

**CATENA-X**  
STANDARD



## **CX - 0037 Semantic Model: Vehicle Product Description**

BUSINESS DOMAIN: PLM & QUALITY

USE CASE: LIVE QUALITY LOOPS

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

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## TABLE OF CONTENTS

About this Document & Motivation .....	1
Disclaimer & Liability .....	2
Revisions & Update .....	3
Copyright & Trademarks .....	3
Management Summary .....	4
1 Introduction.....	5
2 Purpose of the Document .....	6
3 Scope of the Implementation .....	8
3.1 Preconditions and Dependencies .....	8
3.2 Constraints and Limitations.....	8
3.3 License .....	8
4 Data Model.....	9
4.1 Overview .....	9
4.2 Properties .....	9
4.3 Entities .....	12
4.3.1 Properties of the Entity Body .....	12
4.3.2 Properties of the Entity Engine .....	14
4.3.3 Properties of the Entity Equipment.....	17
4.3.4 Properties of the Entity Fuel .....	18
4.3.5 Properties of the Entity OEM .....	21
4.3.6 Properties of the Entity Production .....	22
4.3.7 Properties of the Entity Sales.....	23
4.3.8 Properties of the Entity Vehicle .....	24
5 Normative References .....	30
5.1 Catena-X- Reference Implementation .....	30
5.2 Common Standards.....	30
Glossary .....	31
Abbreviations .....	31
ANNEX.....	31
Figures.....	31

Figures.....	31
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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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<sup>1</sup><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. The 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 Vehicle.ProductDescription data model is a representation of one vehicle affected by one or more QualityTask. The data 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.



## 1 INTRODUCTION

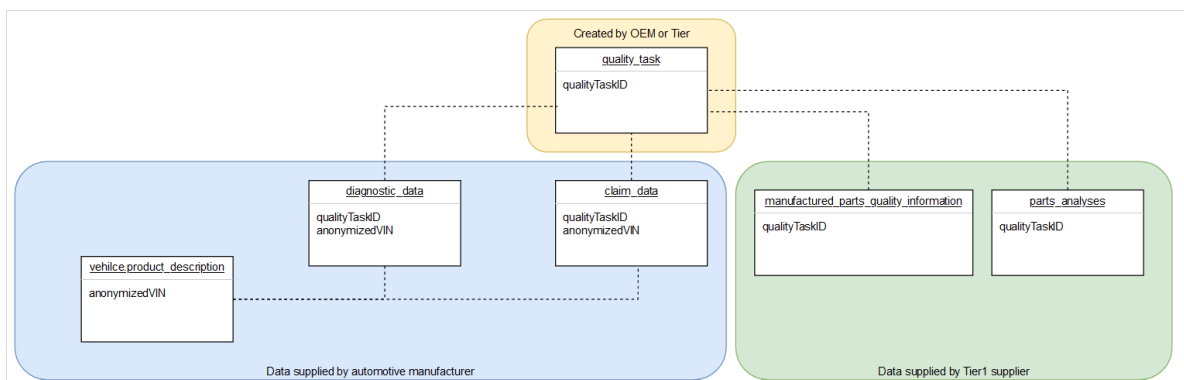
A quality topic has different natures: Proactive quality and reactive quality work.

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 potentially faulty parts that are linked to this QualityTask

The entity body groups the properties for number of doors, color (identifier and description) and body type: Please use minimum one of the attached standard definitions from NHTSA (US authority for National Highway Traffic Safety Administration) or German Kraftfahrt Bundesamt (KBA).

The data model has a list of engines. Modern vehicles can have more than one engine installed – this is especially true for hybrid vehicles. Each engine entity represents one installed engine. The data entity “equipment” from the model has a list of equipment that defines all built in equipment: Standard equipment and optional equipment. The data provider/OEM should send a list of all installed equipment because standard equipment packages can vary from country to country. To represent the the entity “fuel type”, we use one standardized term originating from the US authority NHTSA (National Highway Traffic Safety Administration) or from the German authority KBA (Kraftfahrtbundesamt). The OEM entity groups all properties, that define the manufacturer of the vehicle. Primary property is wmi (World Manufacturer Information). The wmi is always the first 3 chars of the vehicle identification number (VIN). In addition, there is the standardized wmi description from NHTSA and the Catena-X business partner number. The entity “production”, groups production-related properties. The entity Sale groups sales-related properties. And finally, the entity “vehicle” groups properties that do not fit to one of the other entities in this data model. Examples are “vehicle series” or “steering wheel position”. Whenever possible, NHTSA standards are used.

We recommend using NHTSA terms and abbreviations because all of them are in the English language.

## **2 PURPOSE OF THE DOCUMENT**

The purpose of this document is to make the reader familiar 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 model `Vehicle.ProductDescription` is a semantic model that describes specific vehicle criteria like powertrain categories or engine & fuel type of vehicle in the Quality Task.

### 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 from GitHub<sup>1</sup>.

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 Manufacturing<sup>2</sup>.

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 parquet<sup>4</sup> 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 Commons<sup>3</sup>.

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

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

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

<sup>4</sup> <https://parquet.apache.org/>

## 4 DATA MODEL

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.

Vehicle Master Data	
<b>Description</b>	Master data of one vehicle - from an end customer view. This model represents the vehicle as it was sold to the customer. All entities and properties are immutable over the lifetime of the vehicle.
<b>Name</b>	Vehicle Master Data

### 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.

Engines	
<b>Description</b>	List of installed engines in the vehicle
<b>Name</b>	engines
<b>Characteristic</b>	List Has a certain order Duplicates allowed Type urn:bamm:io.catenax.vehicle.product_description:2.0.0#Engine
<b>Optional</b>	No
<b>In Payload</b>	Yes
<b>Payload Key</b>	Engines

Equipments	
<b>Description</b>	Equipments
<b>Name</b>	equipments

<b>Characteristic</b>	List Has a certain order Duplicates allowed Type urn:bamm:io.catenax.vehicle.product_description:2.0.0#Equipment
<b>Optional</b>	No
<b>In Payload</b>	Yes
<b>Payload Key</b>	equipments

<b>Fuel</b>	
<b>Description</b>	The fuel type of the vehicle
<b>Name</b>	fuel
<b>Characteristic</b>	SingleEntity Type urn:bamm:io.catenax.vehicle.product_description:2.0.0#Fuel
<b>Optional</b>	No
<b>In Payload</b>	Yes
<b>Payload Key</b>	fuel

<b>OEM</b>	
<b>Description</b>	Original equipment manufacturer
<b>Name</b>	oem
<b>Characteristic</b>	SingleEntity Type urn:bamm:io.catenax.vehicle.product_description:2.0.0#OriginalEquipmentManufacturer
<b>Optional</b>	No
<b>In Payload</b>	Yes
<b>Payload Key</b>	oem

<b>Production</b>	
<b>Description</b>	Bundles production-related information
<b>Name</b>	production

<b>Characteristic</b>	SingleEntity Type urn:bamm:io.catenax.vehicle.product_ description:2.0.0#Production
<b>Optional</b>	No
<b>In Payload</b>	Yes
<b>Payload Key</b>	Production

<b>Sale</b>	
<b>Description</b>	Bundles all sales related information
<b>Name</b>	Sale
<b>Characteristic</b>	SingleEntity Type: urn:bamm:io.catenax.vehicle.product_ description:2.0.0#Sale
<b>Optional</b>	No
<b>In Payload</b>	Yes
<b>Payload Key</b>	sale

<b>vehicle</b>	
<b>Description</b>	Vehicle (e.g. car, bus, truck etc.)
<b>Name</b>	vehicle
<b>Characteristic</b>	SingleEntity Type urn:bamm:io.catenax.vehicle.product_ description:2.0.0#Vehicle
<b>Optional</b>	No
<b>In Payload</b>	Yes
<b>Payload Key</b>	vehicle

<b>vehicle body</b>	
<b>Description</b>	Vehicle body
<b>Name</b>	body
<b>Characteristic</b>	SingleEntity

	Type urn:bamm:io.catenax.vehicle.product_ description:2.0.0#Body
<b>Optional</b>	No
<b>In Payload</b>	Yes
<b>Payload Key</b>	body

## 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 Body

Body	
<b>Description</b>	Body related data
<b>Name</b>	Body

Number of Doors	
<b>Description</b>	Describes the number of doors of a vehicle
<b>Name</b>	numberOfDoors
<b>Characteristic</b>	Type <a href="http://www.w3.org/2001/XMLSchema#positiveInteger">http://www.w3.org/2001/XMLSchema#positiveInteger</a>
<b>Example</b>	5
<b>Optional</b>	No
<b>In Payload</b>	Yes
<b>Payload Key</b>	numberOfDoors

Color identifier	
<b>Description</b>	Color code describes the code of a specific color of one vehicle
<b>Name</b>	colorId
<b>Characteristic</b>	Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>
<b>Example</b>	LY7W
<b>Optional</b>	No
<b>In Payload</b>	Yes



<b>Payload Key</b>	colorId
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<b>Color description</b>	
<b>Description</b>	Color name describes the color of the color code as a written word
<b>Name</b>	colorDescription
<b>Characteristic</b>	Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>
<b>Example</b>	Light grey
<b>Optional</b>	No
<b>In Payload</b>	Yes
<b>Payload Key</b>	colorDescription

<b>Body variant (KBA)</b>	
<b>Description</b>	Vehicle variant - Body shapes according to German KBA
<b>Name</b>	kbaBody
<b>Characteristic</b>	Enumeration Values Limousine Schräghecklimousine Kombilimousine Coupé Kabrio-Limousine Cabrio-Limousine Mehrzweckfahrzeug Pkw-Pick-up Van Pick-up Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>
<b>Example</b>	Limousine
<b>Optional</b>	Yes
<b>In Payload</b>	Yes
<b>Payload Key</b>	kbaBody

<b>Body variant (NHTSA)</b>	
<b>Description</b>	Vehicle variant - Body shapes according to US NHTSA

<b>Name</b>	nhtsaBody
<b>Characteristic</b>	Enumeration Values Cargo Van Convertible Cabriolet Coupe Crossover Utility Vehicle(CUV) Hatchback Liftback Notchback Limousine Low Speed Vehicle(LSV) Neighborhood Electric Vehicle(NEV) Minivan Pickup Roadster Sedan Saloon Sport Utility Truck(SUT) Sport Utility Vehicle(SUV) Multi-Purpose Vehicle(MPV) Van Wagon Reference <a href="https://vpic.nhtsa.dot.gov/api/">https://vpic.nhtsa.dot.gov/api/</a> Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>
<b>Example</b>	Sedan
<b>Optional</b>	Yes
<b>In Payload</b>	Yes
<b>Payload Key</b>	nhtsaBody

### 4.3.2 Properties of the Entity Engine

Engine Entity	
<b>Description</b>	Describing one installed engine
<b>Name</b>	engine

Engine ID	
Description	OEM-specific identifier/type of the installed engine
Name	engineId
Characteristic	Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>
Example	CKBY
Optional	No
In Payload	Yes
Payload Key	engineId

Engine Description	
Description	Description of the engine
Name	engineDescription
Characteristic	Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>
Example	2.0 TDI
Optional	No
In Payload	Yes
Payload Key	engineDescription

Vehicle engine series	
Description	Engine series
Name	engineSeries
Characteristic	Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>
Example	EA189
Optional	No
In Payload	Yes
Payload Key	engineSeries

Engine serial number	
Description	serial number of the installed engine
Name	serialNumber
Characteristic	Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>

<b>Example</b>	3434937GJJG3738
<b>Optional</b>	No
<b>In Payload</b>	Yes
<b>Payload Key</b>	serialNumber

<b>Engine size</b>	
<b>Description</b>	Cubic capacity in a combustion engine - not available in battery-electric vehicles
<b>Name</b>	size
<b>Characteristic</b>	Measurement cubic capacity of the engine Unit cubic centimetre Symbol cm <sup>3</sup> Code CMQ Conversion factor 10 <sup>-6</sup> m <sup>3</sup> Type <a href="http://www.w3.org/2001/XMLSchema#integer">http://www.w3.org/2001/XMLSchema#integer</a>
<b>Example</b>	1968
<b>Optional</b>	Yes
<b>In Payload</b>	Yes
<b>Payload Key</b>	size

<b>Engine power</b>	
<b>Description</b>	Engine power is the power that an engine can put out
<b>Name</b>	power
<b>Characteristic</b>	Measurement Engine power expressed in kilowatt Unit Kilowatt Symbol kW Code KWT Conversion factor 10 <sup>3</sup> W Type <a href="http://www.w3.org/2001/XMLSchema#integer">http://www.w3.org/2001/XMLSchema#integer</a>
<b>Example</b>	110
<b>Optional</b>	No

<b>In Payload</b>	Yes
<b>Payload Key</b>	power

Engine production date	
<b>Description</b>	Date when the engine was produced
<b>Name</b>	engineProductionDate
<b>Characteristic</b>	Type <a href="http://www.w3.org/2001/XMLSchema#dateTime">http://www.w3.org/2001/XMLSchema#dateTime</a>
<b>Example</b>	2017-10-20
<b>Optional</b>	No
<b>In Payload</b>	Yes
<b>Payload Key</b>	engineProductionDate

Engine install date	
<b>Description</b>	Date when the engine was installed
<b>Name</b>	installDate
<b>Characteristic</b>	Type <a href="http://www.w3.org/2001/XMLSchema#dateTime">http://www.w3.org/2001/XMLSchema#dateTime</a>
<b>Example</b>	2018-01-10
<b>Optional</b>	No
<b>In Payload</b>	Yes
<b>Payload Key</b>	installDate

### 4.3.3 Properties of the Entity Equipment

Equipment	
<b>Description</b>	One optional equipment in car
<b>Name</b>	equipment

Equipment ID	
<b>Description</b>	The identifier of a specific equipment
<b>Name</b>	equipmentIdentifier
<b>Characteristic</b>	Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>
<b>Example</b>	S248A
<b>Optional</b>	No
<b>In Payload</b>	Yes

<b>Payload Key</b>	equipmentIdentifier
--------------------	---------------------

Equipment description	
<b>Description</b>	The equipment variants description
<b>Name</b>	equipmentDescription
<b>Characteristic</b>	Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>
<b>Example</b>	Seat heating front
<b>Optional</b>	No
<b>In Payload</b>	Yes
<b>Payload Key</b>	equipmentDescription

Equipment group	
<b>Description</b>	Grouping the special equipment into categories like (e.g. interior)
<b>Name</b>	group
<b>Characteristic</b>	Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>
<b>Example</b>	Interior
<b>Optional</b>	No
<b>In Payload</b>	Yes
<b>Payload Key</b>	group

#### 4.3.4 Properties of the Entity Fuel

Fuel	
<b>Description</b>	Fuel-related data
<b>Name</b>	fuel

Fuel Type (KBA)	
<b>Description</b>	Description of the fuel according German KBA
<b>Name</b>	kbaFuelType
<b>Characteristic</b>	Enumeration Values Unbekannt Diesel Benzin

Vielstoff  
Elektro  
Flüssiggas  
Benzin/Flüssiggas  
Benzin/komp.Erdgas  
Hybr.Benzin/E  
Erdgas NG  
Hybr.Diesel/E  
Wasserstoff  
Hybr.Wasserst./E  
Wasserstoff/Benzin  
Wasserst./Benzin/E  
BZ/Wasserstoff  
BZ/Benzin  
BZ/Methanol  
BZ/Ethanol  
Hybr.Vielstoff/E  
Methan  
Benzin/Methan  
Hybr.Erdgas/E  
Benzin/Ethanol  
Hybr.Flüssiggas/E  
Hybr.B/E ext.aufl.  
Hybr.D/E ext.aufl.  
Hybr.LPG/E ext.aufl.  
Hybr.W/E ext.aufl.  
Hybr.V/E ext.aufl.  
Hybr.NG/E ext.aufl.  
Hybr.Wod.B/E ext.aufl.  
Wasserstoff/NG  
Hybr.W/NG/E ext.aufl.  
Ethanol  
Hybr.BZ/W/E  
Hybr.BZ/W/E ext. aufl.  
Zweistoff LNG/Diesel  
Verflüssigtes Erdgas (LNG)  
Andere

	Reference <a href="https://www.kba.de/SharedDocs/Downloads/DE/SV/sv221_m1_schad_pdf.pdf">https://www.kba.de/SharedDocs/Downloads/DE/SV/sv221_m1_schad_pdf.pdf</a> Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>
<b>Example</b>	Diesel
<b>Optional</b>	Yes
<b>In Payload</b>	Yes
<b>Payload Key</b>	kbaFuelType

<b>Fuel Type (NHTSA)</b>	
<b>Description</b>	Description of the fuel according US NHTSA
<b>Name</b>	nhtsaFuelType
<b>Characteristic</b>	Enumeration Values Compressed Hydrogen/Hydrogen Compressed Natural Gas(CNG) Diesel Electric Ethanol(E85) Flexible Fuel Vehicle(FFV) Fuel Cell Gasoline Liquefied Natural Gas(LNG) Liquefied Petroleum Gas(propene or LPG) Methanol(M85) Natural Gas Neat Ethanol(E100) Neat Methanol(M100) Unknown Reference <a href="https://vpic.nhtsa.dot.gov/api/">https://vpic.nhtsa.dot.gov/api/</a> Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>
<b>Example</b>	Diesel
<b>Optional</b>	Yes
<b>In Payload</b>	Yes
<b>Payload Key</b>	nhtsaFuelType



#### 4.3.5 Properties of the Entity OEM

OEM	
<b>Description</b>	Describes one OEM to which this vehicle belongs to
<b>Name</b>	OEM

WMI Code		
<b>Description</b>	Short name/code of the vehicle manufacturer according to world manufacturer information(wmi). The wmiCode is the first 3 chars of the vehicle identification number. A list of NHTSA registered wmiCodes can be found in attribute Wmi in the table "[vPICList_lite].[dbo].[Wmi]"	
<b>Name</b>	wmiCode	
<b>Characteristic</b>	Trait Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>	
<b>Example</b>	WBA	
<b>Optional</b>	No	
<b>In Payload</b>	Yes	
<b>Payload Key</b>	wmiCode	
<b>Reference</b>	<a href="https://vpic.nhtsa.dot.gov/">https://vpic.nhtsa.dot.gov/</a>	
<b>Constraints</b>	WorldManufacturerInformationCodeLength	
	Description	Restricts the length of the wmiCode to exactly 3 chars
	Reference	<a href="https://vpic.nhtsa.dot.gov/">https://vpic.nhtsa.dot.gov/</a>
	Min. Length	3
	Max. Length	3

OEM Name	
<b>Description</b>	Name of OEM according to NHTSA or other authorities. Has to be compliant with linked wmiCode attribute. For NHTSA: Name of the table: [vPICList_lite].[dbo].[Manufacturer]
<b>Name</b>	wmiDescription
<b>Characteristic</b>	Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>
<b>Example</b>	BMW AG

<b>Optional</b>	No
<b>In Payload</b>	Yes
<b>Payload Key</b>	wmiDescription
<b>Reference</b>	<a href="https://vpic.nhtsa.dot.gov/">https://vpic.nhtsa.dot.gov/</a>

<b>CX Business partner number</b>	
<b>Description</b>	Catena-X business partner number of this company
<b>Name</b>	cxBPN
<b>Characteristic</b>	Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>
<b>Example</b>	BPN-811
<b>Optional</b>	No
<b>In Payload</b>	Yes
<b>Payload Key</b>	cxBPN

#### 4.3.6 Properties of the Entity Production

<b>Production</b>	
<b>Description</b>	Production-related data
<b>Name</b>	production

<b>Vehicle production Date</b>	
<b>Description</b>	Production date of the vehicle
<b>Name</b>	productionDate
<b>Characteristic</b>	Type <a href="http://www.w3.org/2001/XMLSchema#dateTime">http://www.w3.org/2001/XMLSchema#dateTime</a>
<b>Example</b>	2018-01-15
<b>Optional</b>	No
<b>In Payload</b>	Yes
<b>Payload Key</b>	productionDate

<b>Production plant id</b>	
<b>Description</b>	Plant id of the final assembly of the vehicle
<b>Name</b>	plantIdentifier
<b>Characteristic</b>	Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>
<b>Example</b>	4711

<b>Optional</b>	No
<b>In Payload</b>	Yes
<b>Payload Key</b>	plantIdentifier

<b>Vehicle production plant name</b>	
<b>Description</b>	Long name of the production plant of the vehicle
<b>Name</b>	plantDescription
<b>Characteristic</b>	Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>
<b>Example</b>	Wolfsburg
<b>Optional</b>	No
<b>In Payload</b>	Yes
<b>Payload Key</b>	plantDescription

#### 4.3.7 Properties of the Entity Sales

<b>Sales</b>	
<b>Description</b>	All sales-related data
<b>Name</b>	sales

<b>Vehicle sold date</b>	
<b>Description</b>	Sold date of the vehicle = warranty start date for this vehicle
<b>Name</b>	soldDate
<b>Characteristic</b>	Type <a href="http://www.w3.org/2001/XMLSchema#dateTime">http://www.w3.org/2001/XMLSchema#dateTime</a>
<b>Example</b>	2018-02-03
<b>Optional</b>	No
<b>In Payload</b>	Yes
<b>Payload Key</b>	soldDate

<b>Vehicle sold country</b>	
<b>Description</b>	Vehicle sold country in ISO 8601 alpha 3
<b>Name</b>	countryCode
<b>Characteristic</b>	Trait Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>
<b>Example</b>	DEU

<b>Optional</b>	No	
<b>In Payload</b>	Yes	
<b>Payload Key</b>	countryCode	
<b>Constraints</b>	Country Code Regular Expression	
	Description	Regular expression that ensures a three-letter code
	Reference	<a href="https://www.iso.org/iso-3166-country-codes.html">https://www.iso.org/iso-3166-country-codes.html</a>
	Regular expression	<code>^[A-Z][A-Z][A-Z]\$</code>

<b>Vehicle sold region</b>	
<b>Description</b>	Region where this car was sold
<b>Name</b>	countryGroup
<b>Characteristic</b>	Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>
<b>Example</b>	Europe
<b>Optional</b>	No
<b>In Payload</b>	Yes
<b>Payload Key</b>	countryGroup

#### 4.3.8 Properties of the Entity Vehicle

<b>Vehicle</b>	
<b>Description</b>	Vehicle data
<b>Name</b>	vehicle

<b>Anonymized VIN</b>	
<b>Description</b>	OEM-specific hashed VIN; link to car data over pseudonymized/hashed VIN or Catena-X unique digital twin identifier
<b>Name</b>	anonymizedVin
<b>Characteristic</b>	Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>
<b>Example</b>	3747429FGH382923974682
<b>Optional</b>	No
<b>In Payload</b>	Yes
<b>Payload Key</b>	anonymizedVin

Vehicle Catena-X Identifier		
<b>Description</b>	A fully anonymous Catena-X identifier that is registered in C-X Digital twin registry. Can be used for vehicles, parts, workshops, etc.	
<b>Name</b>	catenaXId	
<b>Characteristic</b>	Trait Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>	
<b>Example</b>	urn:uuid:580d3adf-1981-44a0-a214-13d6ceed9379	
<b>Optional</b>	Yes	
<b>In Payload</b>	Yes	
<b>Payload Key</b>	catenaXId	
<b>Constraints</b>	Catena-X Id Regular Expression	
	<b>Description</b>	The provided regular expression ensures that the UUID is composed of five groups of characters separated by hyphens, in the form 8-4-4-4-12 for a total of 36 characters (32 hexadecimal characters and 4 hyphens), prefixed by "urn:uuid:" to make it an IRI.
	<b>Reference</b>	<a href="https://datatracker.ietf.org/doc/html/rfc4122">https://datatracker.ietf.org/doc/html/rfc4122</a>
	<b>Regular expression</b>	<code>^urn:uuid:[0-9a-fA-F]{8}-[0-9a-fA-F]{4}-[0-9a-fA-F]{4}-[0-9a-fA-F]{4}-[0-9a-fA-F]{12}\$</code>

Vehicle series	
<b>Description</b>	Vehicle series, normally one level above model. E.g. vehicle series = "Golf", vehicle model = "Golf VIII"
<b>Name</b>	vehicleSeries
<b>Characteristic</b>	Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>
<b>Example</b>	Golf
<b>Optional</b>	No
<b>In Payload</b>	Yes
<b>Payload Key</b>	vehicleSeries

Vehicle model	
<b>Description</b>	Detail vehicle model, e.g. "Golf VIII"

<b>Name</b>	modelDescription
<b>Characteristic</b>	Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>
<b>Example</b>	Golf VIII
<b>Optional</b>	No
<b>In Payload</b>	Yes
<b>Payload Key</b>	modelDescription

<b>Model identifier</b>	
<b>Description</b>	OEM-specific model identifier or OEM-specific project name
<b>Name</b>	modelIdentifier
<b>Characteristic</b>	Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>
<b>Example</b>	689-G8
<b>Optional</b>	No
<b>In Payload</b>	Yes
<b>Payload Key</b>	modelIdentifier

<b>Vehicle class</b>	
<b>Description</b>	Class of the vehicle
<b>Name</b>	class
<b>Characteristic</b>	Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>
<b>Example</b>	A
<b>Optional</b>	No
<b>In Payload</b>	Yes
<b>Payload Key</b>	class

<b>Vehicle steering pos</b>	
<b>Description</b>	Position of vehicle steering wheel (e.g. left or right)
<b>Name</b>	steeringPos
<b>Characteristic</b>	Enumeration Values Left-Hand Drive (LHD) Right-Hand Drive (RHD) Reference

	<a href="https://vpic.nhtsa.dot.gov/api/">https://vpic.nhtsa.dot.gov/api/</a> Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>
<b>Example</b>	Left-Hand Drive (LHD)
<b>Optional</b>	No
<b>In Payload</b>	Yes
<b>Payload Key</b>	steeringPos

### Vehicle empty weight

<b>Description</b>	The empty weight of the vehicle in kg as specified
<b>Name</b>	emptyWeight
<b>Characteristic</b>	Measurement Weight of an object Unit Kilogram Symbol kg Code KGM Type <a href="http://www.w3.org/2001/XMLSchema#double">http://www.w3.org/2001/XMLSchema#double</a>
<b>Example</b>	2000.0
<b>Optional</b>	No
<b>In Payload</b>	Yes
<b>Payload Key</b>	emptyWeight

### Vehicle drive type

<b>Description</b>	Drive type of a vehicle according to enumeration
<b>Name</b>	driveType
<b>Characteristic</b>	Enumeration Values All-Wheel Drive (AWD) Front-Wheel Drive (FWD) Rear-Wheel Drive (RWD) Reference <a href="https://vpic.nhtsa.dot.gov/api/">https://vpic.nhtsa.dot.gov/api/</a> Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>
<b>Example</b>	Front-Wheel Drive (FWD)
<b>Optional</b>	No

<b>In Payload</b>	Yes
<b>Payload Key</b>	driveType

<b>Complete system power</b>	
<b>Description</b>	Complete power of this vehicle in KW
<b>Name</b>	systemPower
<b>Characteristic</b>	Measurement Engine power expressed in kilowatt Unit Kilowatt Symbol kW Code KWT Conversion factor 10 <sup>3</sup> W Type <a href="http://www.w3.org/2001/XMLSchema#integer">http://www.w3.org/2001/XMLSchema#integer</a>
<b>Example</b>	110
<b>Optional</b>	No
<b>In Payload</b>	Yes
<b>Payload Key</b>	systemPower

<b>Hybridization</b>	
<b>Description</b>	Kind of the hybridization in this vehicle
<b>Name</b>	hybridizationType
<b>Characteristic</b>	Enumeration Values battery electric vehicle hybrid electric vehicle no hybrid plugin hybrid electric vehicle range extender Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>
<b>Example</b>	no hybrid
<b>Optional</b>	Yes
<b>In Payload</b>	Yes
<b>Payload Key</b>	hybridizationType



Software category	
<b>Description</b>	Some OEMs bring in the software as a complete package for all systems. To identify this software, software category and software version is needed. Software category when this car was built
<b>Name</b>	softwareCategory
<b>Characteristic</b>	Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>
<b>Example</b>	TZGH64738
<b>Optional</b>	Yes
<b>In Payload</b>	Yes
<b>Payload Key</b>	softwareCategory

Software version	
<b>Description</b>	Some OEMs bring in the software as complete package for all systems. To identify this software, software category and software version is needed. Software version when this car was built
<b>Name</b>	softwareVersion
<b>Characteristic</b>	Type <a href="http://www.w3.org/2001/XMLSchema#string">http://www.w3.org/2001/XMLSchema#string</a>
<b>Example</b>	3.4.9837.567
<b>Optional</b>	Yes
<b>In Payload</b>	Yes
<b>Payload Key</b>	softwareVersion

## 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 IMPLEMENTATION

Catena-X Reference Implementations <sup>1</sup>	
CX - 0003	BAMM Aspect Meta Model
CX - 0004	Governance Process
CX - 0010	Business Partner Number
CX - 0018	Eclipse Data Space Connector (EDC)

### 5.2 COMMON STANDARDS

Common Standards	
IDSA	International Data Spaces Association <sup>2</sup>
NHTSA	US standards defined by NHTSA authority.
KBA	German standards defined by KBA authority.
ISO 3166 alpha 3	3 letter country code according ISO definition <sup>34</sup>

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

<sup>2</sup> <https://internationaldataspaces.org/we/the-association/>

<sup>3</sup> <https://unstats.un.org/unsd/methodology/m49/>

<sup>4</sup> <https://www.iso.org/iso-3166-country-codes.html>

## GLOSSARY

### ABBREVIATIONS

Abbreviations	Description
BAMM	BAMM Aspect Meta Model
NHTSA	National Highway Traffic Safety Administration, US authority <sup>1</sup>
KBA	Kraftfahrt Bundesamt, German authority <sup>2</sup>
IDSA	International Data Spaces Association

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<sup>1</sup> <https://www.nhtsa.gov/>

<sup>2</sup> <https://www.kba.de>

**ADDENDUM FOR CONFORMITY ASSESSMENT**

**DISCLAIMER**

**The following pages are not part of the standard documentation.**

**CATENA-X**

ADDENDUM FOR CONFORMITY  
ASSESSMENT



## **CX – 0037 ASPECT MODEL: VEHICLE PRODUCTION DATA**

BUSINESS DOMAIN: PLM & QUALITY

USE CASE: LIVE QUALITY LOOPS

**Contact:** [standardisierung@catena-x.net](mailto:standardisierung@catena-x.net)

## TABLE OF CONTENTS

About this Document & Motivation .....	1
Disclaimer & Liability .....	2
Revisions & Update .....	3
Copyright & Trademarks .....	3
1 Introduction.....	4
1.1 Audience & Scope .....	4
1.2 Context .....	4
1.3 Conformance .....	4
1.4 Proof of conformity .....	5
1.5 Examples.....	5
1.6 Terminology.....	6
2 Aspect Model Vehicle Product Description .....	8
2.1 Introduction.....	8
2.2 Normative Criteria .....	9
2.2.1 Normative criteria for Data Provider .....	9
2.2.2 Normative criteria for Business Application Provider .....	9
2.3 License .....	10
2.4 Identifier of Semantic Model.....	10
2.5 Formats of Semantic Model .....	10
2.5.1 RDF Turtle .....	10
2.5.2 JSON Schema .....	10
3 References .....	11
3.1 Normative References .....	11

## 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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<sup>1</sup> [https://catena-x.net/fileadmin/user\\_upload/Vereinsdokumente/Catena-X\\_IP\\_Regelwerk\\_IP\\_Regulations.pdf](https://catena-x.net/fileadmin/user_upload/Vereinsdokumente/Catena-X_IP_Regelwerk_IP_Regulations.pdf)



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

# 1 INTRODUCTION

This document describes the semantic model “Vehicle Product Description” 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 Vehicle.ProductDescription data model is a representation of one vehicle affected by one or more QualityTask. The data 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.

## 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 prove the expected results.

## 1.5 EXAMPLES

Example payload in JSON format:

```
{
  "equipments" : [ {
    "equipmentIdentifier" : "S248A",
    "equipmentDescription" : "Seat heating front",
    "group" : "Interior"
  } ],
  "sale" : {
    "soldDate" : "2018-02-03",
    "countryCode" : "DEU",
    "countryGroup" : "Europe"
  },
  "production" : {
    "plantIdentifier" : "4711",
    "productionDate" : "2018-01-15",
    "plantDescription" : "Wolfsburg"
  },
  "oem" : {
    "wmiCode" : "WBA",
    "cxBPN" : "BPN-811",
    "wmiDescription" : "BMW AG"
  }
}
```

```
},
"engines" : [ {
  "serialNumber" : "3434937GJJG3738",
  "size" : 1968,
  "installDate" : "2018-01-10",
  "engineDescription" : "2.0 TDI",
  "power" : 110,
  "engineId" : "CKBY",
  "engineSeries" : "EA189",
  "engineProductionDate" : "2017-10-20"
} ],
"fuel" : {
  "kbaFuelType" : "Unbekannt",
  "nhtsaFuelType" : "Compressed Hydrogen/Hydrogen"
},
"body" : {
  "numberOfDoors" : 5,
  "kbaBody" : "Limousine",
  "nhtsaBody" : "Cargo Van",
  "colorId" : "LY7W ",
  "colorDescription" : "Light grey"
},
"vehicle" : {
  "catenaXId" : "urn:uuid:580d3adf-1981-44a0-a214-13d6ceed9379",
  "modelIdentifier" : "689-G8",
  "emptyWeight" : 2000.0,
  "driveType" : "All-Wheel Drive(AWD)",
  "steeringPos" : "Left-Hand Drive (LHD)",
  "hybridizationType" : "battery electric vehicle",
  "anonymizedVin" : "3747429FGH382923974682",
  "modelDescription" : "Golf VIII",
  "vehicleSeries" : "Golf",
  "softwareCategory" : "TZGH64738",
  "systemPower" : 110,
  "class" : "A",
  "softwareVersion" : "3.4.9837.567"
}
}
```

## 1.6 TERMINOLOGY

*This section is non-normative*

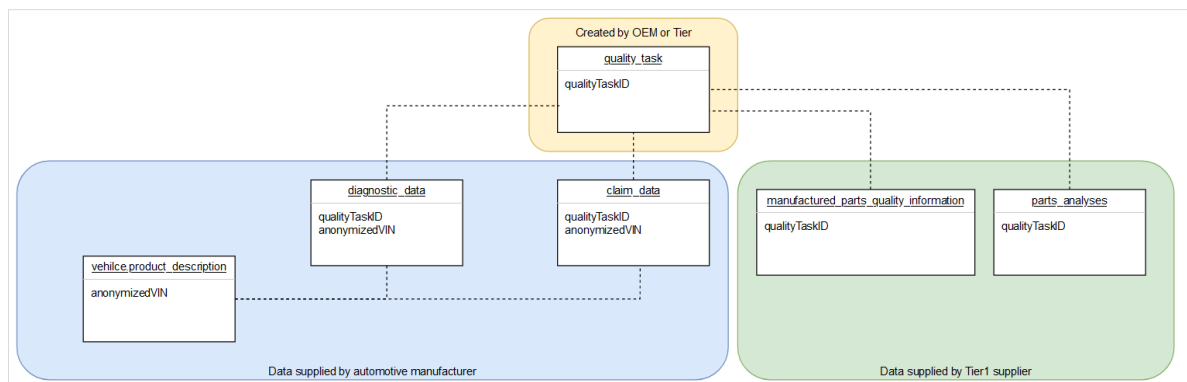
**Business Partner Number (BPN)**

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

## 2 ASPECT MODEL VEHICLE PRODUCT DESCRIPTION

### 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 “Vehicle Product Description” 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 MUST provide the data conformant to the semantic model specified in CX-0037.

It is a MUST to provide oem entity with property “wmiCode” and Catena-X business partner number properties.

It is a MUST to provide property “anonymizedVin” of entity Vehicle.

If available catenaXId of entity Vehicle SHOULD be provided.

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

It is RECOMMEND to use Apache parquet<sup>1</sup> file format together with EDC S3 data plane for file data exchange “Vehicle Product Description” 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 “Vehicle Product Description”.

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<sup>1</sup> <https://parquet.apache.org/>

## 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<sup>1</sup>.

The license information is available in github.

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 has the unique identifier  
urn:bamm:io.catenax.vehicle.product\_description:2.0.0

## 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.vehicle.product\\_description/2.0.0](https://github.com/eclipse-tractusx/sldt-semantic-models/tree/main/io.catenax.vehicle.product_description/2.0.0)

The open source command line tool of the Eclipse Semantic Modeling Framework<sup>2</sup>(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.

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<sup>1</sup> <https://creativecommons.org/licenses/by/4.0/legalcode>

<sup>2</sup> <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)