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Inteligentni transportni sistemi - Specifikacije za izmenjavo podatkov DATEX II pri upravljanju prometa in informiranju - 1. del: Kontekst in okvir

Intelligent transport systems - DATEX II data exchange specifications for traffic management and information - Part 1: Context and Framework

Intelligente Verkehrssysteme - Datex II Datenaustauschspezifikation für Verkehrsmanagement und Verkehrsinformation - Teil 1: Kontext und Rahmenwerk

Systèmes de transport intelligents - Spécifications DATEX II d'échange de données pour la gestion du trafic et l'information routière - Partie 1: Contexte et cadre général

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English Version

Intelligent transport systems - DATEX II data exchange specifications for traffic management and information - Part 1: Context and framework

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN 16157-1:2018) has been prepared by Technical Committee CEN/TC 278 “Intelligent transport systems”, the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2019, and conflicting national standards shall be withdrawn at the latest by June 2019.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

Together with EN 16157-7, this document supersedes CEN/TS 16157-1:2011.

The major differences introduced in this part are the following:

— Correction of unclear phrases;

— Methodology now based on UML 2;

— Metamodel now based on explicit UML profile;

— Pre-defined model elements removed (these are now covered by Part 7, see below).

EN 16157-1 is the first part of a multi-part standard under the general title *Intelligent transport systems — DATEX II data exchange specifications for traffic management and information*.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This European Standard defines a common set of data modelling specifications to support the vision of a seamless interoperable exchange of traffic and travel information across boundaries, including national, urban, interurban, road administrations, infrastructure providers and service providers. Standardization in this context is a vital constituent to ensure interoperability, reduction of risk, reduction of the cost base, promotion of open marketplaces and many social, economic and community benefits to be gained from more informed travellers, network managers and transport operators.

Delivering European Transport Policy in line with the White Paper issued by the European Commission requires co-ordination of traffic management and development of seamless pan European services. With the aim to support sustainable mobility in Europe, the European Commission has been supporting the development of information exchange mainly between the actors of the road traffic management domain for a number of years. In the road sector, DATEX II has been long in fruition, with the European Commission being fundamental to its development through an initial contract and subsequent co-funding through the Euro-Regional projects. With this standardization of DATEX II there is a real basis for common exchange between the actors of the traffic and travel information sector.

This European Standard includes the framework and context for exchanges, the modelling approach, data content and data structure and relationships.

This European Standard supports a methodology that is extensible.

This part of EN 16157 is targeted towards all stakeholders that want to understand the modelling methodology applied throughout the DATEX II specifications. While this is potentially a wide range of readers, the document addresses specifically those users that intend to extend the DATEX II data model and therefore need to understand – and comply with – the modelling principles, the use of the Unified Modelling Language (UML) and other conventions for DATEX II modelling.

Further to the UML modelling, this document also defines the mapping of this model to the eXtensible Markup Language (XML), used for formatting data in DATEX II data exchanges. XML, being the most widely used method nowadays of formatting data for business-to-business data exchange (i.e. centre-to-centre) over the Internet, is one of the possible solutions for mapping the UML modelling into formatted data. Other method like UPER based on ASN.1 defined by ISO/IEC 8825-2 can also be considered.

1 Scope

This document specifies and defines components required to support the exchange and shared use of data and information in the field of traffic and travel.

The components include the framework and context for the modelling approach, data content, data structure and relationships.

This document is applicable to:

— traffic and travel information which is of relevance to road networks (non-urban and urban),

— public transport information that is of direct relevance to the use of a road network (e.g. road link via train or ferry service),

— traffic and travel information in the case of Cooperative intelligent transport systems (C-ITS).

This document establishes specifications for data exchange between any two instances of the following actors:

— Traffic Information Centres (TICs),

— Traffic Control Centres (TCCs),

— Service Providers (SPs),

Use of this document can be applicable for use by other actors.

This document covers, at least, the following types of informational content:

— road traffic event information – planned and unplanned occurrences both on the road network and in the surrounding environment,

— information about operator-initiated actions – including both advisory and mandatory measures,

— road traffic measurement data, status data, and travel time data,

— travel information relevant to road users, including weather and environmental information,

— road traffic management information and information and advice relating to use of the road network.

This part of EN 16157 specifies the DATEX II framework of all parts of this European Standard, the context of use and the modelling approach taken and used throughout this European Standard. This approach is described using formal methods and provides the mandatory reference framework for all other parts.

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 14977:1996, *Information technology — Syntactic metalanguage — Extended BNF*

ISO/IEC 19505-1:2012, *Information technology — Object Management Group Unified Modeling Language (OMG UML) — Part 1: Infrastructure*

3 Terms and definitions

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

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

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1 Terms and definitions adapted from ISO/IEC 19505-1:2012:

NOTE Definitions have been adapted to meet the particular use of UML within this specification.

3.1.1
Association
semantic relationship between classes

3.1.2
Attribute
named slot within a class that describes a range of values that instances of the class may hold

3.1.3
Class
description of a set of objects that share the same attributes, relationships, and semantics

3.1.4
Composition
association between two classes, where one class is a composite and the other is a part

Note 1 to entry: This characteristic is expressed in UML with an attribute named “isComposite” on the part end of the Association being set to “true”.

3.1.5
Dependency
implementation or functioning of one or more elements that requires the presence of one or more other elements

3.1.6
Enumeration
data type whose range is a list of predefined values, called enumeration literals

3.1.7
Enumeration literal
element of the value space of an enumeration data type

3.1.8
Generalization
taxonomic relationship between a more general element and a more specific element

3.1.9
Multiplicity
range of integers specifying the allowable cardinalities for an instantiation of an element

Note 1 to entry: The upper bound of the range cannot be below the lower bound. The lower bound shall be a nonnegative integer. The upper bound shall be a nonnegative integer or the special value unlimited, which indicates there is no upper bound on the range.

3.1.10
Package
grouping of model elements

3.1.11
UML profile
mechanism that allows metaclasses from existing metamodels to be extended to adapt them for different purposes

Note 1 to entry: The term profile within the term UML profile has a different meaning than the term profile defined in 3.2.15.

3.1.12
Stereotype
concept provides a way of branding (classifying) model elements so that they behave in some respects as if they were instances of new virtual metamodel constructs

3.2 Other terms and definitions:

3.2.1
binary (association)
association that connects exactly two classes

3.2.2
extension
set of data model elements not in the Level A model and following the Level B extension rules of DATEX II

3.2.3
Globally Unique Identifier – GUID
Identifier that is unique in space and time, i.e. no other object will ever have the same identifier at any other place and at any time

3.2.4
Lower Camel Case – LCC
description of the practice of concatenating compound phrases without whitespace in between where phrases are delimited by upper case letters and the initial letter is lower case

EXAMPLE Lower Camel Case describes the case where the initial letter is lower case, e.g. as in lowerCamelCase.

3.2.5
Model Element
generic term for any construct of metadata used within a model to specify a particular aspect or element of this model

3.2.6
Platform Independent Model – PIM
model of aspects of an information system (e.g. the data model) that is independent of any technical platform used to implement the model

Note 1 to entry: Concrete implementations can be derived from the platform independent model by platform specific models or mappings.

3.2.7
Platform Specific Model – PSM
model of aspects of an information system (e.g. the data model) that is linked to a specific technological platform (e.g. a specific programming language or data transfer syntax)

3.2.8
Publication
traffic-related information or associated management information created at a specific point in time that can be exchanged via a DATEX II interface

Note 1 to entry: The "PayloadPublication" class is the top-level root class for DATEX II Level A.

3.2.9
Upper Camel Case – UCC
description of the practice of concatenating compound phrases without whitespace in between where phrases are delimited by upper case letters and the initial letter is upper case

EXAMPLE Upper Camel Case describes the case where the initial letter is upper case, e.g. as in UpperCamelCase.

3.2.10
Unique Resource Identifier / Locator – URI / URL
character string of well-defined structure used to uniquely identify a resource

Note 1 to entry: If that string is actually pointing at a resource accessible via the Internet, it is called a Unique Resource Locator.

3.2.11
eXtensible Markup Language – XML
set of rules for encoding electronic documents defined by the World Wide Web Consortium W3C

Note 1 to entry: Although developed for documents, it is today widely used for data exchange in general, usually in conjunction with an XML Schema Definition.

3.2.12
XML Metadata Interchange – XMI
XML based specification for the interoperable exchange of metadata

Note 1 to entry: It is today most commonly used to exchange UML models between UML tools. XMI is specified in ISO/IEC 19508.

3.2.13
XML Schema Definition – XSD
formal description of the allowed content of an XML document that claims compliance to the schema

Note 1 to entry: XML Schema Definitions allow for formal validation of syntactical compliance of instance documents.

3.2.14
Extension
enlarged model incorporating new elements

3.2.15
Profile
selection of possible, optional elements

3.2.16
Superclass
generalization class containing elements a class shares with other classes

3.2.17
Namespace
identifier that specifies a set of unique names

3.2.18
Facet
defining aspect of a value space

4 Symbols and abbreviations

GUID – Globally Unique identifier

LCC – Lower Camel Case

PIM – Platform Independent Model

UCC – Upper Camel Case

UML – Unified Modelling Language

W3C – World Wide Web Consortium

5 Conformance

This document provides requirements for UML models (as of ISO/IEC 19505-1:2012) that claim conformance with the DATEX II specifications. UML models claiming this conformance shall comply with the provisions of the normative clauses and annex of this part. Conformance with metadata constructs is subject to multiplicity requirements stated explicitly in the model or is implicitly defined in provisions of this European Standard. Metadata constructs with minimum multiplicity of 1 or more shall be present in any data claiming conformance. Metadata constructs with minimum multiplicity of 0 may be present or may be missing without violating conformance.

6 General conventions and requirements

6.1 Metamodelling

The DATEX II data modelling methodology uses the Unified Modelling Language (UML), version 2 as specified in ISO/IEC 19505-1:2012. More accurately the release 2.4.1 of UML 2 is used.

UML provides a vast set of modelling elements that are not all used for DATEX II data modelling. In fact, DATEX II uses a fairly small UML profile, based on the following metaclasses from the Core::Basic and Core::Constructs packages specified in ISO/IEC 19505-1:2012:

— Association (stereotypes: D2Relation);