SLOVENSKI STANDARD
kSIST-TS FprCEN ISO/TS 22726-2:2024

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Inteligentni transportni sistemi - Specifikacija podatkovne baze dinamičnih podatkov in zemljevidov za aplikacije povezanih in avtomatiziranih voznih sistemov - 2. del: Logični podatkovni model dinamičnih podatkov (ISO/DTS 22726-2:2024)

Intelligent transport systems - Dynamic data and map database specification for connected and automated driving system applications - Part 2: Logical data model of dynamic data (ISO/DTS 22726-2:2024)

Intelligente Verkehrssysteme - Dynamische Daten und Kartendatenbankspezifikation für verbundene und automatisierte Fahrsystemanwendungen - Teil 2: Logisches Datenmodell für dynamische Daten (ISO/DTS 22726-2:2024)

Systèmes de transport intelligents - Spécification de données dynamiques et de bases de données cartographiques pour les applications de système de conduite connectées et automatisées - Partie 2: Modèle de données logique des données dynamiques (ISO/DTS 22726-2:2024)

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FINAL DRAFT
Technical Specification

ISO/DTS 22726-2

Intelligent transport systems — Dynamic data and map database specification for connected and automated driving system applications —

Part 2: Logical data model of dynamic data

Systèmes de transport intelligents — Spécification de données dynamiques et de bases de données cartographiques pour les applications de système de conduite connectées et automatisées —

Partie 2: Modèle de données logique des données dynamiques

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 204, *Intelligent transport systems,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 278, *Intelligent transport systems,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

A list of all parts in the ISO 22726 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

In response to emerging automated driving system development, the need to define associated map database standards has been recognized. Automated driving systems require information of the road, lane and intersection. Conventional road networks for intelligent transport systems (ITS) use a linear modelling method such as link and node. Due to these new requirements, automated driving systems need a data model to express advanced features. The belt-shaped data modelling method has already been developed based on the "belt concept" in ISO 20524-2 to provide information about the road, lane and intersection. The concept of "map for highly automated driving" (MHAD) adopts the belt-shaped data model and harmonizes with the conventional road model such as that of ISO 14296.

This document can be used as a reference model for ITS, for example, connected and automated driving system applications and applications of backend map centres which use map and map-related data. Implementation of this document can lead to cost reductions in maintenance/expansion of map access libraries as well as compilation/maintenance of map and map-related data for data providers and connected and automated driving/vehicle control applications.

This document does not define or specify new standards for dynamic information. Neither does it define procedures and/or methods for generating unified contents. It can be used for connected and automated driving system applications. This document's data model of MHAD and that of ISO 14296 complement each other.

Intelligent transport systems — Dynamic data and map database specification for connected and automated driving system applications —

Part 2: Logical data model of dynamic data

1 Scope

This document specifies a unified logical data model based on available existing dynamic information standards. The data has precise relative location references to be linked with ISO/TS 22726-1 which specifies the architecture and the logical data model of static map data for connected and automated driving applications. Dynamic event data comes from external systems and has been defined and specified independently by existing standards. Therefore, the logical data model in this document is formed to synthesize contents referring to other standards.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 19505 (all parts), *Information technology — Object Management Group Unified Modeling Language (OMG UML)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
cancellation
action which provides indication that all the element information previously sent is not considered valid, due to an incorrect content

3.2
end
binary attribute specifying whether the situation element is finished (true) or not (false)

EXAMPLE In EN 16157-7:2018, Table A.10, if finished (i.e. end is true) the overallEndTime in the OverallPeriod class associated with the SituationRecord is populated.

3.3
correctness
correspondence with the universe of discourse

[SOURCE: ISO 19157-1:2023, 3.4]

3.4
accuracy
closeness of agreement between a test result or measurement result and the true value

[SOURCE: ISO 19157-1:2023, 3.1 modified — Note 1 to entry has been removed.]

3.5
timeliness
degree to which an IT service delivers outcomes within time limits

Note 1 to entry: In some cases, service timeliness is affected by a combination of multiple services provided by different service providers. For example, online shopping service is expected to provide not only timely retrieval of newly added products on sale, but also timely delivery to the user by the parcel-delivery service provider

[SOURCE: ISO/IEC TS 25011:2017, 3.2.6.1]

3.6
location reference
specification of a location according to a specific set of rules

3.7
location
identifiable place within a three-dimensional space

3.8
area location
location that has a two-dimensional character

3.9
linear location
location that has a one-dimensional character

3.10
line string
geometric object representing a sequence of connected line segments in a 2D or 3D space and consisting of two or more points connected by straight line segments

Note 1 to entry: It can be used to represent a variety of features, such as roads, paths, or boundaries.

3.11
multipolygon
collection of polygons

3.12
point by coordinates
point location defined by a coordinate set with an optional bearing directionNote 1 to entry: Adapted from EN 16157-2:2019, Table A.42.]

3.13
point location
location that has a zero-dimensional character

3.14
position confidence
degree of certainty of the current location or position of an event or an object

3.15
transversal location reference
method of determining the location of a point or feature relative to a fixed reference line or centreline

3.16
universe of discourse
view of the real or hypothetical world that includes everything of interest

[SOURCE: ISO 19101-1:2014, 4.1.38]

4 Abbreviated terms

DATEX	data exchange between traffic and travel information centres
DENM	decentralized environmental notification message
EV	electric vehicle
IVI	in-vehicle information
MHAD	map for highly automated driving
VICS	vehicle information and communication systems
VMS	variable message sign

5 Conformance

The UML diagrams used in this document shall be in conformance with the ISO/IEC 19505 series.

6 Modelling

6.1 Introduction

This document was created by developing a generic logical data model for dynamic data services and comparing with the data models of services of interest, namely EN 16157-2, EN 16157-3 and EN 16157-7 (DATEX II), ISO 21219-15 (TPEG2-TEC), ISO/TS 19321 (IVI), ETSI EN 302 637-3 (DENM), ISO/TS 18234-8 (TPEG1-CTT) and VICS, which is based on a Japanese national standard. The methodology uses data modelling based on the Unified Modeling Language (UML), version 2, as specified in the ISO/IEC 19505 series. The generic data model specified in this document does conforms to ISO 19103 and ISO 19107.

6.2 Mapping of the different standards' classes and the proposed generic data model's classes

The generic data model specified within this document has been compared with the data models of EN 16157-2, EN 16157-3 and EN 16157-7 (DATEX II) in the first case, ISO 21219-15 (TPEG2-TEC) in the second case, ISO/TS 19321 (IVI) in the third case, and ETSI EN 302 637-3 (DENM) for the fourth. When relevant, relationships have been established between classes of one of the existing specifications' data model and the generic logical data model of this document.

Annex A contains various matrices. The Relationship Matrix is a spreadsheet display of relationships between elements (classes) in two different packages, one of the generic data model and the other from one of the existing data models. The Relationship Matrices have been produced for all models.

NOTE The matrices were exported to Excel and merged into one single matrix where the corresponding classes can be managed together. Where no UML model is available (in the case of ISO/TS 18234-8 (TPEG1-CTT) and VICS) the classes of the specifications concerned have been added manually and the correctness of the mapping checked with the corresponding stakeholders (Republic of Korea and Japan).

Once the classes have been mapped to each other, the corresponding data attributes and metadata have been processed and the generic data model complemented.

6.3 Relationship between ISO/TS 22726-1 and this document (ISO/TS 22726-1)

Dynamic map data needs to be set onto the right location on a digital map. For this purpose, a map-matching function is used which consists of using different types of location referencing systems such as point locations, linear locations and area locations. For this reason, this document also covers the description of the interface specifying the logical link between dynamic data and static data as specified respectively by this document and by ISO/TS 22726-1.

The LocationRealisation package of the LocationReference package is used for this purpose. All location reference packages (AreaLocation, LinearLocation, PointLocation) have their respective Location Realisation class diagram implementing the interface to RoadNetworkElement specified in ISO/TS 22726-1 (see Figure 1).

Annex B presents different possible use cases in relation to location referencing.

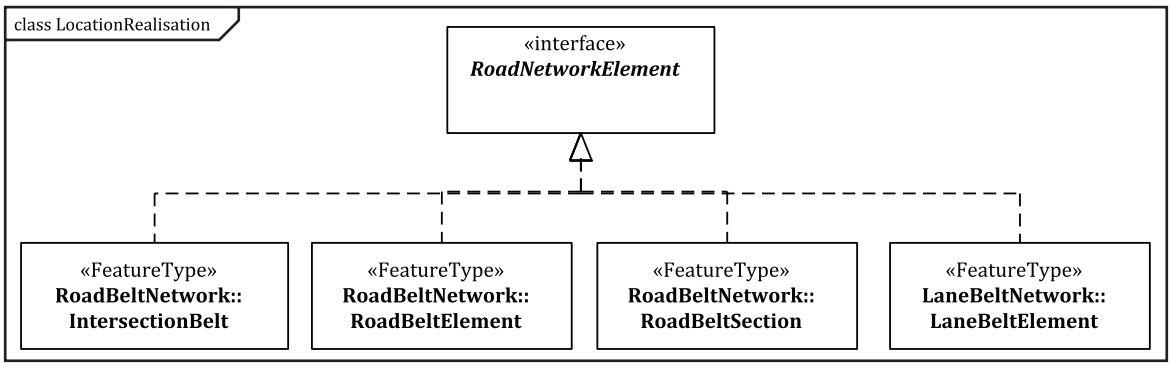

Figure 1 — LocationRealisation class from ISO/TS 22726-1:2023

7 Data content specification

7.1 Introduction

This clause provides a detailed overview of the data packages and related data classes of the generic data model, including their definition, structure and content.

7.2 "DynamicInformationDataSet" package

7.2.1 Overall presentation

The DynamicInformationDataSet package shall contain the different packages dealing with data sets that can be exchanged via one the dynamic data interface considered by this document.

Figure 2 pictures the classes of the package including the relationships between them.

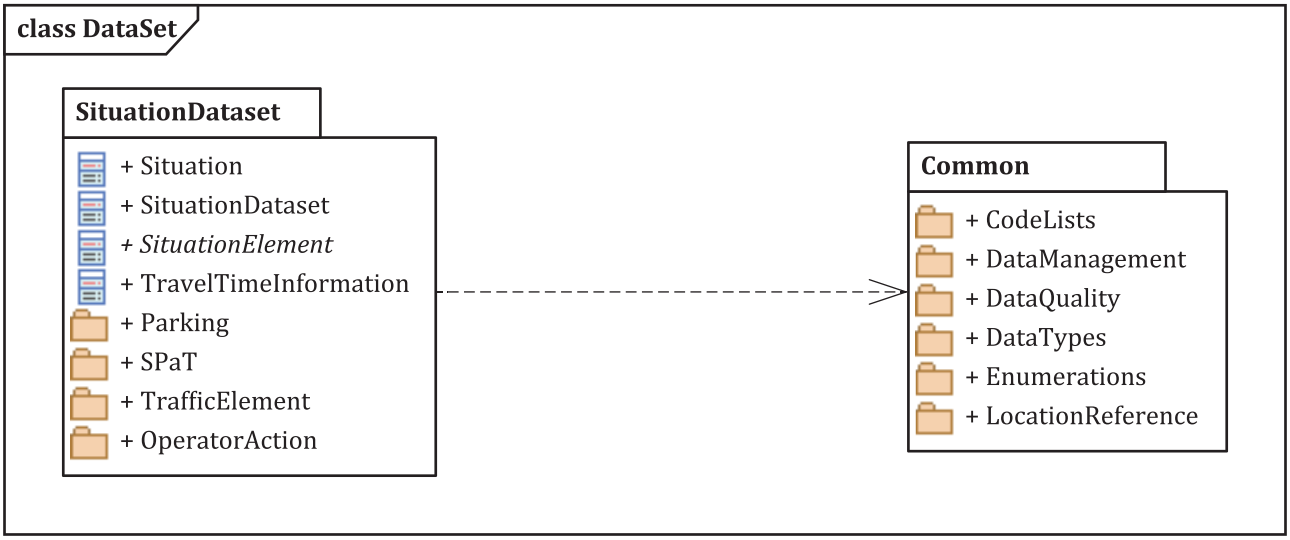

Figure 2 — The "DataSet" class diagram

7.2.2 Class definition

The classes belonging to the difference packages shown in Figure 2 are described by the tables appearing in the subclause in which the package is detailed.

7.3 "Common" package

7.3.1 Overall presentation

The Common package shall comprise a collection of information including data types, reusable collections and lists of enumerations.

Figure 3 pictures the classes of the package including the relationships between them.

Figure 3 — The "Common" class diagram

7.3.2 Class definition

The classes belonging to the difference packages shown in Figure 3 are described by the tables appearing in the subclause in which the package is detailed.

7.4 "CodeLists" package

7.4.1 Overall presentation

The CodeLists package shall comprise a collection of code lists used by the dynamic data services.

For these classes the list of provided values is not comprehensive and they are only for illustrative purpose.