

CATENA-X
STANDARD



CX - 0036 Semantic Model: Quality Task

BUSINESS DOMAIN: PLM & QUALITY

USE CASE: LIVE QUALITY LOOPS

Contact: standardisierung@catena-x.net

Note: Please specify the platform capability in the email subject line.

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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 reference implementations 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. Defining the data model as a reference implementation enables faster information exchange and homogeneity across the Catena-X ecosystem.

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¹ https://catena-x.net/fileadmin/user_upload/Vereinsdokumente/Catena-X_IP_Regelwerk_IP_Regulations.pdf

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¹ <https://catena-x.net/de/standardisierung/catena-x-einfuehren-umsetzen/standardisierung/standard-library>

MANAGEMENT SUMMARY

The Catena-X use case Live Quality Loops (QAX) provides the ability to detect quality issues the earliest possible to start root cause analyses and/or to enable an early warning feature for new quality topics. In subsequent steps, counter measures can also be defined earlier and monitored. In sum, this reduces the number of vehicles affected by quality issues and increases the availability of the vehicle and built-in components. Catena-X use case Live Quality Loops is powered by Catena-X standard core components to share data from OEM and suppliers based on data sharing agreements and usage policies.

The Catena-X use case Live Quality Loops (QAX) uses multiple data models to exchange data between automotive manufacturer (OEM) and component supplier (TIER1). Each of these data models can be supplied independently.

The QualityTask data model defines the root element for Catena-X-based quality work. It describes the quality task and why two or more companies want to work on collaboratively on a quality topic.

1 INTRODUCTION

A quality topic has different natures: Proactive quality and reactive quality work.

Example for proactive quality work: A component supplier (TIER1) releases a new component for a vehicle. The TIER1 delivers this component to an automotive manufacturer (OEM). The OEM launches a new vehicle model with this component.

For both companies the end-user experience of this component/of the new vehicle is key. Therefore, they align in a Catena-X QualityTask to exchange anonymized component performance data from the real vehicle to closely track the behavior of this component. They use Catena-X core infrastructure to exchange relevant data and start the collaborative quality monitoring.

Example for reactive quality work: More and more end-customers are complaining about a potentially faulty component in a specific vehicle model. The component supplier (TIER1) and the automotive manufacturer (OEM) are defining a Catena-X QualityTask to eliminate this quality topic.

They use Catena-X core infrastructure to exchange relevant data and start the collaborative quality work to define countermeasures for the root cause(s).

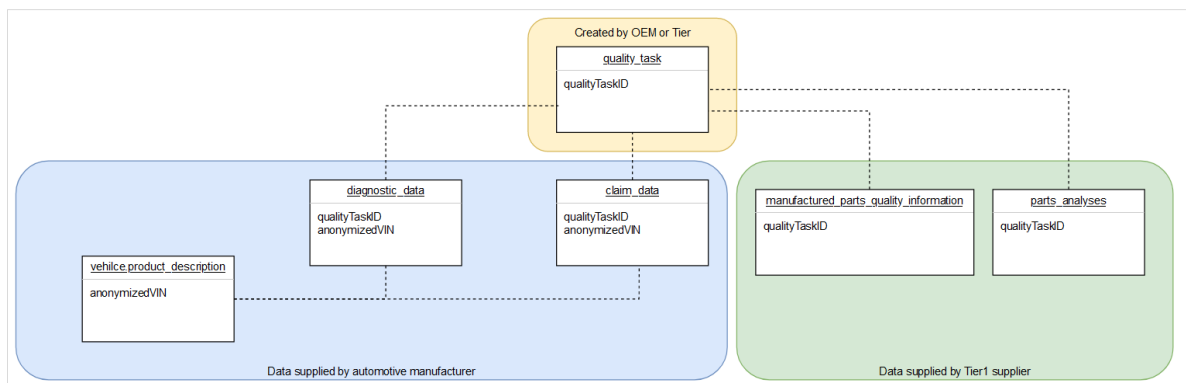


Figure 1: Hierarchy of Catena-X Live Quality Loops data models

Data models in QAX and their content:

- **QualityTask** is the root element and describes why companies are working together on a quality topic and what they want to do. All involved companies and their contact people are named. In addition, a flag tells what should be done with exchanged data after a QualityTask is closed.
- **Vehicle.ProductDescription**: This data model is a representation of one vehicle affected by this QualityTask. The model represents the vehicle when it was sold to the end-customers from an end-customers point of view: Which standard equipment was installed in the vehicle and which extra equipment was installed in the vehicle.

- Fleet.DiagnosticData: Diagnostic data coming from multiple vehicles that are affected by this QualityTask + Diagnostic data from similar vehicles that are not affected by this QualityTask.
- Fleet.ClaimData: Customer complaints that are linked to this QualityTask + Data about the exchange of potentially faulty parts
- ManufacturedPartsQualityInformation: A selection of manufacturing-related parameters that help to solve the QualityTask
- PartsAnalyses: Analyses results of replaced and potentially faulty parts that are linked to this QualityTask

2 PURPOSE OF THE DOCUMENT

The purpose of this document is to create familiarity with the Catena-X use case Live Quality Loops (QAX) and the Catena-X data models that were defined by QAX. The QualityTask is the root element of the Catena-X Live Quality Loops models and describes the reason and the procedure of a quality action. The reader of this document should be able to understand the core principles of this Catena-X data model.

The creator of a QualityTask uses the properties title, description and component (automotive component) to define why multiple companies are working together and on what they are working on. To have a reference on all involved companies, a list of company entities is included. Each company is defined by the business partner number of Catena-X, a description and an e-Mail address of a contact person.

All companies and contact people involved are mentioned. In addition, a flag tells what happens with exchanged data after a QualityTask is closed. What should be done with the transferred data is defined in the property dataDeletion – the default is “delete-data-after-closing”. This means a company has to delete all transferred data from another company after a QualityTask reached the status “Closed”.

3 SCOPE OF THE IMPLEMENTATION

This chapter serves to situate the given reference implementation, to outline its prerequisites and to point out its limitations.

3.1 PRECONDITIONS AND DEPENDENCIES

Like all Catena-X data models, this model will be available in a machine-readable format on GitHub¹.

This aspect model is written in BAMM 2.0 as a modeling language, which is a separate industry standard from the open manufacturing platform, see Open Manufacturing².

The data contained in this Catena-X data model is requested and exchanged via Catena-X using an Eclipse Dataspace Connector (EDC), which is a separate Catena-X standard and an implementation of the IDSA standard.

The recommendation is to use Apache parquet⁴ file format together with EDC S3 data plane for file data exchange.

3.2 CONSTRAINTS AND LIMITATIONS

There are no constraints and limitations to this reference implementation document.

3.3 LICENSE

This Catena-X data model is an outcome of the Catena-X use case group Live Quality Loops (QAX). This Catena-X data model is made available under the terms of the Creative Commons Attribution 4.0 International (CC-BY-4.0) license, which is available at Creative Commons³.

¹ <https://github.com/eclipse-tractusx/sldt-semantic-models>.

² <https://openmanufacturingplatform.github.io/>

³ <https://creativecommons.org/licenses/by/4.0/legalcode>

⁴ <https://parquet.apache.org/>

4 DATA MODEL QUALITY TASK

The data model is described in BAMB and is available in the semantic hub, from which the following description originates.

4.1 OVERVIEW

The data model can be described in different formats. The graphical representation of this data model can be found in the annex.

QualityTask	
Description	A quality task (qTask) defines why data is exchanged between two or more companies and what insights should be generated out of the transferred data. In addition, there is a flag what happens with the transferred data when this qTask is closed.
Name	QualityTask

4.2 PROPERTIES

A property of a BAMB Aspect Meta Model represents a named value and the following are the properties that refer to the aspect of the model.

qualityTaskId	
Description	An unique quality task identifier for this quality task. Each company generates their own quality task ids using the Catena-X business partner number.
Name	q-Task ID
Characteristic	bamm-c:Text
Optional	No
In Payload	Yes
Payload Key	qualityTaskId

status	
Description	Status of this quality task
Name	Status
Characteristic	bamm-c:Enumeration
Optional	No

In Payload	Yes
Payload Key	status
Enumeration	"new" "in progress" "completed" "closed"

creationDate	
Description	Timestamp when this quality task was created
Name	Creation Date
Characteristic	bamm-c:Timestamp
Optional	No
In Payload	Yes
Payload Key	creationDate

title	
Description	Working title for this quality task
Name	Title
Characteristic	bamm-c:Text
Optional	No
In Payload	Yes
Payload Key	title

description	
Description	Description what should be done in this quality task
Name	Description
Characteristic	bamm-c:Text
Optional	No
In Payload	Yes
Payload Key	description

component	
Description	The component that should be investigated in this quality task
Name	Component
Characteristic	bamm-c:Text

Optional	No
In Payload	Yes
Payload Key	component

dataDeletion	
Description	What should be done with the data after this quality task is closed
Name	Deletion policy
Characteristic	bamm-c:Enumeration
Optional	No
In Payload	Yes
Payload Key	dataDeletion
Enumeration	"delete-data-after-closing" "no-deletion-after-closing"

listOfCompanies	
Description	A list of companies involved in this quality task
Name	List of companies
Characteristic	bamm-c:List of Company entities
Optional	No
In Payload	Yes
Payload Key	listOfCompanies

4.3 ENTITIES

An entity is a logical encapsulation of multiple values. It has a number of properties, which are described in the following, starting with the entity, followed by its properties.

4.3.1 Properties of the Entity Company

Company	
Description	One company involved in this quality task
Name	Company

cxBPN	
Description	Catena-X business partner number of this company

Name	CX Business partner number
Characteristic	bamm-c:Text
Optional	No
In Payload	Yes
Payload Key	cxBPN

name	
Description	Name of the company
Name	Company name
Characteristic	bamm-c:Text
Optional	No
In Payload	Yes
Payload Key	name

email		
Description	An email address of somebody within this company	
Name	e-Mail	
Characteristic	bamm-c:Text	
Optional	No	
In Payload	Yes	
Payload Key	email	
Constraint	EMailConstraint a bamm-c:RegularExpressionConstraint	
	Description	Regular expression for mail address as defined in W3C (see https://html.spec.whatwg.org/multipage/input.html#valid-e-mail-address)
	Regular expression	^[a-zA-Z0-9.!#\$%&'*\+\ /=^_`{ }~-]+@[a-zA-Z0-9-]+(?:\.[a-zA-Z0-9-]+)*\$

5 NORMATIVE REFERENCES

The following references refer to related Catena-X reference implementations and external standards. This is intended to place the present reference implementation in the context of existing references.

5.1 CATENA-X REFERENCE IMPLEMENTATIONS

Catena-X Reference Implementations ²	
CX - 0003	BAMM Aspect Meta Model
CX - 0004	Governance Process, Version
CX - 0010	Business Partner Number
CX - 0018	Eclipse Data Space Connector (EDC)

5.2 COMMON STANDARDS

Common Standards	
IDSA	International Data Spaces Association ¹

¹ <https://internationaldataspaces.org/we/the-association/>

² <https://catena-x.net/de/standard-library>

GLOSSARY

ABBREVIATIONS

Abbreviations	Description
BAMM	BAMM Aspect Meta Model
IDSA	International Data Spaces Association

ADDENDUM FOR CONFORMITY ASSESSMENT

DISCLAIMER

The following pages are not part of the standard documentation.

CATENA-X

ADDENDUM FOR
CONFORMITY
ASSESSMENT



CX – 0036 ASPECT MODEL: QUALITY TASK

BUSINESS DOMAIN: PLM & QUALITY

USE CASE: LIVE QUALITY LOOPS

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ABOUT THIS DOCUMENT & MOTIVATION

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.

The addendum for conformity assessment clarifies the requirements and scope for each standard. It contains conformity assessment criteria (CAC) that specify how a participant can receive a certificate for the correct application of the standard.

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¹ <https://catena-x.net/de/standard-library>

1 INTRODUCTION

This document describes the semantic model Quality Task used in the Catena-X network.

1.1 AUDIENCE & SCOPE

This section is non-normative

The described semantic model is relevant for :

- Data Provider / Consumer
- Business Application Provider

1.2 CONTEXT

This section is non-normative

The Catena-X use case Live Quality Loops (QAX) uses multiple data models to exchange data between automotive manufacturer (OEM) and component supplier (TIER1). Each of these data models can be supplied independently.

The Quality Task data model defines the root element for Catena-X-based quality work. It describes the quality task and why two or more companies want to work collaboratively on a quality topic.

1.3 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.

1.4 PROOF OF CONFORMITY

This section is non-normative

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

For Data Provider: To prove conformity you have to fulfill all MUST criteria mentioned in chapter [Normative criteria for Data Provider](#).

There is no proof of conformity necessary for Data Consumer.

For Business Application Provider: To prove conformity you have to fulfill all MUST criteria mentioned in chapter [Normative criteria for Business Application Provider](#).

A model validator must be created, to prove the correctness of the data model. A generic test set created for the model must proof the expected results.

1.5 EXAMPLES

Example payload in JSON format:

```
{
  "component": "ComponentA",
  "listOfCompanies": [
    {
      "cxBPN": "BPN-8110",
      "name": "testCompanyA",
      "email": "Horst.Schlemmer@testCompanyA.de"
    },
    {
      "cxBPN": "BPN-0711",
      "name": "testCompanyB",
      "email": "Evje.van.Dampen@testCompanyB.de"
    }
  ],
  "qualityTaskId": "BPN-811_2022_000001",
  "description": "Early Warning of vehicle model A",
  "creationDate": "2019-04-01T14:00:00",
  "title": "Early Warning A",
  "status": "new",
  "dataDeletion": "delete-data-after-closing"
}
```

1.6 TERMINOLOGY

This section is non-normative

Business Partner Number (BPN)

A BPN is the unique identifier of a partner within Catena-x.

2 ASPECT MODEL QUALITY TASK

2.1 INTRODUCTION

Catena-X use case “Live Quality Loops” (QAX) uses several Catena-X standardized data models to exchange data:

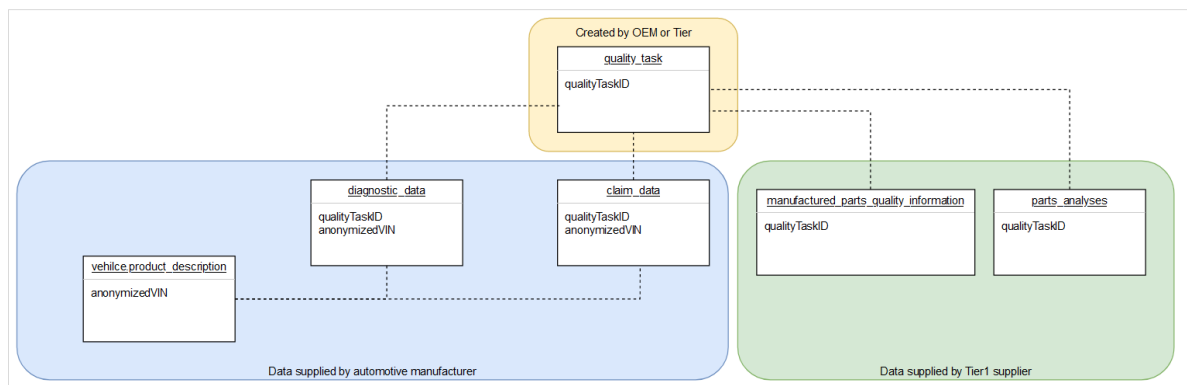


Figure 1: Hierarchy of Catena-X data models used in QAX

Data models in QAX and their content:

- QualityTask is the root element and describes why companies are working together on a quality topic and what they want to do. All involved companies and their contact people are named. In addition, a flag tells what should be done with exchanged data after a QualityTask is closed.
- Vehicle.ProductDescription: This data model is a representation of one vehicle affected by this QualityTask. The model represents the vehicle when it was sold to the end-customers from an end-customers point of view: Which standard equipment was installed in the vehicle and which extra equipment was installed in the vehicle.
- Fleet.DiagnosticData: Diagnostic data coming from multiple vehicles that are affected by this QualityTask + Diagnostic data from similar vehicles that are not affected by this QualityTask.
- Fleet.ClaimData: Customer complaints that are linked to this QualityTask + Data about the exchange of potentially faulty parts
- ManufacturedPartsQualityInformation: A selection of manufacturing-related parameters that help to solve the QualityTask
- PartsAnalyses: Analyses results of replaced and potentially faulty parts that are linked to this QualityTask

2.2 NORMATIVE CRITERIA

The usage of the described semantic model “Quality Task” is a MUST for Data Provider and Data Consumer that want to work together on a quality topic over Catena-X automotive network.

2.2.1 Normative criteria for Data Provider

Every data provider of “Quality Task” data MUST provide the data conformant to the semantic model specified CX-0036.

A data provider of “Quality Task” data MUST ensure that the identifier qualityTaskId is unique by using his Catena-X company business partner number (see separate Catena-X standard) followed by a unique number inside his company.

In the Catena-X data space “Quality Task” data MUST be exchanged via Eclipse Dataspace Connector (EDC) conformant to CX-0018 and CX-0002.

It is RECOMMEND to use Apache parquet¹ file format together with EDC S3 data plane for file data exchange for “Quality Task” data.

2.2.2 Normative criteria for Business Application Provider

It is a MUST for Business Application Provider to support at least 2 standardized Catena-X QAX aspect models from Catena-X Release 3.0 (2 out of Catena-X standards CX – 0036, CX – 0037, CX – 0038, CX – 0039, CX – 0040, CX – 0041) to get the label “Catena-X Certified Solution” for their quality application.

It is RECOMMEND for Business Application Provider to be able to read the semantic model “Quality Task”.

2.3 LICENSE

This Catena-X data model is an outcome of Catena-X use case group Live Quality Loops (QAX). This Catena-X data model is made available under the terms of the Creative Commons Attribution 4.0 International (CC-BY-4.0) license, which is available at Creative Commons.²

The license information is available in github.

¹ <https://parquet.apache.org/>

² <https://creativecommons.org/licenses/by/4.0/legalcode>

In case of doubt the license, copyright and authors information in github overwrites the information in this specification document.

2.4 IDENTIFER OF SEMANTIC MODEL

This semantic model “Quality Task” has the unique identifier `urn:bamm:io.catenax.quality_task:1.0.0`

2.5 FORMATS OF SEMANTIC MODEL

2.5.1 RDF Turtle

The rdf turtle file, adhering to the Semantic Aspect Meta Model, is the master for generating additional file formats and serializations. It is provided here:

https://github.com/eclipse-tractusx/sldt-semantic-models/tree/main/io.catenax.quality_task/1.0.0

The open source command line tool of the Eclipse Semantic Modeling Framework¹(ESMF) is used for generation of other file formats like for example a JSON Schema, aasx for Asset Administration Shell Submodel Template or a HTML documentation.

2.5.2 JSON Schema

A JSON Schema can be generated from the RDF Turtle file using the Eclipse ESMF tooling. The JSON Schema defines the Value-Only payload of the Asset Administration Shell for the API operation "GetSubmodel".

If present, example JSON-payloads MUST validate against the generated JSON schema.

¹ <https://github.com/eclipse-esmf/esmf-sdk>

3 REFERENCES

3.1 NORMATIVE REFERENCES

- CX-0003 SEMANTIC ASPECT META MODEL
- CX-0004 GOVERNANCE PROCESS FOR SEMANTIC MODELS
- CX-0018 ECLPISE DATA SPACE CONNECTOR (EDC)