principals, under the umbrella of the Eclipse Foundation. All Catena-X reference implementations and KITs are licensed under Apache 2.0 and CY BB 4.0. In order to structure and guide the development in open-source, Catena-X installed Organizational Elements (e.g., committees in the Catena-X Association), created a working group and project in Eclipse Tractus-X and defined a scalable structure for a business-oriented development and adoption of relevant artifacts and SW codes:

- **Enablement Services**
- **Core Services**
- **Industry Core**
- **and use case KITs**

With regard to standardization, the Catena-X Association promotes, sponsors and coordinates the overarching requirements of the Eclipse Tractus-X project. Standards are always linked, structured, and offered within those four elements.

Catena-X offers use case KITs to enable a multi-vender ecosystem of software solutions and services for each Catena-X use case. Solution and Service providers can create interoperable and data sovereign solutions and trusted services based on the Catena-X KITs and offer them on trusted marketplaces within the Catena-X Data Space (→ Core Service Provider A). The marketplaces are certified marketplaces that offer interoperable solutions from different solutions providers. The Core Services as well as marketplaces are part of the cxOS and are operated by certified operating companies (see **Figure 4**). With this comprehensive solution portfolio, players in the automotive value chain can create business value by establishing data-driven use cases and data chains.

Trust and conformity (of Services, Offers, and potentially other non-automotive data spaces) are fundamental for Catena-X's acceptance, scalability, and value creation. Therefore, Catena-X chose and installed various neutral governance bodies – covering development and operation. The following partnerships and components in sum ensure a global data space built by best-in-class experts on trusted principles:

- 1**
Gaia-X is the basis for our overarching Trust Framework and forms the foundation for a federated, interoperable data space with trusted identities.
- 2**
The International Data Space Association (IDSA) provides architecture principles that enable sovereign data exchange.
- 3**
The Eclipse Foundation hosts the official open-source development project of the Catena-X ecosystem and follows the Eclipse Foundation's trusted development process.

- 4**
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. It also defines the vision, mission, and guiding principles for the Catena-X data space through the governance framework based on the Catena-X Statutes.

More specifically, in the **Catena-X operating environment**, the Catena-X Regulatory Framework for Data Space operations acts as a reliable mutual foundation to ensure trust, interoperability and therefore scalability. Catena-X's success largely depends on trust that every participant plays by the same, commonly set rules. By standardizing many of the relationships and agreements necessary for

data exchange and bringing Catena-X use cases to life, data space participants can put their focus largely on their individual business needs rather than individual contract negotiation between business partners. Through collectively approved guidelines and templates, data exchanges on Catena-X can be seamlessly executed and operated without friction.



03 – Who: Roles in the Catena-X Ecosystem

The Catena-X ecosystem operates on the principle of multiple distinct roles, designed to create an appealing and functional data space (see **Figure 3**). Participants can take on one or more roles in any combination, and multiple participants can fulfill the same role except for the CSP-B role. The CSP-B role can only exist once in the data space due to complexity and technical reasons. Provider roles receive a label through a certification or qualification process to demonstrate that they are trusted partners (see **Chapter 7**).

3.1 Overview of Roles

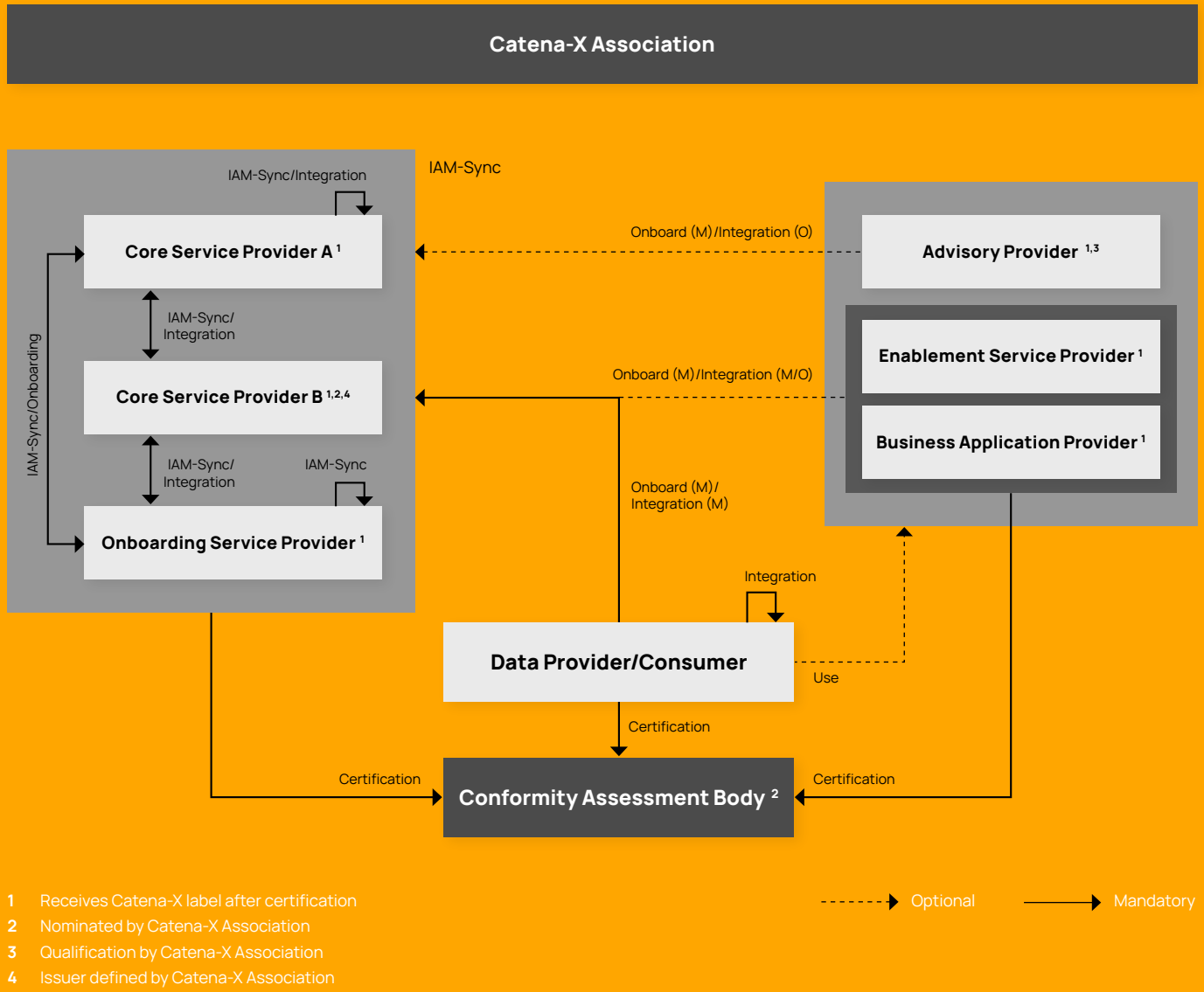


Figure 3 Role Overview and Relationships

3.2 Detailed Description of Each Role

Below, each role that a participant can assume in the Catena-X data spaces is described in detail, along with its assigned description, responsibilities, relationships, pre-requisites, and complements. Please refer to **Chapter 10.1**.

for a comprehensive overview of the relationships between these roles as well as a definition of the relationship type and **Chapter 4** for an overview of the Service Map.

3.2.1 Core Service Provider A

Role	Core Service Provider A (CSP-A)
Description/ Responsibilities	<p>A CSP-A is responsible for deploying, operating, and maintaining core services A according to Catena-X standards. Core Services A provide common business functionalities for all data space participants (e.g., managing marketplace offers, semantic models, or searching for business partner information).</p> <p>A CSP-A can operate various bundles of Core Services A, whereby the operation of an IAM and a marketplace is mandatory. Note that the synchronization of marketplace offers is at the discretion of a provider, who may submit and list its offer on multiple marketplaces. The CSP-A role can be taken on by multiple participants.</p> <p>For smooth operations, the CSP-A must provide comprehensive technical documentation, along with first, second, and third level support to facilitate integration with its services. Each CSP-A has freedom of choice regarding their business model towards their potential customers.</p>
Relationships	<ul style="list-style-type: none"> • A CSP-A must implement an IAM synchronization and must integrate with other CSP-As. • A CSP-A must implement an IAM synchronization with an OSP. • A CSP-A must integrate with the CSP-B to be able to offer and operate its services. This includes implementing IAM synchronization and integrating with required Core Services B. • A CSP-A must use the services of one of the OSPs to register and onboard itself to the data space (e.g., registration service). • A CSP-A must accept any certified solution that wants to be listed on its marketplace in accordance with its respective terms and conditions, without discriminating against individual organisations.
Prerequisites	<ul style="list-style-type: none"> • A CSP-A and its services must be certified by a CAB. • A CSP-A must accept and comply with the Catena-X regulatory framework during onboarding via one of the OSPs.
Limitations Release 23.09	<p>Due to technical limitations, the CSP-A role currently cannot be fully assumed and executed more than once. Further details can be found in Chapter 8.2 or can be requested during the conformity assessment.</p>

3.2.2 Core Service Provider B

Role	Core Service Provider A (CSP-B)
<p>Description/ Responsibilities</p>	<p>The CSP-B is responsible for deploying, operating, and maintaining all core services section B according to Catena-X standards. Core Services B include identity and common accessibility and discoverability functionalities for all data space participants.</p> <p>The CSP-B operates all Core Services B as one bundle to enable trusted participation and sovereign data exchange across all data space participants. The CSP-B role can only be taken on by one participant and is nominated by the Catena-X Association to operate and further develop the services on their behalf.</p> <p>For smooth operations, the CSP-B must provide comprehensive technical documentation, along with first, second, and third level support to facilitate integration with its services.</p> <p>Due to its special role, the CSP-B is responsible for:</p> <ul style="list-style-type: none"> • providing non-discriminatory access to Core Services Section B for all data space participants. • coordinating the release management of Core Services B in the data space (with affected participants) based on Catena-X Association and Tractus-X releases. • marketing Core Services B and managing contractual partners. • issuing and revoking access of BPNs to the data space based on the country clearance list by the Catena-X Association. • temporarily executing the trust anchor role and issuing verifiable credentials.
<p>Relationships</p>	<ul style="list-style-type: none"> • The CSP-B must support the integration of all other data space participants to the Core Services B. • A CSP-B must implement an IAM synchronization with CSP-As and OSPs.
<p>Prerequisites</p>	<ul style="list-style-type: none"> • A CSP-B must be nominated by the Catena-X Association. • A CSP-B must be a Catena-X Association member. • A CSP-B and its services must be certified by a CAB. • A CSP-B must accept and comply with the Catena-X regulatory framework via an MoU with the Association.
<p>Limitations Release 23.09</p>	<p>To ensure complete functionality of the data space, the CSP-B must also operate the relevant services of both the CSP-A and OSP roles.</p> <p>Further details can be found in Chapter 8.2. how Catena-X foster competition.</p>

3.2.3 Onboarding Service Provider

Role	Onboarding Service Provider (OSP)
Description/ Responsibilities	<p>An OSP is responsible for deploying, operating, and maintaining onboarding services according to Catena-X standards. The onboarding services enable and support data space participants to register and onboard and offboard to Catena-X data space.</p> <p>This includes organizational registration and technical integration (see Chapter 5.1), after which an organization can fully participate in the data space. An OSP can enable new prospects and/or their existing customer base in terms of network-of-networks. To ensure maximum trust in the data space during the onboarding process, the OSP must establish a connection with the Gaia-X Digital Clearing House (GXDCH).</p> <p>For smooth operations, the OSP must provide comprehensive technical documentation, along with first, second, and third level support to facilitate integration with its services.</p>
Relationships	<ul style="list-style-type: none"> • An OSP must implement an IAM synchronization with CSP-As, the CSP-B, and OSPs to provide its customers with access to the data space. • An OSP must integrate and use CSP-B services to access their identity (e.g., identity wallet) and enable data exchange. • An OSP must integrate and use the GAIA-X Digital Clearing House to validate e.g., the Legal Person Self-Description.
Prerequisites	<ul style="list-style-type: none"> • An OSP and its services must be certified by a CAB. • An OSP must integrate and use CSP-B services to access its identity (e.g., identity wallet) • An OSP must accept and comply with the Catena-X regulatory framework during onboarding via one of the other OSPs. • An OSP must use the dedicated GAIA-X Clearing House Service nominated by the Catena-X Association.
Limitations Release 23.09	<p>Due to technical limitations, the OSP role currently cannot be fully assumed and executed more than once. Further details can be found in Chapter 8.2 or can be requested during the conformity assessment. Offboarding will be included within the upcoming releases.</p>



3.2.4 Enablement Service Provider

Role	Enablement Service Provider (ESP)
Description/ Responsibilities	<p>An ESP is responsible for deploying, operating, and maintaining enablement services according to Catena-X standards.</p> <p>An ESP can operate various bundles of decentralized services that enable sovereign participation and data exchange for data providers and consumers in the Catena-X data space. An ESP can decide on the scope of its enablement service and whether to offer them on one or multiple of the marketplaces.</p> <p>In addition, ESPs can also offer non-standardized services such as automated data mapping, in which data is extracted from company systems and converted into Catena-X semantic models.</p>
Relationships	<ul style="list-style-type: none">• An ESP can use one or more CSP-A services (e.g., semantic hub).• An ESP must integrate and use CSP-B services to access its identity (e.g., identity wallet) and enable data exchange.• An ESP must use the services of one of the OSPs to register and onboard itself to the data space (e.g., registration service).
Prerequisites	<ul style="list-style-type: none">• An ESP and its services must be certified by a CAB.• An ESP must accept and comply with the Catena-X regulatory framework during onboarding via one of the OSPs.
Limitations Release 23.09	n/a



3.2.5 Business Application Provider

Role	Business Application Provider (BAP)
Description/ Responsibilities	<p>A BAP is responsible for deploying, operating, and maintaining business applications to Catena-X standards. Business applications enable data providers and consumers to leverage different use cases and data-driven processes to solve a specific industry problem (e.g., PCF) and create business value, by using KITs and Standards for an interoperable and trusted data exchange.</p> <p>A BAP can decide on the scope of its business applications and whether to offer them on one or multiple of the marketplaces.</p>
Relationships	<ul style="list-style-type: none">• A BAP can use one or more CSP-A services (e.g., semantic hub).• A BAP must integrate and use CSP-B services to access his identity (e.g., identity wallet) and enable data exchange.• A BAP must use the services of one of the OSPs to register and onboard itself to the data space (e.g., registration service).
Prerequisites	<ul style="list-style-type: none">• A BAP and its services must be certified by a CAB.• A BAP must list its solution on a marketplace provided by a CSP-A.• A BAP must accept and comply with the Catena-X regulatory framework during onboarding via one of the OSPs.
Limitations Release 23.09	n/a



3.2.6 Advisory Provider

Role	Advisory Provider (AP)
Description/ Responsibilities	An AP offers advisory services in various areas, from strategy to operations to technology or business use cases for those interested in the Catena-X data space. Providing advisory services includes topics such as onboarding guidance, business value assessment, organizational and technical enablement, but do not include the operation of technical services.
Relationships	<ul style="list-style-type: none">• An AP can use one or more CSP-As if it intends to utilize specific CSP-A services such as listing an offer on a marketplace.• An AP can integrate and use CSP-B services to access the Core Services B.• An AP must use the services of one of the OSPs to register and onboard itself to the data space (e.g., registration service).
Prerequisites	<ul style="list-style-type: none">• An AP must be qualified by the Catena-X Association.• An AP must accept and comply with the Catena-X regulatory framework during onboarding via one of the OSPs.
Limitations Release 23.09	n/a



3.2.7 Data Provider/Consumer

Role	Data Provider and Consumer (DPC)
Description/ Responsibilities	<p>A DPC provides, consumes, and processes data to collaborate with other data space participants to solve a specific industry problem und create business value. This includes both standardized use cases and direct collaboration.</p>
Relationships	<ul style="list-style-type: none"> • A DPC can use the services of a CSP-A (e.g., marketplace). • A DPC must integrate and use CSP-B services to access his identity (e.g., identity wallet) and enable data exchange. • An DPC must use the services of one of the OSPs to register and onboard itself to the data space (e.g., registration service). This can be delegated to a BAP or ESP • A DPC must connect with another DPC to exchange data and create value. • A DPC can use advisory services from a qualified AP. • A DPC can use certified enablement services from a commercial ESP (e.g., SaaS solution). Alternatively, a DPC can certify and operate its own enablement services. • A DPC can use certified business applications from a commercial BAP (e.g., SaaS solution). Alternatively, a DPC can certify and operate its own business application.
Prerequisites	<ul style="list-style-type: none"> • A DPC must use certified enablement services or business applications. Alternatively, a DPC must certify its own enablement services and/or business applications by one of the CABs (as outlined in Chapter 7.2). • A DPC must accept and comply with the Catena-X regulatory framework during onboarding via one of the OSPs.
Limitations Release 23.09	<p>n/a</p>

In addition to the roles in the data space, there are independent roles such as the Catena-X Association or Conformity Assessment Bodies (CABs) to ensure neutral, trustworthy, and secure operation of the Catena-X data space.



3.2.8 Catena-X Association

Role	Data Provider and Consumer (DPC)
Description / Responsibilities	The Association is responsible for the neutral governance of the Catena-X ecosystem including the execution of nomination, standardization, qualification, and certification processes. It promotes and facilitates working groups, committees, and expert groups to discuss and align on, standards, KITs, and requirements for open-source reference implementation for the Catena-X operating system and use cases. In addition, it provides various informational resources to interested parties and Association members.
Relationships	<ul style="list-style-type: none">• The Association nominates the CSP-B and CABs.• The Association delegates the certification of data space participants to CABs.• The Association defines the Issuer of verifiable credentials.• The Association qualifies APs.• The Association promotes, sponsors, and coordinates the overlying requirements of the Eclipse Tractus-X Project with a view to standardization.
Prerequisites	n/a
Limitations Release 23.09	For the upcoming releases there will be a dedicated issuer concept in place. As of now the Association defines the Issuer (CSP-B). Further details can be found in Chapter 5.3 . An outlook can be found in Chapter 8.3 .

3.2.9 Conformity Assessment Body

Role	Conformity Assessment Body (CAB)
Description / Responsibilities	<p>A CAB carries out the conformity assessment process in accordance with the Catena-X Certification Framework on behalf of the Catena-X Association. The Certification Framework consists of the certification manual and the certification catalog (derived from the Catena-X standards ↗). A CAB is nominated by the Catena-X Association to ensure an independent, trustworthy, and secure conformity assessment process.</p> <p>A CAB is responsible for:</p> <ul style="list-style-type: none"> • creating offers for the conformity assessments. • carrying out the conformity assessment process for various certification objects (e.g., provider, solutions). • informing the Catena-X Association and the certification candidate about the certification results. • issuing, reissuing, and revoking of certificates on behalf of the Catena-X Association.
Relationships	<p>The CAB must carry out the conformity assessment for all affected data space participants and their IT solutions.</p>
Prerequisites	<ul style="list-style-type: none"> • A CAB must be nominated by the Catena-X Association and comply with the Catena-X certification framework. • Business model supporting adoption and offering a non-discriminating access, esp. by small and medium business.
Limitations Release 23.09	<p>n/a</p>



04 – What: Service Map

The architecture of the Catena-X Operating System (cxOS) is derived from the reference architectures of Industrial Data Space Association (IDSA) and Gaia-X. The cxOS consists of three areas: Core, Onboarding, and Enablement Services shown in **Figure 4**.

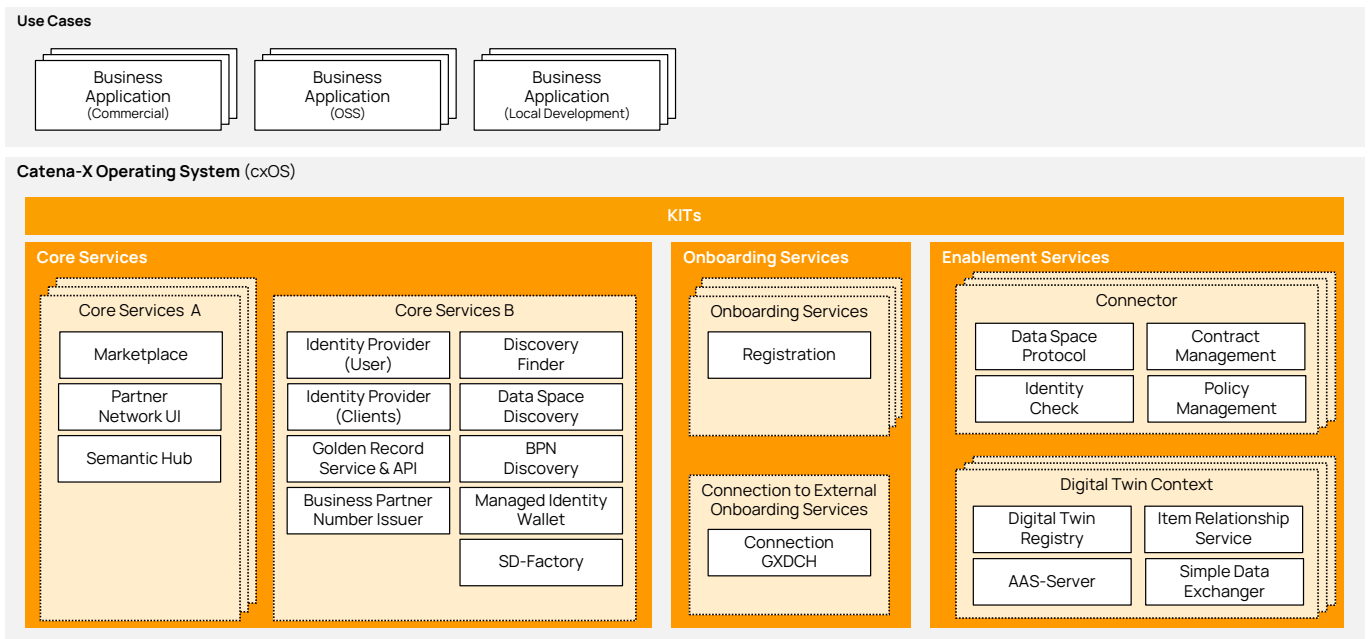


Figure 4 Service Map (Deployment View)

The cxOS is the technical foundation enabling business use cases to operate in a network-enabled manner across company boundaries. The operating system offers various capabilities:

4.1 Enablement Services

The Enablement Services are a bundle of decentral services that enable participation in the Catena-X data space. Each participant must deploy and use the enablement services to connect to the data space and enable standardized interactions based on the requirements of the respective use case. They ensure the strategic value proposition of technical/semantic interoperability and (data) sovereignty.

The connector (e.g., EDC) based on the data space protocol and the identity wallet form the mandatory basis of enablement services enabling standardized technical connectivity and sovereign data exchange. All participants can use them to establish a basic connection to the data space, independent of the business use case.

In addition to generic data-exchange capabilities, enabling services include context-specific service offerings. Examples are the Asset Administration Shell (AAS) as harmonized access layer for digital twins, the Decentral Digital Twin Registry (DDTR) for local discoverability of digital twins in decentral organized data spaces or the Item Relationship Service (IRS) for building data chains and iterating through a tree structure of digital twins.

Please note that there are various options for running enablement services, ranging from leveraging software-as-a-service solutions to local deployments of open-source reference implementations. Further information on deployment and usage premises can be found in **Chapter 5.5**.

4.2 Core Services

In contrast to Enablement Services, Core Services are provided and operated by Core Service providers A/B. Core services provide common accessibility and discoverability functionalities for data space participants. Examples include BPN issuer for maintaining business partner numbers, and participant information, IAM solutions for identity and access management, and discovery services to localize the address of assets in decentral organized registries across the data space. The Core Services can be divided into two areas:

Core Services A lists Core Services that can be operated "n" times in the Catena-X data space.

Core Services B lists Core Services that can only be operated once in the Catena-X data space due to business reasons or technical limitations and are therefore tendered via the nomination process of the Association.

Some of the Core Services, such as the Managed Identity Wallet, are by nature Enablement Services, but because of technical reasons they are considered Core Services B as an interim solution.

4.3 Onboarding Services

The Onboarding Services are provided and operated by OSPs. Onboarding Services enable participants to onboard into the Catena-X data space. As shown in **Chapter 8.2**, the scope of Onboarding Services will change over time. The Onboarding Services can be divided into two areas:

Onboarding Services list the services that ensure a standardized and compliant Catena-X onboarding process (e.g., registration process).

External Onboarding Services list the services that OSPs must integrate and use to implement a trusted onboarding process but are developed and operated by an external initiative or provider.

4.4 Use Cases

The goal of a Catena-X use case is to solve a specific business problem and to create value for data providers and consumers. To do this, the Catena-X Association demands and promotes that use cases create Standards and KITs to enable a multi-vendor ecosystem of interoperable and compatible business applications (see: **business application**). 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 business apps, especially for SMEs.

4.4.1 KITs – Keep It Together

KIT, short for Keep It Together, bundles all necessary resources and technical documentation designed to adopt a Catena-X use case for all data space participants (see **Figure 5**).

A KIT is always structured in the same way and supports the individual journey of a company joining the Catena-X data space. To ensure interoperability and data sovereignty in Catena-X use cases, adherence to a minimum set of

elements is required, including semantic models for data integration and understanding, logic and schemas for value calculation, API implementation for technical communication, and access and usage policies to maintain data sovereignty. A KIT consists of various other artifacts in addition to the minimum set. A comprehensive overview of the artefacts can be found on the [Tractus-X project website](#) ↗.

Our KITs Toolbox

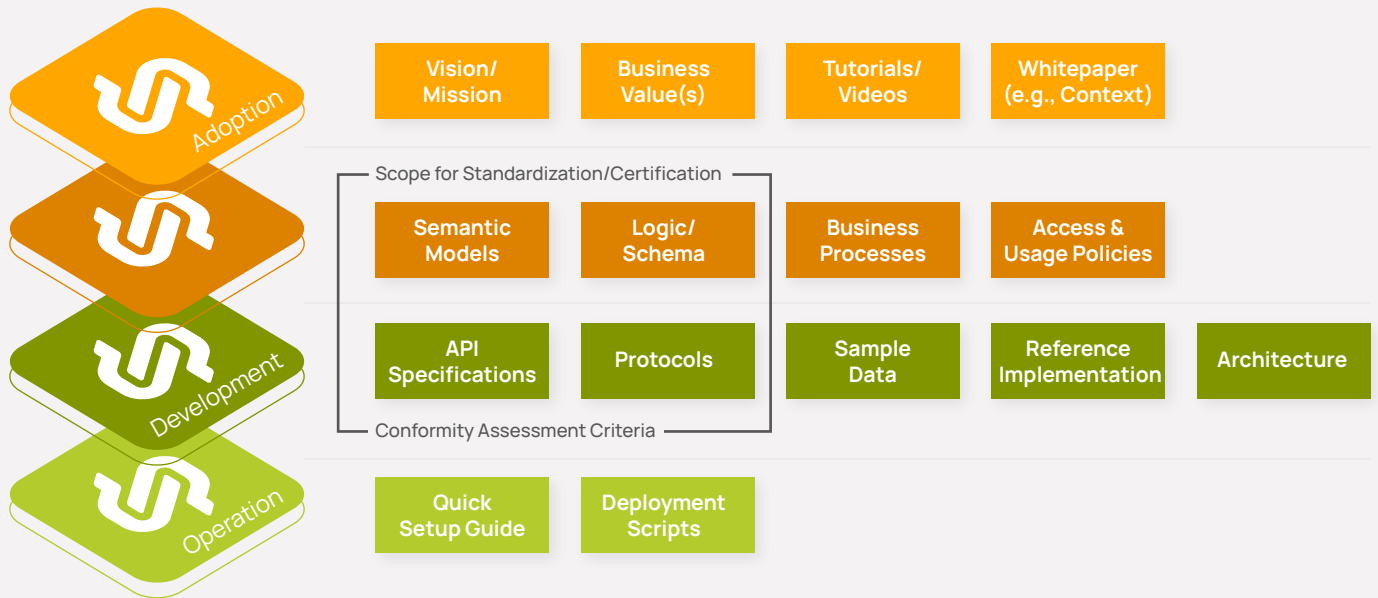


Figure 5 KITs Toolbox

DPCs that are part of the automotive value chain and strive to participate in a Catena-X use case require technical support, specifications, and tutorials. For instance, a production company may need to exchange product carbon footprint data with its partners. KITs consolidate the necessary software components, standards, access and usage policies, and code examples, ensuring these companies have everything required to successfully participate in a Catena-X use case.

BAPs interested in offering a business application for a specific use case on one of the Catena-X marketplaces. These companies need to align their existing solutions with Catena-X requirements. Within a KIT, they receive guidelines and the technical support necessary for adapting their solutions to meet Catena-X conformity based on our five steps to Catena-X: Inform, connect, boost, adapt, utilize. KITs are the way forward to create a valuable multi-vendor ecosystem to promote seamless interoperability between different commercial solutions.

4.4.2 New Use Cases and Direct Collaboration

In addition to the first 10 use cases that have been initially developed in the Catena-X Consortium and are now governed by the Association Committees (e.g., Sustainability Committee), data space participants have the following scenarios for collaboration:

Initiate new use case

Any Catena-X Association member can initiate a new use case by creating a working in the Catena-X Association or expand an existing committee (whatever suits the purpose best, the final judgement is made by the Board of the Association). The goal of a committee or working group is to discuss and define a common vision, roadmap, standards, KITs, and other open-source artefacts for the use cases with focus on interoperability and data sovereignty to create multi-tier value chains for a dedicated business process.

To validate the value proposition or technical specifications, a new use case can be tested in future either in a sandbox environment of the CSP-B or in the test environments of the Catena-X Association. Note that new uses cases without standards provide only limited interoperability, require individual use case policies, and cannot be certified and thus not be listed on one of the marketplaces and are therefore not supported and trusted.

Direct collaboration (no multi-tier approach)

The Catena-X data space also enables secure and sovereign data exchange for direct collaboration between data provider and consumer. In this scenario, the data provider and consumer are responsible for defining a bilateral semantic model, as well as appropriate usage and access policies. Alternatively, they can make use of existing usage and access policy that meets their needs. The goal of the Catena-X data space remains to always create interoperable use cases with consistent data chains. Note that direct collaboration without standards provides only limited interoperability and cannot be certified and thus not be listed on one of the marketplaces.



05 – How: Data Space Operations

This chapter outlines the overarching processes and premises to onboard and exchange data in the Catena-X data space. This includes the general onboarding process that all participants must complete to join the Catena-X data space. It involves registration and technical integration, as well as compliance with the regulatory framework and verification through the Gaia-X Digital Clearing House. The introduction of Self Sovereign Identities (SSI) in Tractus-X Release 23.09 updates the process for offering, exchanging, and using data, while the chapter also covers EDC deployment and usage premises and available support options for participants.

5.1 General Onboarding

To participate in the data space, all participants must complete the general registration process, which involves registration and can be extended by the technical integration (see [Figure 6](#)).

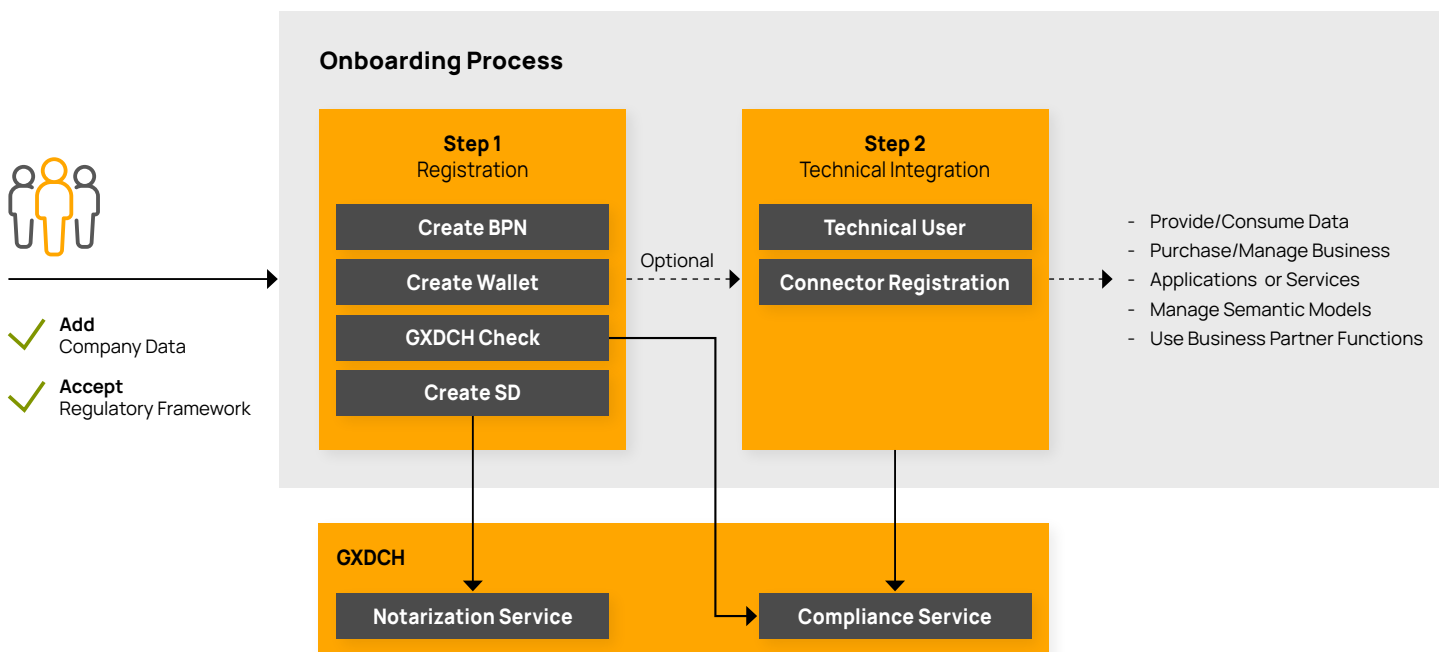


Figure 6 General Onboarding Process



During **registration**, all participants must fill out their company data, select their data space role, and agree to the regulatory framework via one of the OSPs (see **Chapter 3.2.3**). A BPNL (if not yet existing) as well as a Managed Wallet Tenant with BPNL Credential and CX membership Credential are created as part of the registration approval process, which is owned/managed by the operation company. Each participant can collect their identity proofs, certificates and other verifiable information, rights, or services in its identity wallet.

During **technical integration**, the technical user creation and registration of the connectors are essential to enable

the company communication with the data space. The technical user enables the customer company to connect the connector with the wallet and the connector registration is needed to ensure that the connector can get found by other data space members.

The self-descriptions of newly registered legal entities and connectors are validated by the GXDCH (see **Chapter 5.2**). This involves signing and issuing credentials to the identity wallet of a DPC, providing proof of Gaia-X compliance and legal entity notarization. Detailed information about the Standard CX-0006 in the [Standard Library](#) of the Catena-X Association.

5.2 Gaia-X Compliance

The Gaia-X Digital Clearing House (GXDCH) is an external service that maximizes trust within the Catena-X data space and interoperability with other data space initiatives based on the Gaia-X Trust Framework. The GXDCH enables the validation of legal entities, ensures Gaia-X compliance, and creates an eIDAS conform digital signature (Self-Description) for all data space participants. There is one

GXDCH provider for the Catena-X data space, which is nominated and managed by the Catena-X Association. To ensure compliance with the Catena-X onboarding process, every OSP must connect to the GXDCH. OSP candidates can request more information during conformity assessment.

5.3 SSI Issuer Concept

The Tractus-X Release 23.09 initiates the introduction of Self Sovereign Identities (SSI), replacing the Dynamic Attribute Provisioning Service (DAPS). The current release and version of SSI allows only one issuer and one centrally managed identity wallet operated by the CSP-B (see **Chapter 4**). This also includes the revocation of issued certificates. This is done in cooperation with the Catena-X Association e.g., in case of conscious violation of legal and

technical framework. With the 23.09. Release the CSP-B is the single issuer authority of Catena-X credentials. Multi-issuer concept is planned in the following releases. The BPNL can be found on the Catena-X Association website and the portal of the CSP-B. This concept will evolve in future releases, the details of which can be found in **Chapter 8.3**.

5.4 Data Exchange based on SSI

With the introduction of Self Sovereign Identities (SSI) in the Tractus-X Release 23.09, the processes to participate in a use case as well as offer, exchange, and use data are updated as follows (see **Figure 7**):

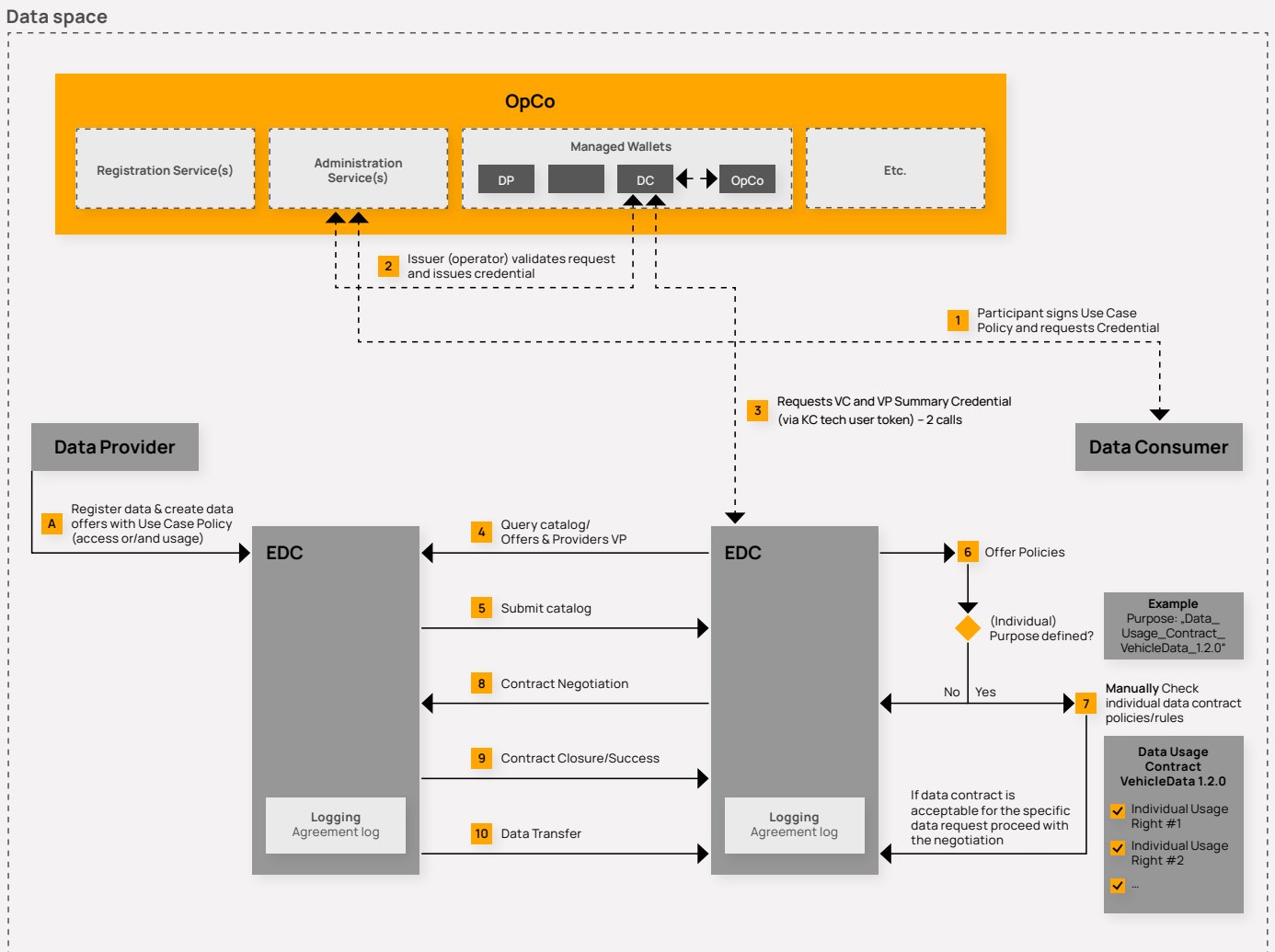


Figure 7 Data Exchange Process

1 Participant signs pre-defined use case framework conditions and requests credential via CSP-B
 The data consumer must sign and upload the respective use case framework conditions to request the use case participation credential.

2 Issuer validates request and issues credential
 The request from the participant (e.g., data consumer) is sent to the issuer (operator) for validation (frame version and existing signature) and confirmation, which triggers the creation of the VC.

**3 & 4****Requests credential & query catalogue/offers**

The customer EDC calls the MIW to retrieve the verified summary credentials, requests the signature and retrieves the verified presentation with the summary credential. With the query of the data provider catalog, the consumer EDC submits the request with the VP in the request header. Upon successful validation, the issuer generates the verified credential using the MIW component and stores it in the wallet tenant of the customer company wallet. is recreated containing both the previous credentials and the newly added credential.

5**Submit catalog**

The received offer catalog request and the submitted customer VP are validated by the provider EDC. All data offers where the data access policies set by the provider match the verified credentials owned by the data consumer are sent to the customer. Any data offers that require verified credentials that the data consumer does not have will not be sent/published to the data consumer.

6**Manual checking of data offering policies**

Configured data offer policies must be manually checked by the data consumer.

- If a purpose is specified, the purpose must be validated internally by the data consumer. The purpose may refer to an individual contract concluded between the data consumer and the data provider. The data consumer must review the contract and decide whether the policies are acceptable for the specific data offering based on the established policies (see **next step 7**).
- If no purpose is specified, the negotiation can start immediately, as the access and usage policies are automatically technically enforced and validated by the EDCs.

7**Decision on the purpose of the data offer**

Based on step 6 individual data contract validation, the data consumer must decide whether to proceed with the negotiation or whether to disagree with the individual purpose. If there is disagreement, the negotiation should not be started. If there is consent, the data consumer can start the negotiation.

8**Contract negotiation**

The data consumer starts the contract negotiation by sending a request for an agreement/contract.

9**Contract conclusion/success**

The EDC of the data provider receives the negotiation requests, validates the access and usage policies of the specific data offer requested by the data provider, and matches it with the VP of the data consumer. If the data consumer has all relevant credentials, the agreement is successfully concluded, and an agreement log is stored in both EDCs.

10**Data transfer**

Data transmission/access by the data consumer can take place as long as the contract is active.

5.5 EDC Deployment and Usage Premises

Each data space participant has its own organizational structure, consisting of different legal entities and/or subsidiaries. Depending on the organizational structures, data space participants must consider how to organize

the representation of their organization in the Catena-X data space. This includes considerations for setting up connector instances regarding organizational, technical, and legal conditions. The following premises apply:

- The data exchange always takes place between two legal entities, as only their representatives can sign legally binding contracts.
- Legal entities must be registered and known in the data space.
- To represent a legal entity in the data space, an associated business partner number (BPNL) is required.
- The deployment and use of at least one connector (e.g., EDC) per legal entity for data exchange is mandatory.
- The connector negotiates data usage between endpoints (data plane) by synchronizing access and usage policies between data providers and data consumers.
- There is no data processing or reviewing of data within the connector itself.
- Data usage takes place instead at the endpoints of the data providers or data consumers, respectively.
- Data usage with respect to location and assignment to computer instances/platforms is independent of the runtime environment of the connector itself.

There are various options for organizational structures and data exchange scenarios such as “one legal entity and one site in one country”, “one legal entity and multiple sites in one country” or “one legal entity and multiple sites in different countries”. For more details on possible connector usage scenarios, please refer to our [Initial Onboarding Guide](#)⁷. This includes also the different options to obtain a connector, e.g., it can be acquired via an ESP, it can be self-developed

or adapted from open-source, or it can be part of a business application from a BAP. If the data exchange does not take place between several legal entities within Catena-X as defined above, no EDC is required. An example would be the connection of the OSP to the GXDCH. For this connection no connector is needed, because this is not an exchange of data between two legal entities within Catena-X.



06 – How: Data Space Governance

6.1 Standardization

6.1.1 Why do we standardize?

The success of the digital transformation of the automotive industry critically depends on multilateral collaboration between all stakeholders along the automotive value chain. Our growing Catena-X ecosystem will enable enormous amounts of data to be integrated and collaboratively harnessed.

6.1.2 What do we standardize?

The standards of our Catena-X data ecosystem define how the exchange of data and information in our network works. They are the basis for ensuring that the technologies, components, policies, and processes used are developed and operated according to uniform rules. All standards developed for the Catena-X data ecosystem are based on the technological and industry-specific requirements of the automotive industry.

6.1.3 How do we standardize?

Based on [Catena-X's Intellectual Property \(IP\)-Regulations](#) and in compliance with applicable antitrust law, the Catena-X standardization process aims to develop and implement uniform standards for networking and data

exchange in the automotive sector. A general overview of the process is depicted in **Figure 8**:

However, this vision is complex: companies at various stages of the automotive value chain, such as production, delivery, or logistics, often have their own IT systems to manage their data. To ensure that these complex data volumes can be sent, received, and processed smoothly across all stages of the value chain, we need one language for all players: **common standards and frameworks**.

The Catena-X Association publishes standards for generic core and enabling services as well as for domain-specific business applications (see KITS **Chapter 4.4.1**). These standards and artifacts form the basis for the development and operation of software components in the Catena-X network to ensure interoperability and data sovereignty between different software components and providers. All relevant standards are accessible in the [Catena-X standard library](#).

exchange in the automotive sector. A general overview of the process is depicted in **Figure 8**:

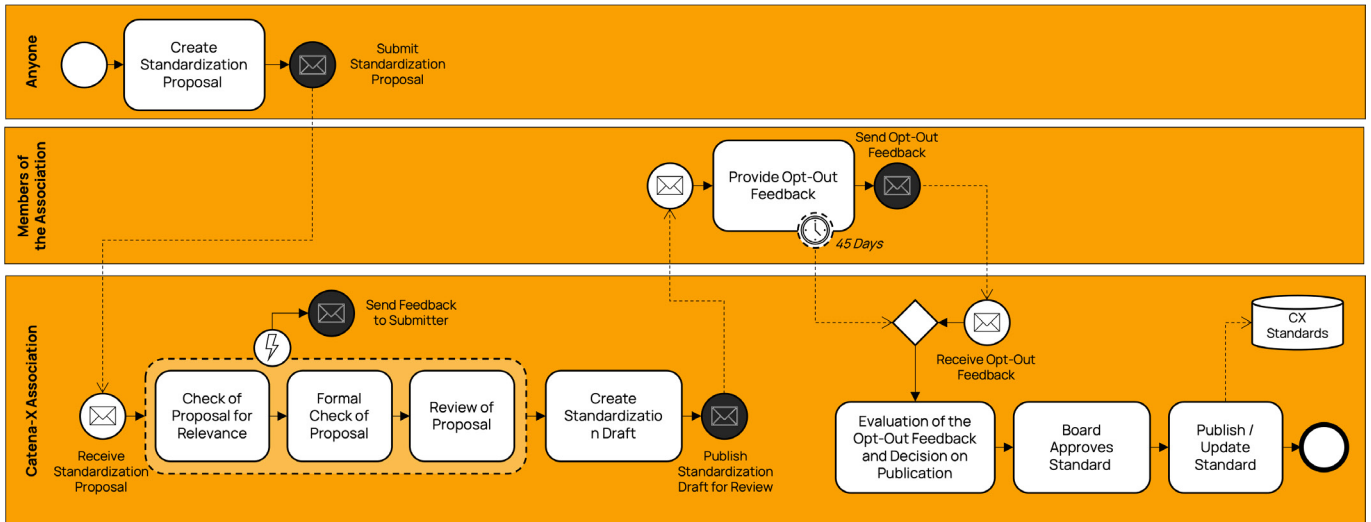


Figure 8 Catena-X Standardization Process

The [Catena-X standardization policy](#) provides a detailed description of how Catena-X standards are being developed including everyone involved and their respective responsibilities.

6.2 Conformity Assessment

6.2.1 Why do we certify?

Cross company interactions highly rely on mutual trust. Our certifications provide trust via transparency and reliability based on our Catena-X standards. By setting up a certification process, we guarantee that our major principles are considered in every component of the network. From the core service providers to the data

connectors and every single application in the network, a consistent framework was created to ensure beneficial participation for all participants in the network. A chain is only as strong as its weakest link, and to gain trust we need to ensure that all links are as strong as possible.

6.2.2 What do we certify?

Catena-X certification is done in a modular, role-based way, to fulfill different requirements of participants in our ecosystem, whether IT application providers, service providers or onboarding partners. The modularity allows high flexibility and lowers the efforts and redundancies for all parties involved.

Catena-X standards become mandatory for certification as soon as they have been integrated into the certification framework. The Catena-X Association aims to release an update of its certification framework simultaneously with newly released standards. The most current version can always be found on the [Catena-X website](#).

6.2.3 How do we certify?

An overview of the certification process is depicted in **Figure 9**.

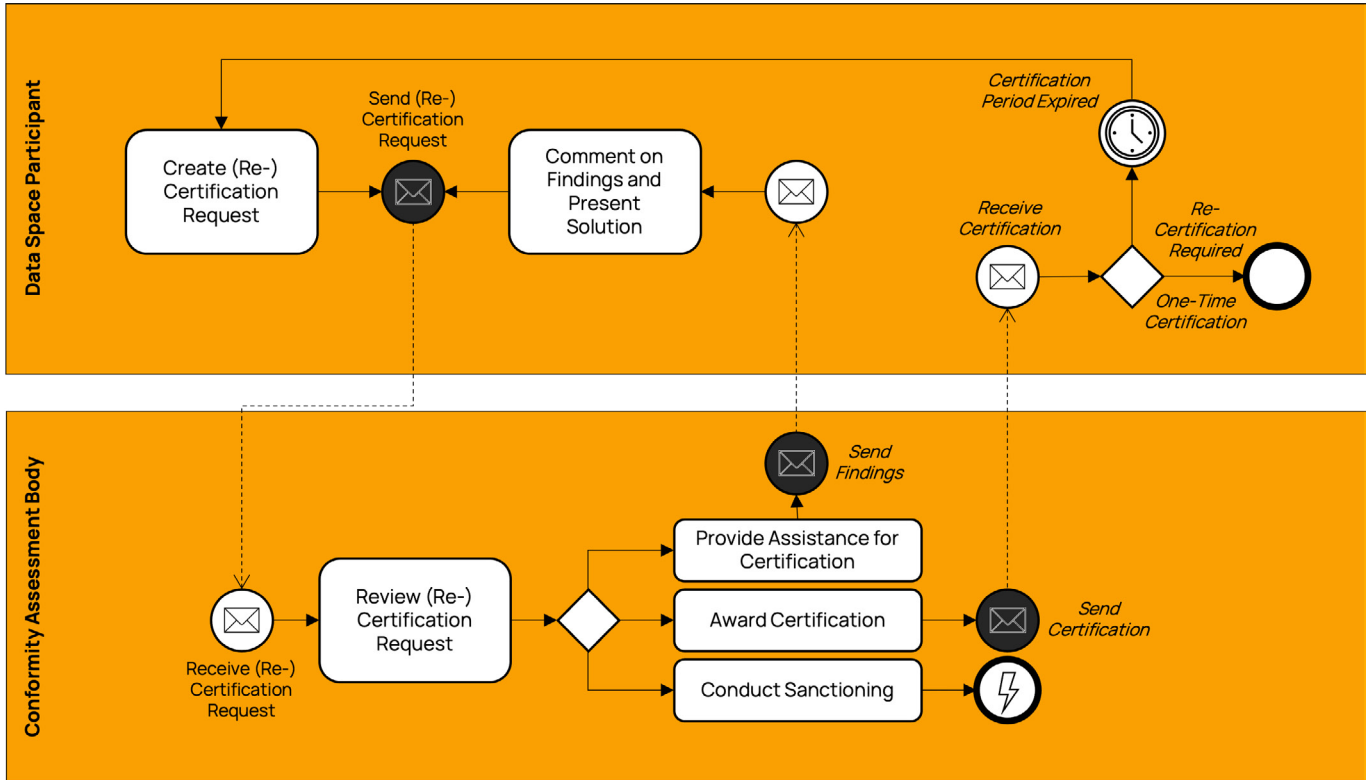


Figure 9 Catena-X Certification Process

The [Catena-X Conformity Assessment Framework Handbook](#) provides a detailed description of how Catena-X conducts conformity assessment through Conformity Assessment Bodies.

6.2.4 Catena-X Labels

Catena-X issues four different labels to help customers find suitable and legitimate providers for their needs. Each label is issued to the relevant role after achieving successful certification and/or qualification. Labels are associated with the offered services of the provider.

Certified Operating Company (CSP-A/CSP-B)



Certified Provider (e.g., BAP, ESP, OSP)



Certified Solution (e.g., Business App, Service...)



Qualified Advisor (Advisory Provider)



Each label is obtained after successful completion of the Catena-X certification or qualification process. Details on pathways to be added.

6.2.5 Exceptions & Timeline for Release 23.09

Release 23.09 is the official GoLive Release of the Catena-X data ecosystem. For the first time, all major components of the Catena-X data ecosystem will be available to the vast majority of the automotive value chain. To fulfil this promise to all our stakeholders while some areas of Catena-X are still under development, certain exceptions are made during this transitional period:

#1

45-day grace period to obtain valid certification after Release 3.2 (23.09)

Catena-X will release a standard update (Release 3.2) on Sept. 28, 2023, on the Catena-X Association website. **This release will include “breaking changes” as defined in the [Semantic Versioning](#)** ↗.

The GoLive of the Catena-X data ecosystem (productive environment) will be **exclusively on Release 3.2**. This will be accompanied by an **update of the certification framework** (“which role needs to have which components certified”) for release 3.2.

Each partner needs to ensure conformity to the new standards to be active in the data space. To this end, the following procedure applies: Every participant in the data space has **45 days after Sept. 28** (grace period) to complete their certification via a CAB or, in case of an existing certification, via free self-assessment. **Deadline is Nov. 12, 2023** (Sept. 28 + 45 days).

Cofinity-X will **allow data space registration** of a partner from GoLive Oct. 16 after consultation with the Association, **subject to the proviso that certification must be completed by the Nov. 12 deadline**. If the certificate is not proven within the 45 days, Partners must be removed from the data space at the direction of the Catena-X Association.

Data space participants and their solutions that were already certified for Release 3.0/3.1 can use the 45-day grace period to prove their compliance to the Association via a **free self-assessment** and thus confirm the validity of their certificate even after release updates (up to a maximum of 12 months after initial issue). A corresponding form including confirmation of conformity with each standard required for the certificate can be requested from info@catena-x.net ↗. This does not apply to a CSP-B.

#2

Certification of business applications vs. internal systems that fall under the definition of a Catena-X business application*

A business application provides specific logic and schemas defined in a Catena-X use case (e. g., data processing, transformation functions) that is applied to input data to produce an expected output. This includes the transformation of data from an input format into an output format using Catena-X semantic models (semantic interoperability) as well as the technical data exchange using standardized protocols and API-specifications (technical interoperability). This does not apply to internal systems of an organization, such as internal databases, data lakes, data pipelines (ETL) or source systems. To become operational on the

Catena-X data space, a business application must comply with the corresponding standards (see **Chapter 7.2**).

Companies connected to Catena-X might want to **connect certain internal systems** including company-internal business applications to the Catena-X network. It remains, however, crucial that all participants can rely on a standardized data exchange that guarantees stable data chains built on data sovereignty and interoperability.

Consequently, the following two principles apply:

Everything that is necessary to uphold a stable data chain is required to follow Catena-X standards and has to be certified by a CAB.

All business applications that are either associated with the Catena-X brand and/or are offered on a Catena-X marketplace are required to follow Catena-X standards and have to be certified by a CAB.

If an internal system fulfills one of these two criteria, a Catena-X certification is mandatory.

* For future reference, to provide a scalable way of certification, additional technical and partially automated solutions of assessing conformity are currently under assessment. (10 votes for, 0 against à also Steve vote for publication)

#3

No Catena-X Business Applications without listing on a certified CX Marketplace

Catena-X is built on trust. Consequently, certified Catena-X marketplaces (CSP-A) are checking, whether services provided are coming with verified credentials to ensure that the listed offer is trustworthy and conform to Catena-X standards.

To further anchor this trust, all Catena-X related business applications and services require a listing on a Catena-X

certified marketplace. Catena-X does not permit operating a Catena-X solution outside of a certified Catena-X market place.

As noted in **Chapter 8.2**, as of release 23.12, Catena-X will provide the technical possibility for multiple CSP-A providers. This will foster multiple verifiers of credentials.

6.3 Nomination Process for unique Roles (e.g., CSP-B)

The nomination process is intended to ensure neutrality and trustworthy execution of selected roles and tasks within the Catena-X ecosystem. The Catena-X Association is responsible for the execution of the nomination process including partner selection.

The various rights and obligations of the provider are described in the Request for Tender (RFT). This is, for example,

the license for operation, which can also be withdrawn in case of unfair behavior. This ensures fair awarding and safe operation of the various components. Tasks include, for example, the operation of Core Services - Section B by Core Service Providers or the certification of providers and solutions by CABs. An overview of the nomination process is depicted in **Figure 10**.

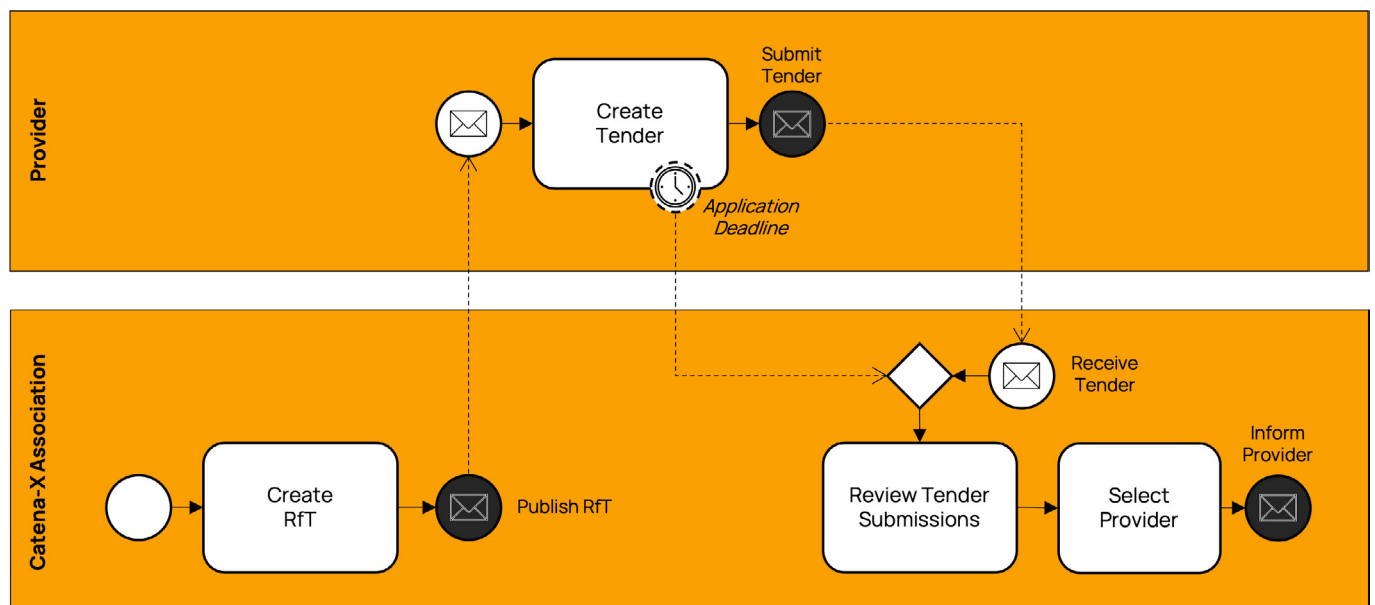


Figure 10 Catena-X Nomination Process

The process steps of the nomination process are described in detail below.

Process Step	Description	Input	Output
Create Request for Tender (RfT)	The Catena-X Association is responsible for the creation of the Request for Tender (RfT) document (e.g., for Core Services - section B)		RfT Document(s)
Publish RfT on Website	The Catena-X Association is responsible for the publication and distribution of the RfT Document on the website ↗ .	RfT Document(s)	RfT Document(s) RfT Event incl. Timeline RfT Template
Create and Submit Tender for selected Core Service(s)	A provider can create and submit a tender for the published RfT.	RfT Document RfT Event RfT Template	Tender
Receive and Review Submissions	The CX Association compares the tender(s), regarding the fulfillment of the nomination criteria and creates a short list of candidates for the board.	Tender(s)	Short List of Provider Candidates
Select Provider	The board of the Association elects a provider with an absolute majority vote.	Short List of Provider Candidates	Nomination of Provider
Inform Providers	The CX Association informs all provider(s) about the result of the nomination process.		

Table 1 Nomination Process Steps

6.4 Qualification Process

6.4.1 Why do we qualify?

On the way to creating value with Catena-X, companies may be dependent on advisory services. The quality of these advisory services is decisive for the success of the participation and thus for the success of Catena-X. Catena-X can only be successful if it succeeds in integrating large parts

of the automotive value chain. We assume that this will lead to a high demand for advisory services, which must be met. These advisory services must cover the needs of small and medium-sized companies as well as the needs of large companies, which have extended integration requirements.

Advisory services are hard, if not impossible, to standardize. Consequently, conformity assessment of qualified advisory services cannot take place through certification. To maintain a consistent level of quality among advisory service providers in the Catena-X data space, the Catena-X Association thus offers a qualification process that is mandatory for all advisory service providers that want to get listed in a marketplace.

6.4.2 Who do we qualify?

Catena-X invites advisory service providers of all kinds to support the successful onboarding of data space participants, SMEs in particular. One of the few prerequisites is the binding commitment to provide high-quality

advisory service providers, like all other participants active on the Catena-X data space, must adhere to the Catena-X regulatory framework and thereby confirm their full and unconditional support of our data ecosystem including its mission and standards.

consulting at fair and reasonable costs. Catena-X supports this endeavor with information and predefined content as well as a qualification system to prove appropriate support and consulting competencies.

6.4.3 How do we qualify?

There are two ways to become a Catena-X qualified advisory service provider.

- 1 Qualification through training
- 2 Qualification through existing experience

to advisory service providers that have gained experience by actively contributing to the Catena-X ecosystem either by directly accompanying companies within the Catena-X beta phase or contributing directly to the Catena-X kick-starter consortium as a listed member. An overview of the qualification process is depicted in **Figure 11**.

For most advisory service providers, the first option applies. Qualification through existing experience is a path offered



Figure 11 Catena-X Qualification Process

As of the Operating Model White Paper v.2.1, the process for qualification through training has yet to be established. It will be released on the Catena-X website as soon as it is available. Qualification through experience applies to all advisory service providers that registered for and participated in the Catena-X beta phase.

If a company is interested in qualification and/or the proof of qualification, the first step is to contact the Catena-X Association via info@catena-x.net. Further information and a first questionnaire to collect basic information about the company will then be made accessible.

6.5 Regulatory Framework

The [Catena-X Regulatory Framework for data space operations](#) outlines the requirements and responsibilities for all stakeholders involved in the Catena-X data ecosystem. It includes detailed information on data sovereignty, mandatory use case requirements, and other regulatory considerations that are relevant and mandatory to our activities.

The Regulatory Framework is made up of individual components that each govern a specific layer of our data space operations. To understand the layers of our Regulatory Framework, Catena-X uses flight levels as a metaphor (see [Figure 12](#)):

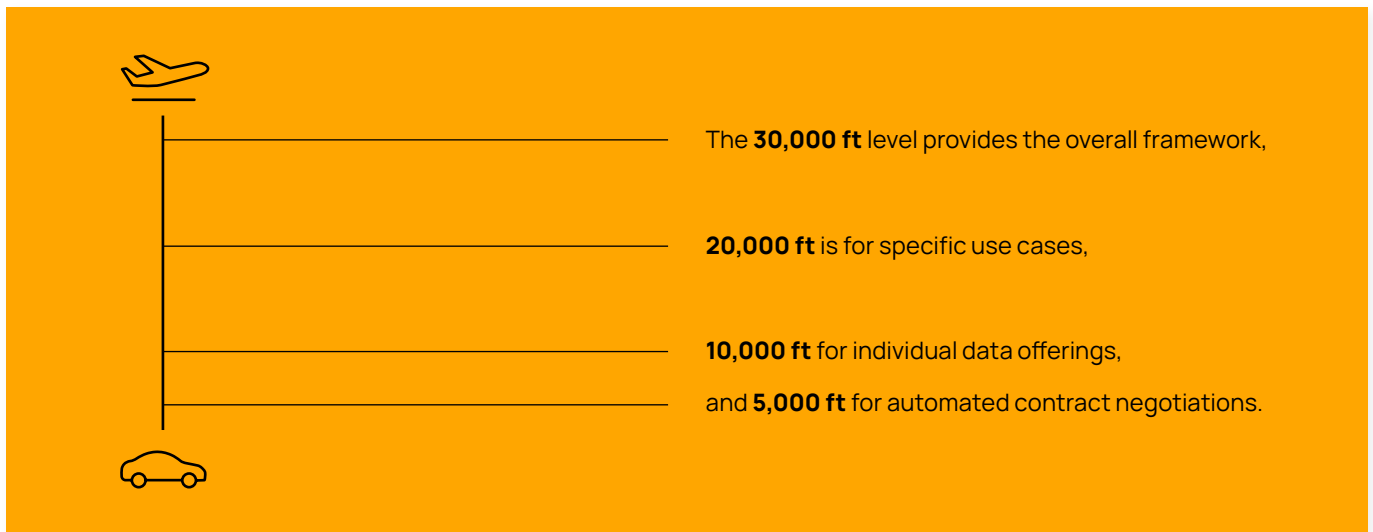


Figure 12 Catena-X Governance Framework flight levels

Each higher-level cascades into the lower ones, and the lower levels align with those above. Each level comes with specific guidelines and resources but also responsibilities for participants in our data space. This Operating Model falls under the 30,000 ft level and is thus mandatory for all data space participants.

Maintaining and updating our Regulatory Framework for data space operations lies within the responsibility of the Catena-X Association. All resources and normative documents included in the regulatory framework are listed on the [Catena-X website](#).



07 – How: Life Cycle Management

Managing versions and changes of different artifacts in federated data spaces is critical to ensure compatibility, interoperability, and security. The life cycle management of the Catena-X ecosystem is coordinated by the Catena-X Association and includes the releases in the Catena-X Association and in the Eclipse Tractus-X Project (see **Figure 14**). It is planned to provide quarterly releases

including **one major** and **three minor** releases per year. Both releases follow calendar versioning (see **CalVer**), whereas their artifacts such as standards, normative documents, products, and KITs follow semantic versioning (see **SemVer**). To ensure backward compatibility in the future (see **Chapter 8.5**), versioning and passing of pre-defined test cases of each individual artifact is mandatory.

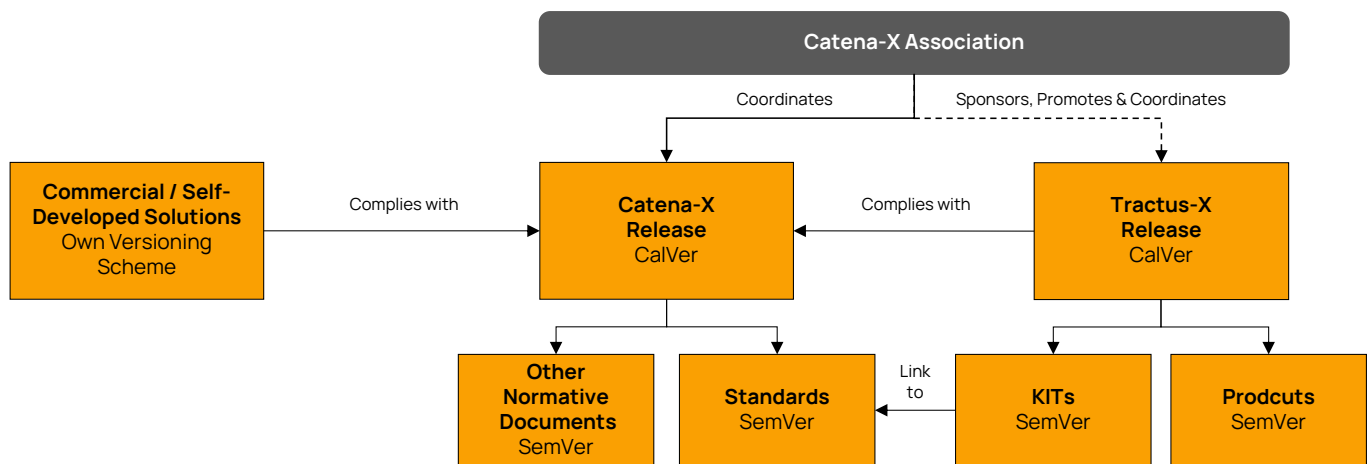


Figure 13 Overview Life Cycle Management

The Catena-X Association release includes all binding and certification-relevant artifacts such as standards (e. g., API-specifications, semantic models) and normative documents for all data space participants. The Tractus-X release contains all open-source products (including services or helm charts) of the cxOS and business applications as well as KITs. In addition, there are various commercial or self-developed solutions for business applications and services following individual release cycles and versioning schemes.

Both the Tractus-X release and any commercial or self-developed solutions must adhere to Catena-X standards and other relevant normative documents.

Open-source products are required to fulfill the Tractus-X release guideline (TRGs) and take part in our integration tests to be part of a quarterly Tractus-X release. For critical issues (e. g., security issues), hot fixes may be released to fix a bug in the active Catena-X operating system that interrupts the normal release cycle.



08 – Outlook

The Catena-X Operating Model is a normative document within the regulatory framework, which is binding for all participants in the Catena-X data space. It describes the status of our data space artifacts, including roles, services, and processes along with their respective roadmaps. As Catena-X is an ongoing journey, all of these artifacts will continuously evolve to promote broader adoption and scalability, ensuring maximum interoperability, and (data) sovereignty.

8.1 Industry Core

The Industry Core aims to reduce the complexity of multi-tier connections within the decentralized Catena-X data space and to act as an enabler for data-driven use cases like tracking a product carbon footprint (PCF) value or circular economy. Reusing common components and standards (especially data provisioning of digital twins of parts) across different use cases promotes efficiency and

interoperability. To enable onboarding for corporations that have different legal entities, concepts for a corporate BPNL are also created. This enables a simple participation via a company-group-wide BPNL. The industry core fosters the realization of seamless data chains, with one use case benefiting from another. As a result, cross-domain network effects and n-tier use cases become possible.

8.2 Increase Decentralization of Core Services

Catena-X follows a business-oriented decentralization approach that aims to achieve interoperability and data sovereignty while balancing manageability of complexity, and technical maturity. Therefore, Core Services B will

gradually transition into onboarding services or Core Services A, if appropriate. Please find below the timeline for the upcoming decentralization of Core Services B (see [Figure 14](#)).

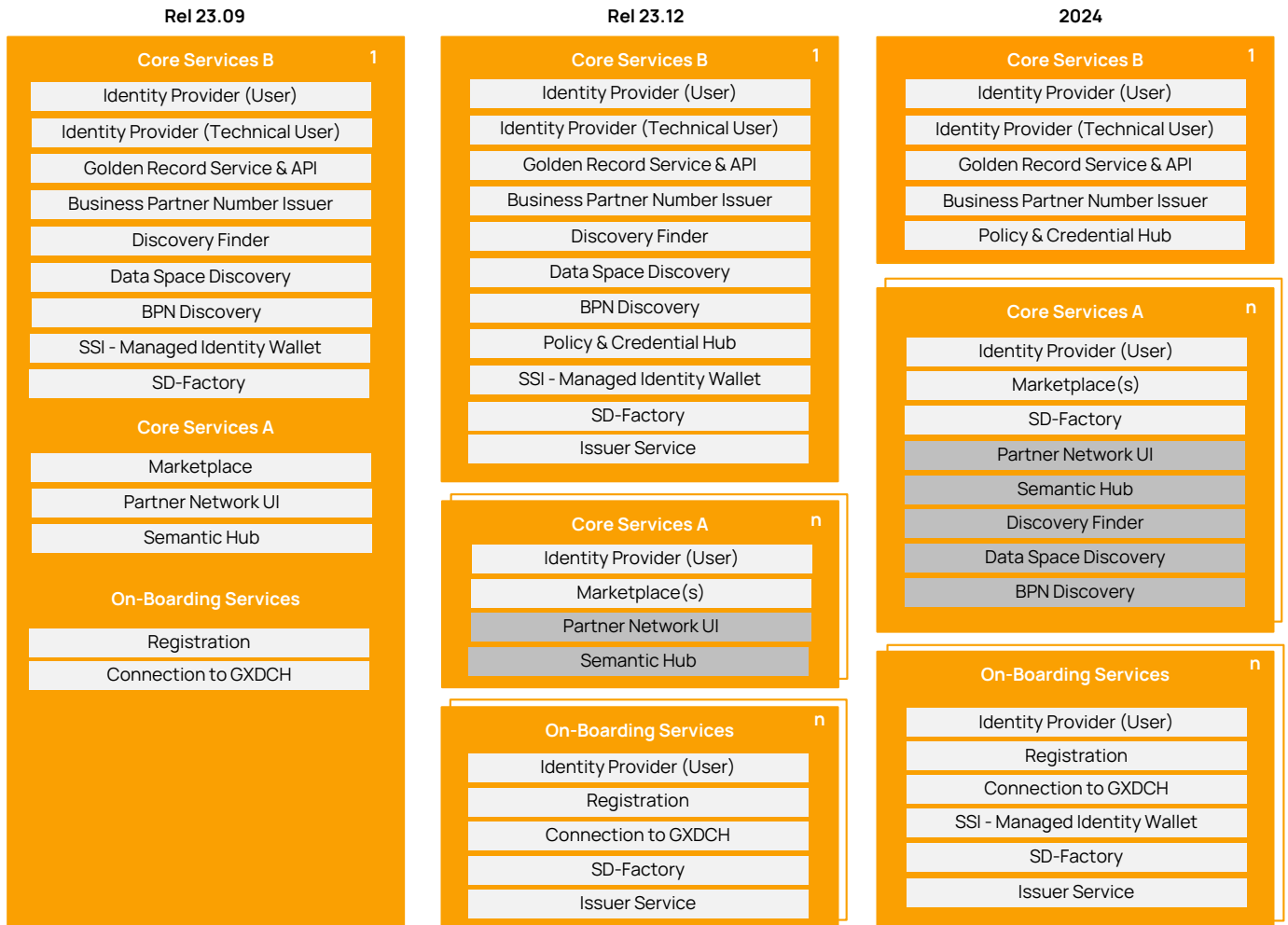


Figure 14 Timeline for further Decentralization

Provider
Mandatory
Optional min.1

Release v23.09

Due to organizational and technical limitations, the services associated with the CSP-A and OSP roles can only be operated once and must therefore temporarily be offered by the nominated CSP-B.

Release v23.12 (planned)

With the introduction of new identity synchronization functions, multiple CSP-A and OSP can operate the corresponding services and collaborate. In addition, there will be new CSP-B services such as the Policy and Credential Hub.

Releases 2024 (planned)

With an increasing decentralization of services, Core Services B are shifted step by step to Core Services A and the decentralized portfolio of Onboarding Service Provider likewise increases. For future releases, committees, expert, and working groups will be coordinated to develop a detailed decentralization roadmap under the supervision of the Catena-X Association.

8.3 Further Integration of SSI Technologies

To realize the Catena-X vision of a decentralized data space, we will further develop our SSI technologies. Future releases will enable the use of both managed identity wallets and self-provisioned identity wallets. To enable the technical enforcement of policies, it is planned to introduce a policy hub and policy code templates to also provide the information transparently to the participants. This also includes the decentralization of the issuer service and logging functionality for agreements. To further strengthen trust in the data space, we will introduce the option to define

various root trust anchors (e.g., the Catena-X Association). This will also allow the identity wallet to be decentralized and allow multiple issuers. In addition, a chain of trust will be established to prove that a given credential comes from a trusted source according to the Catena-X Governance Framework. The concept is still under development and will be released in one of the next versions (by May 2024). While developing this concept, the concepts of the Policy Hub and the Certifications Hub will also be concretized. An illustration of this can be found in **Chapter 10.2**.

8.4 Data Space Interoperability

The Catena-X Association is committed to promote and engage in various initiatives that focus on creating common guidelines and standards to ensure interoperability with other data space initiatives. Initiatives such as the Data Space Support Centre (DSSC) and Manufacturing-X will help establish an interoperable data space across

different industry sectors. Furthermore, the Catena-X Association will drive technical initiatives, such as the Eclipse Tractus-X project and the Eclipse Dataspace Working Group (EDWG), which aim to align a common technical foundation, certification procedures and test/security requirements.

8.5 Backward Compatibility

The vision of the Catena-X data space is to provide seamless data access and creation of data chains across multi-tier value chains. Initially, the data space can be operated and evolved by deployment of dedicated, synchronized releases (see **Chapter 6**). While initially, dedicated, synchronized releases (see **Chapter 6**) may suffice, our goal of involving

thousands of partners makes it impossible to maintain the same technical components across the board. To overcome this challenge, we must ensure that the release and upgrade of dedicated components can be executed independently, without causing disruptions in the network connectivity and data chains.

To achieve this in areas such as APIs, semantic models, and procedural specifications, the Catena-X Association promotes and supports adherence to the following principles:

Continuous revising of standards to ensure compatibility between different versions and releases.

Developing technical specifications and reference implementations in Eclipse Tractus-X that follow the required standards to lay the technical foundation.

Coordinating closely with different **operators** to execute rollout and implementation of the different versions and releases.

8.6 Sanctions

Following its GoLive, the Catena-X data space will grow in participants and complexity. Consequently, ensuring compliance of all participants with established rules, regulations, and standards becomes increasingly relevant.

Moving forward, concepts of imposing restrictions or penalties on individuals, organizations, or entities that

engage in actions or behaviors that are deemed harmful, illegal, or unethical within the context of data management, privacy, and security will be evaluated and developed.

These sanctions will aim to deter, correct, or punish non-compliant behavior, thereby safeguarding data integrity, protecting individual rights, and maintaining the trust and credibility of the data ecosystem.



09 – Glossary

AAS	Asset Administration Shell
AP	Advisory Provider
API	Application Programming Interfaces
BAP	Business Application Provider
BPN (BPNL, BPNA, BPNS)	Business Partner Number (Legal Entities, Addresses, Sites)
CAB	Conformity Assessment Body
CAC	Conformity Assessment Criteria
COTS	Commercial-off-the-Shelf (Software)
CSP-A	Core Service Provider A
CSP-B	Core Service Provider B
cxOS	Catena-X Operating System
DAPS	Dynamic Attribute Provisioning Service
DDTR	Decentralized Digital Twin Registry
DSSC	Data Space Support Center
EDC	Eclipse Data Space Components
EDWG	Eclipse Data Space Working Group
ETL	Extract, Transform, Load (Process)
GXDCH	Gaia-X Digital Clearing House
IAM	Identity and Access Management
IDSA	International Data Spaces Association
IRS	Item Relationship Service
MIW	Managed Identity Wallet
PCF	Product Carbon Footprint
RfT	Request for Tender
SaaS	Software-as-a-Service
SSI	Self-Sovereign Identity
TRG	Tractus-X Release Guideline
OSP	Onboarding Service Provider
VC	Verifiable Credential
VP	Verifiable Presentation



10 – Appendix

10.1 Role Relationships

Overview of mandatory (M) and optional (O) relationships between roles (release 23.09)

	CSP-A	CSP-B	OSP	DPC	ESP	BAP	AP	CAB	C-X
CSP-A	M	M	M	-	-	-	-	M	-
CSP-B	M	-	M	-	-	-	-	M	M
OSP	M	M	M	-	-	-	-	M	-
DPC	O	M	M	M	O	O	O	M	-
ESP	O	M	M	-	-	-	-	M	-
BAP	O	M	M	-	-	-	-	M	-
AP	O	O	M	-	-	-	-	-	M
CAB	-	-	-	-	-	-	-	-	M

Overview of mandatory and optional relationships between roles.

Relationship	Description
IAM-Sync	The IdP is a service responsible for storing and verifying user identities. Its objective is to enable user access to all IAMs of Catena-X operators as soon as they onboard themselves and receive a user in an IAM. Achieving this requires synchronization of each IAM with every other one, a process known as Identity-Sync, which involves both regular users and technical clients.



Relationship	Description
Integration	<p>Technical integration is required to use Core Services Section B of the CSP-B. The other parties must have access to the services to be able to offer their services. The technical integration refers to an API. This includes documentation, access data, definition of commercial aspects and SLAs.</p> <p>To fully utilize Core Services B of the CSP-B, it is required to perform technical integration with the related APIs. This integration is necessary for enabling other data space participants to access the services to provide their own services. This also includes to provide documentation, access credentials, and define commercial aspects and SLAs for other related services to ensure smooth functionality.</p>
Onboarding	<p>The onboarding enables either existing customers in other networks or interested parties to access the Catena-X data space (Trusted Access Point). This is the technical connection and registration of the participants. With the successful completion of the onboarding, the participant is part of Catena-X and can use the network.</p>
Certification	<p>When certified by a CAB, the party is audited against the Catena-X standards. These independent third parties ensure security and in-teroperability.</p>
Nomination	<p>The nomination process is designed to ensure neutrality and trustworthy execution of selected roles and tasks within the Catena-X ecosystem. The various rights and obligations of the operator are described in the Request for Tender (RFT).</p>
Qualification	<p>With the qualification, the Catena-X Association ensures that there is a uniform level of quality and service of the various providers. This creates security and trust for the users of the services.</p>
Trademark Rights	<p>With the different qualifications and certifications, the respective parties receive different Catena-X labels. With these they can identify themselves and use them for illustration. The Catena-X Association holds the trademark rights to the labels and Catena-X itself.</p>
Use	<p>Within Catena-X, a participant can use different offers from service providers (AP, ESP, BAP). These are certified applications. Alternatively, they can certify and operate them by themselves, but then it would not use services. The offers can be SaaS solutions or local deployments.</p>

10.2 Data Exchange based on SSI - Next Steps

Catena-X Policies as part of the Data Exchange

(please note the image below covers own as well as managed Wallet solutions; the credential request flow is not displayed since no changes are planned so far)

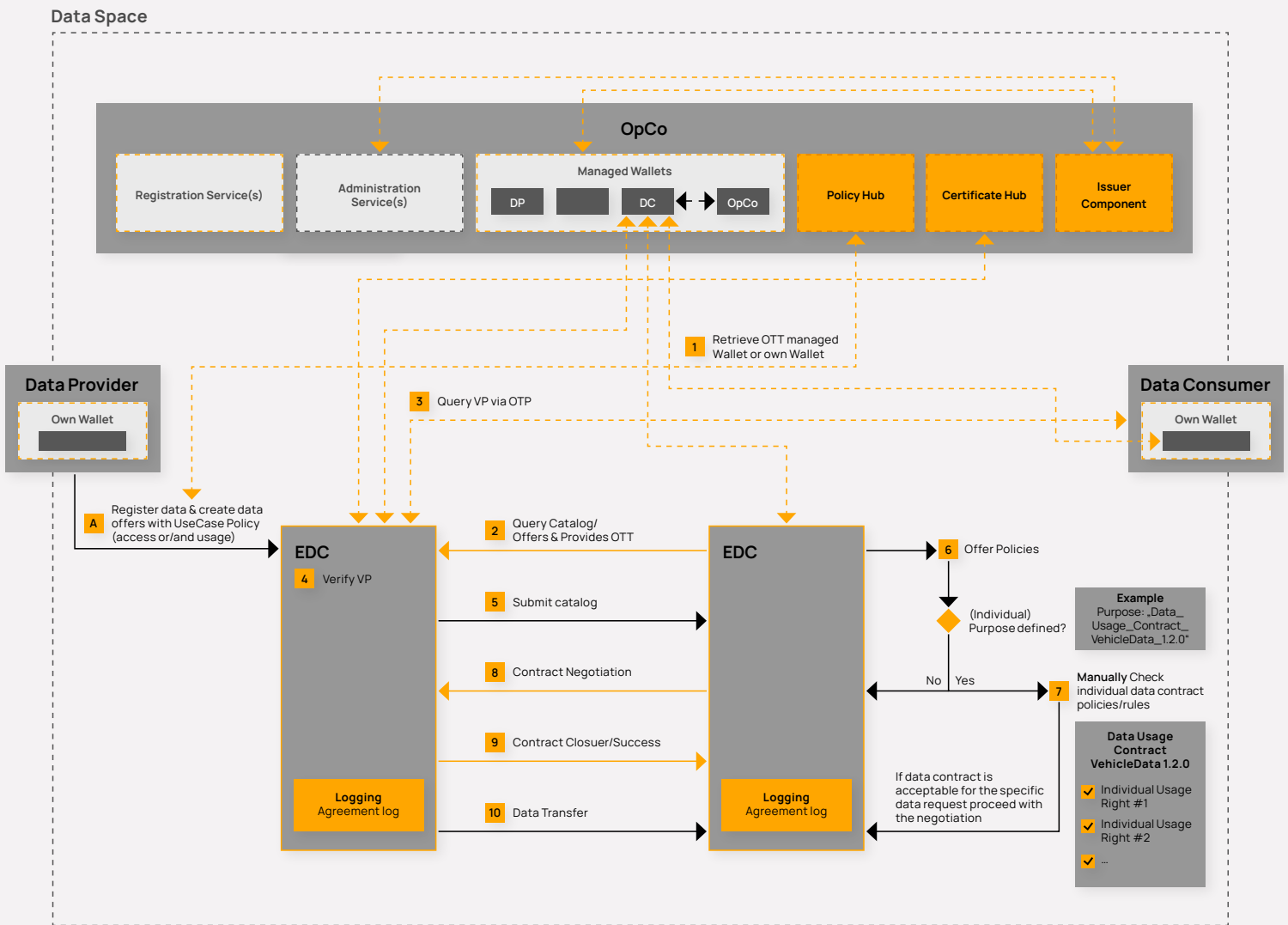


Figure 15 Further development of the data exchange based on SSI



11 – Change Log

Version 2.1 - 09.10.2023

Added

- Role: Catena-X Automotive Network e.V.
- Service Map: Onboarding Service Category
- Data Space Operations: Providing information, guidelines, and premises on how to participate and exchange data in the data space:
 - General Onboarding Process
 - Gaia-X Compliance
 - SSI Issuer Concept
 - Data Exchange based on SSI
 - EDC Deployment and Usage Premises
- Life Cycle Management:
 - Versioning
 - Backward Compatibility
- Data Space Governance:
 - Qualification Process
 - Exceptions

Changed/Updated

- Introduction: clarity and readability improvements
- Roles:
 - Re-naming of consulting provider to advisory provider
 - Detailing the description of all roles with responsibilities, respective relationships, prerequisites, and complements
- Service Map: Update of service map according to Tractus-X release 23.09
- Standardization process: reference provided to standardization policy that details the Catena-X standardization process further
- Certification process: reference provided to Conformity Assessment Framework that details the Catena-X certification process further
- Labels: Removed distinguishing factors between Certified Operating Company and Certified Partner
- Outlook: updated according to release 23.09

Unchanged

- Nomination Process

Catena-X Automotive Network e.V.
Reinhardtstr. 58, 10117 Berlin
Germany

Tel: +49. 030.5360.7799

E-Mail: info[[@](mailto:info@catena-x.net)]catena-x[.]net

Register of associations at the district court Berlin
(Charlottenburg) Nr D1537

Authorized representatives of the board:

Oliver Ganser (Chairman)

Prof Dr. Boris Otto (Vice Chairman)

Claus Cremers (Treasurer)