

**CATENA-X**  
STANDARD



**CX - 0005 Item Relationship API v.1.1.2**

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## ABOUT THIS DOCUMENT & MOTIVATION

Catena-X is the first open and collaborative data ecosystem. The goal is to provide an environment for the creation, operation, and joint use of end-to-end data chains along the entire automotive value chain. All partners are on an equal ground, have sovereign control over their data and no lock-in effects occur. This situation provides a sustainable solution for the digitalization of supply chains, especially for medium-sized and small companies, and supports the cooperation and collaboration of market participants and competitors.

The ever-growing Catena-X ecosystem will enable enormous amounts of data to be integrated and collaboratively harnessed. To ensure that these complex data volumes can be sent, received, and processed smoothly across all stages of the value chain, one language for all players: common standards. The standards of the 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, and processes used are developed and operated according to uniform rules.

Common standards create added value for all partners: Within our network, data flows more smoothly through interfaces. In addition, we avoid cumbersome individual IT solutions for sharing data with other partners. In the field of international

standardization, Catena-X follows the proven international standardization institutions: ISO/IEC/ITU and CEN-CENELC/ETSI.

For users and data providers, implementation of standards will reduce the costs that would arise from adapting different systems. In addition, no important data is lost. On the contrary, it even becomes easier to collect data across companies. For operators and developers, standards will create a framework that provides reliable orientation and planning security.

The following document describes one of the standards used in the Catena-X ecosystem and the requirements needed to implement it. Here, it serves as main resource to illustrate the following data model. It contains information starting from the format of the model, up to the conceptual and physical model. The standardisation of the data model will enable faster information sharing and homogeneity throughout the entire Catena-X ecosystem.

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## ABSTRACT

\*\*Today, a large amount of data is stored among different participants in a supply chain of an industry. The value of the data can be enhanced immensely by connecting the data to their related context.

To enable cross-enterprise linked data, standards such as aspect models, standardized protocols, and standardized ways to connect the data are applied. One of the first FOSS solutions to be developed in Catena-X for accessing cross-enterprise linked data is the Item Relationship Service. This document aims to standardize the API of the service so that any new participant can access this interface to build new solutions based on data chains. Connected data, so-called data chains, are seen as a valuable asset for the consortia that serve as an enabler technology for other use cases to build solutions on.\*\*

## 1. INTRODUCTION

### 1.1 AUDIENCE & SCOPE

*This section is non-normative*

List for which roles the standard is relevant:

- Core Service Provider
- Data Provider / Consumer
- Business Application Provider
- Enablement Service Provider
- Consulting Services Provider

This standard applies for applications, which want to access Data Chains, and provide an interoperable solution for the Catena-X Network. To the time being of writing this document there are Traceability Aspect Models which build data chains. So, this applies to the Traceability Business Domain.

### 1.2 CONTEXT

*This section is non-normative*

This standardization is built upon existing standards, such as

- "Traceability-BoMAs-BuiltTriangle" [CX-0060]
- "Aspect Model: SerialPartTypization" [CX-0019]
- "Aspect Model: AssemblyPartRelationship" [CX-0020]
- "Aspect Model: Batch" [CX-0021]
- "TraceabilityDataProvisioningBoMAs-PlannedTriangle" [CX-0061]
- "Aspect Model: SingleLevelBomAsPlanned" [CX-0042]
- "Aspect Model: PartAsPlanned" [CX-0043]
- "Implementation Specification: Data Provisioning for Release 2" [CX - 0024]
- "Eclipse Dataspace Connector (EDC)" [CX-0018]
- "Digital Twins in Catena-X" [CX-0002]

further Aspects which conclude in connecting Digital Twins between each other will be added to the Semantic Hub.

Currently, no open standard exists, which addresses this issue, based on the combination of the used standards like Aspect Models, AAS (AssetAdministrationShell), EDC (Eclipse Dataspace Connector), and the Implementation specification it is a solution fit to the needs of Catena-X to simplify the interactions with data chains.

This API has been designed to provide interoperability within Catena-X on a Data Chain layer. Currently, this is being developed in the Tractus-X Eclipse FOSS project.

The IRS iterates through multiple digital twin aspects, which are representing a relationship. An example aspect is the AssemblyPartRelationship aspect, which connects serialized parts with each other, across company boundaries. This service is accessing the aspects of digital twins for which an EDC policy and data contract must exist.

The following general conditions apply:

- Access control through policies and contracts by the EDC
- Direct data exchange between supply-chain partners
- Catena-X partners of the accessible value chain are known to the data-consumer

### **1.3 ARCHITECTURE OVERVIEW**

*This section is non-normative*

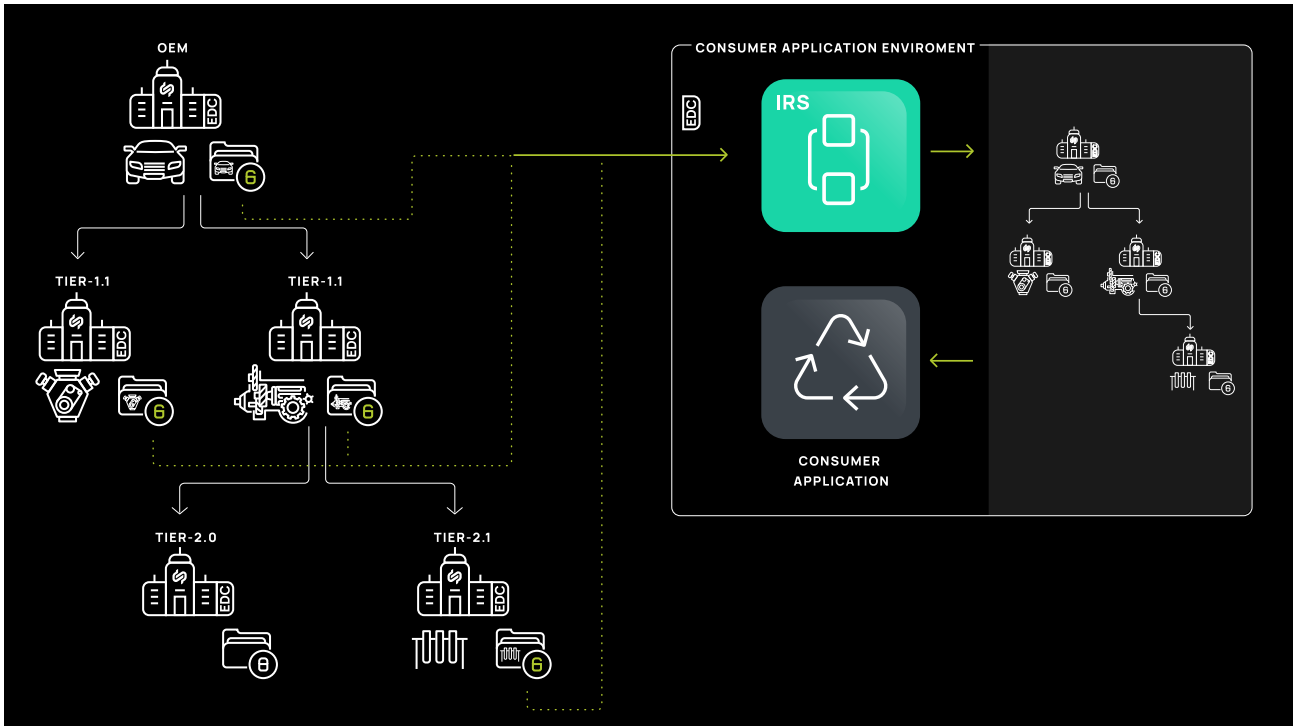


Figure 1: IRS Iterative

## 1.4 CONFORMANCE

As well as sections marked as non-normative, all authoring guidelines, diagrams, examples, and notes in this specification are non-normative. Everything else in this specification is normative.

The key words **MAY**, **MUST**, **MUST NOT**, **OPTIONAL**, **RECOMMENDED**, **REQUIRED**, **SHOULD** and **SHOULD NOT** in this document are to be interpreted as described in BCP 14 [RFC2119] [RFC8174] when, and only when, they appear in all capitals, as shown here.

## 1.5 PROOF OF CONFORMITY

*This section is non-normative*

All participants and their solutions will need to prove, that they are conform with the Catena-X standards. To validate that the standards are applied correctly, Catena-X employs Conformity Assessment Bodies (CABs).

To proof conformity with the IRS API Standard provide the following assets to a conformity assessment body:

- API Response of the Implementation matches to the response structure of the API Documentation
- API maps to the IRS standard workflow for building Data Chains

## 1.6 EXAMPLES

Examples and further information are being shared in the [Data Chain KIT](#) and in the [Tractus-X Github Repository](#).

## 1.7 TERMINOLOGY

*This section is non-normative*

Business Partner Number (BPN) : A BPN is the unique identifier of a partner within Catena-X

InternationalDataSpace(IDS) : InternationalDataSpace and its protocol for data exchange foresees an compliant connector handling contract negotiations before each data transfer and defines a general architecture for data exchange.

EclipseDataspaceConnector(EDC) : The EDC is a reference implementation for an IDS compliant connector currently acting as a de-facto standard and/or reference Implementation within Catena-X

Additional terminology used in this standard can be looked up in the glossary on the association homepage.

## 2. Item Relationship Service API

*This section is normative*

The IRS API follows the Apache 2.0 licenses. The Item Relationship Service API is implemented as a RESTful API following the OpenAPI 3.0 specification in JSON format. It covers initiating, retrieving, and controlling the lifecycle of a data chain retrieval processes. We use OpenAPI standard to align on the industry standards for illustrating RESTful APIs.

### 2.1 PRECONDITIONS AND DEPENDENCIES

The IRS API **MUST** be published behind the Consumer EDC, so that all policies and data contracts from the data consumer apply.

The data accessed and consolidated via the IRS **MUST** be accessible via EDC Assets by data providers; "Eclipse Dataspace Connector (EDC)" [CX-0018] and be registered via the Registry Service (Digital Twin Registry) [CX-0002].

### 2.2 API SPECIFICATION

#### 2.2.1 API Endpoints & resources

The API **MUST** be implemented as specified in the openAPI documentation as stated here: <https://github.com/eclipse-tractusx/item-relationship-service/tree/v1.0.0/api>

#### 2.2.2 Available Data Types

The API **MUST** use JSON as the payload transported via HTTPS(TLS).

#### 2.2.3 EDC Data Asset Structure

Not applicable for this document

#### 2.2.4 Error Handling

The following http response codes **MUST** be defined for IRS API endpoints:

- 200**: The request succeeded
- 206**: This is sent when a partial result of a resource is being sent.
- 400**: Bad Request
- 401**: Unauthorized
- 403**: Forbidden
- 404**: Not Found

More information can be extracted from the openAPI document referenced above.

## 3 REFERENCES

### 3.1 NORMATIVE REFERENCES

Digital Twins in Catena-X [CX-0002]  
Eclipse Dataspace Connector (EDC) [CX-0018]  
Aspect Model: AssemblyPartRelationship [CX-0020]  
Implementation Specification: Data Provisioning for Release 2 [CX - 0024]  
Aspect Model: SingleLevelBomAsPlanned [CX-0042]  
Traceability-BoMAs-BuiltTriangle [CX-0060]  
TraceabilityDataProvisioningBoMAs-PlannedTriangle [CX-0061]

### 3.2 NON-NORMATIVE REFERENCES

*This section is non-normative*

Aspect Model: SerialPartTypization [CX-0019]  
Aspect Model: Aspect Model: Batch [CX-0021]  
Aspect Model: PartAsPlanned [CX-0043]  
Item Relationship Service (Publication on website)

### 3.3 REFERENCE IMPLEMENTATIONS

*This section is non-normative*

The code found at <https://github.com/eclipse-tractusx/item-relationship-service> represents a reference implementation that implements this standard.

## ANNEXES

### FIGURES

*This section is non-normative*

### TABLES

*This section is non-normative*