

DATEX II v2.3

**GUIDE FOR ROAD-SAFETY
RELATED TRAFFIC CONTENT
IN DATEX II**

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TABLE OF CONTENTS

1. Introduction	2
1.1. Objective.....	2
1.2. Document structure.....	2
1.3. DATEX II reference documents	2
2. General information	4
2.1. Background / Framework.....	4
2.2. Exchange.....	5
2.3. Profiling.....	5
3. Content	8
3.1. DATEX II Objects for all categories of Road-Safety-Related Traffic Content.....	8
3.2. Component “Conditions”	9
3.3. Component “Obstruction”	11
3.4. Component “TrafficElement”	13
3.5. Component “OperatorAction”	14
3.6. Unmanaged blockage of a road	16
4. Annex	18
4.1. Table Of Figures	18

INTRODUCTION



1. Introduction

1.1. Objective

This guide is intended to support ITS stakeholders who want to deploy a content feed for road-safety related traffic information (SRTI). The term content feed is used here to explicitly denote a digital data flow that

- a) is aiming at **machine-to-machine communication**, i.e. it does not refer to pictures or textual representation of information that has been rendered to target human users (e.g. no PDF documents with natural language text, no PNG pictures with map views, etc.),
- b) lies – at least partly – within the scope of Commission Delegated Regulation **(EU) No 886/2013**, and
- c) is supposed to be implemented using **DATEX II**, in particular using the **CEN/TS 16157** set of specifications for data coding¹.

Targeting this audience, this text aims at providing additional insight in what steps to take, what issues to tackle and what pitfalls to avoid in the process of setting up such a content feed. It is fully compliant with the DATEX II specifications and the CEN/TS 16517 set of specifications, as well as with the EasyWay Deployment Guideline TIS-DG02 on *FORECAST AND REAL TIME EVENT INFORMATION*.

It focuses on technical aspects to be taken into account but does not stipulate or address anything with regard to publication policies, licenses, contracts or interchange agreements governing the provision of SRTI.

It also does not contain a DATEX II profile, since it is not possible to create a single profile for this purpose. The technical justification why this is not possible can be found below in Section “2.3 Profiling”.

1.2. Document structure

This document is structured as follows:

- Section 2 provides information about the background and framework, about exchange and profiling.
- Section 3 describes the content of Safety related messages.

1.3. DATEX II reference documents

Reference in this document	DATEX II document	Document version	Date
[Modelling methodology]	DATEX II Modelling methodology	2.3	30-09-2014
[Data model]	DATEX II Data model	2.3	30-09-2014
[Schema generation tool]	DATEX II Schema generation tool	2.3	30-09-2014
[Exchange PSM]	DATEX II Exchange PSM	2.3	30-09-2014
[WSDL]	DATEX II Push/Pull	2.3	30-09-2014
[XML schema]	DATEX II v2.3 schema	2.3	30-09-2014
	Supporting documentation		
[User guide]	DATEX II User's guide	2.3	30-09-2014
[Software developers guide]	DATEX II Software developer's guide	2.3	30-09-2014
[XML schematoolguide]	DATEX II Schema generation tool guide	2.3	30-09-2014
[Extension guide]	DATEX II Extension guideline	2.3	30-09-2014
[Profile guide]	DATEX II Profile guideline	2.3	30-09-2014
[Safety messages guide]	DATEX II Guide for road-safety related traffic content	2.3	30-01-2015
[Exchange PIM]	DATEX II Exchange PIM	1.01	08-02-2005

¹ Note that this text refers to DATEX II v2.3, which includes an approved extension for marking up safety related content elements.

GENERAL INFORMATION



2. General information

2.1. Background / Framework

The provision of Safety Related Traffic Information is encapsulated in a legal framework established by the European Union.

In 2010 the European Parliament and Council adopted the ITS Directive (Directive EU 2010/40/EU on the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport. In the Directive so called priority areas and actions are defined, containing domains on which the EU wishes to reach further harmonisation of deployment of ITS systems. The defined Priority Areas and Actions are:

- **Area I:** Optimal use of road, traffic and travel data
In this Priority Area, the directive defines three Actions:
 - o **Action a):** Make EU wide multimodal travel information services accurate and available across borders
 - o **Action b):** Make EU wide real time travel information services accurate and available across borders
 - o **Action c):** Provision of Road Safety Related universal Traffic Information, where possible, free of charge to all users, based on a minimum content.
- **Area II:** Continuity of traffic and freight management ITS services
- **Area III:** ITS road safety and security applications
 - o **Action d):** provision of interoperable EU-wide eCall
 - o **Action e):** proved ITS based information services for safe and secure parking places for trucks and commercial vehicles
 - o **Action f):** ITS based reservation services for safe and secure parking places for trucks and commercial vehicles.
- **Area IV:** Linking the vehicle with the transport infrastructure

The way the EU wants to achieve the aims of the Priority Actions is reflected by Delegated Acts that will be adopted for each Priority Action, by the EU.

For Action c: Provision of Road Safety Related universal Traffic Information, where possible, free of charge to all users, based on a minimum content, the European Commission adopted the *Commission delegated regulation (EU) No 886/2013 supplementing Directive 2010/40/EU of the European Parliament and of the Council with regard to data and procedures for the provision, where possible, of road safety-related minimum universal traffic information free of charge to users.* This so called Delegated Act on SRTI (Safety Related universal Traffic Information) states the following about the content:

Article 3 (containing the information categories)

List of road safety-related events or conditions

The events or conditions covered by the road safety-related minimum universal traffic information service shall consist of at least one of the following categories:

- (a) temporary slippery road;
- (b) animal, people, obstacles, debris on the road;
- (c) unprotected accident area;
- (d) short-term road works;
- (e) reduced visibility;
- (f) wrong-way driver;
- (g) unmanaged blockage of a road;
- (h) exceptional weather conditions.

Article 4

Information content

1. The information provided on the road safety-related events or conditions shall include the following items:
 - (a) location of the event or the condition;
 - (b) the category of event or condition as referred to in Article 3 and, where appropriate, short description of it;
 - (c) driving behaviour advice, where appropriate.
2. The information shall be withdrawn if the event or condition cease to subsist, or shall be modified if there is a change in the event or condition.

And about the technical format:

..... providers shall share and exchange the data they collect ... For that purpose, they shall make these data available in the DATEX II (CEN/TS 16157) format or any fully compatible and interoperable with DATEX II machine-readable format through an access point.

It was generally recognised that this “specification” does not have the required level of detail for operational implementation. Therefore the German BAST initiated a joint activity of TISA and DATEX II to create a more detailed list of events available in DATEX II and TMC and TPEG as end-user service provision standards, that could be the specialisation of the 8 categories in the Delegated Act 886/2013. This list is a TISA document known as *Safety related message sets – Selection of DATEX II Codes, TPEG2-TEC-Causes and TMCEvents for EC high level Categories 2013-10-01*.

The so called TISA SRTI list however is not restrictive. The provision of other events that fit in the definition of the Delegated Act still can be chosen by the data providing party (generally a road operator), as well as further details of the events and circumstances, involved vehicles etc. So in addition to the Delegated Act and the TISA SRTI list a need for guidance how to create a DATEX II service, compliant to the Delegated Act, was recognised as setting up a DATEX II service requires more choices than events only.

2.2. Exchange

Regarding exchange the delegated act only says that “these data available in the DATEX II (CEN/TS 16157) format or any fully compatible and interoperable with DATEX II machine-readable format through an access point”.

The current CEN/TS 16157 specification set does not yet include a specification for Exchange. In the DATEX II specifications, not yet standardized, there is a specification for Exchange, The Exchange PSM (Platform Specific Model).

This specification is under revision and there is an on-going work to make this into a CEN/ ISO standard.

The Exchange PSM includes a simple http get specification (PULL) and a more advanced web service interface that supports subscriptions (PULL and PUSH).

Neither the DATEX II specifications nor the delegated Act clearly specifies what option for exchange that should be use.

In DATEX II terms an Access Point defined in the delegated Act is, at least, a PULL service.

The delegated Act clearly states that the format should be according DATEX II CEN/TS 16157 or any fully compatible and interoperable with DATEX II machine-readable format which means that the technical and physical format shall be according to the to the DATEX II XML Schema. For interoperability this is very important.

2.3. Profiling

Many users expect to find a single “safety related DATEX II profile” being made available somewhere. But this is not possible. Profiles are a tool to narrow down the possible options of a standard in order to indicate to clients of a service, which of the optional DATEX II data elements are actually used on this particular service. For more details, refer to the DATEX II profile guideline. Delegated Regulation 886/2013 does not limit, enforce or stipulate the choice of optional components or attributes beyond those that are needed to represent the semantic concepts presented verbally in the regulation text. A commonly agreed mapping of those concepts to the formal elements in the relevant domain standards (ALERT-C codes, TPEG table elements and DATEX II objects) has been developed jointly by TISA and the DATEX organisation. It is recommended that content feeds that provide content governed by Delegated Regulation 885/2013 **shall** use the objects quoted in this document and it is also recommended that such content feeds **shall** make use of the approved extension for marking up safety related DATEX II objects. Nevertheless, content feeds are entirely free and **may** use further optional data elements that are available within their systems.

Hence, the fact that content falling under Delegated Regulation 886/2013 and foreseen for publication using DATEX II encoding does not relieve the content feed of the task to create a service specific profile. It only adds a few requirements to this task; in particular to use the objects and attributes of the mapping table and to use the safety related indicator from the approved extension. This indicator is an attribute in a class that extends the DATEX II Level A class SituationRecord. This choice is fairly obvious since the content governed by 886/2013 is clearly targeting Situation data and the indicator must be on the record rather than the situation level since situations may well consist of safety related as well as non-safety related records, for example in a situation containing a congestion record (AbnormalTraffic) due to short term road work (Roadworks), only the short term road work record is directly addressed by Article 3 of 886/2013 as category (d).

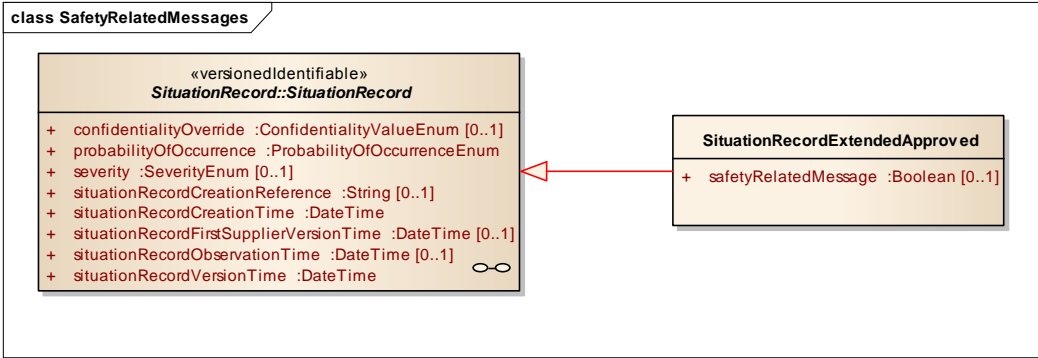


Figure 1: Safety related indicator

DRAFT

CONTENT



3. Content

3.1. DATEX II Objects for all categories of Road-Safety-Related Traffic Content

This chapter describes the main DATEX II structure to be used to specify Road-Safety-Related Traffic Content. Afterwards, additional chapters will point out details for the different categories and subcategories.

The main structure is given by a specific specialisation of a SituationRecord.

(Several SituationRecords can be part of a Situation and several Situations can be part of a SituationPublication, which is a PayloadPublication).

Figure 2 shows the corresponding class diagram. Dark blue enumerations are mandatory; those that are light blue are optional enumerations.

The following attributes are mandatory:

- confidentiality
- informationStatus
- situationRecordCreationTime
- situationRecordVersionTime
- probabilityOfOccurrence
- Validity with validityStatus and overallStartTime (see Figure 3)
- GroupOfLocation (see Figure 3) – location referencing is not described here in detail.

See the dark blue enumerations for details. Note that there are some more elements in the 'Exchange' Package, which are mandatory, too, when using a PayloadPublication, but which are not shown here.

Figure 2 also shows optional elements, which can be used, like additional header information, additional time stamps, references to other messages etc.

Figure 3 shows the two specialisations 'TrafficElement' and 'OperatorAction', which are used to specify Road-Safety-Related Traffic Content. (note that there might be other specialisations not shown here in case of 'Unmanaged blockage of road', as there are not bound to a special SituationRecord).

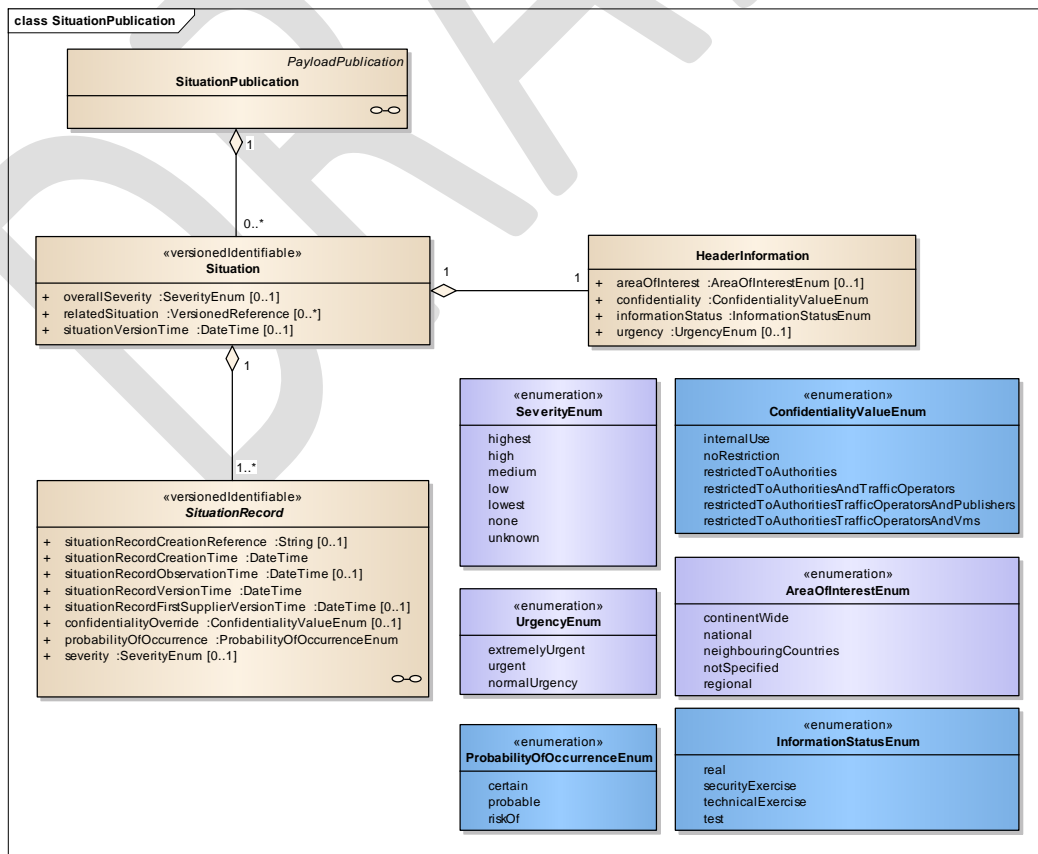


Figure 2: Situation Publication

Figure 3 also shows optional elements, which may be added:

- Comments
- Impact
- Cause

The more detailed validity model, information about url and message source as well as delay information are further optional elements of a situation record in principle, but their usage is not recommended for Road-Safety-Related Traffic Content..

A more detailed list of the recommended optional elements can be found in each of the following chapters.

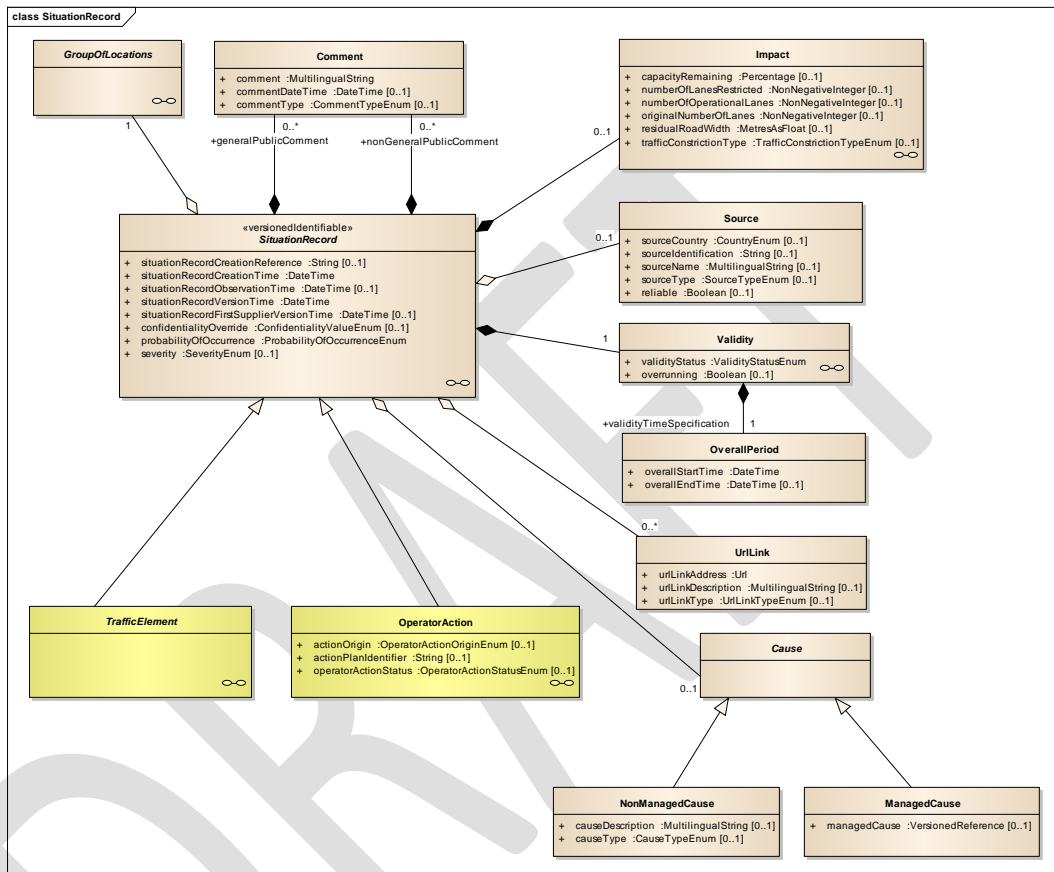


Figure 3: Component Situation Record



In addition, it is recommended for Road-Safety-Related Traffic Content to use the Location Referencing attributes **“length affected”** and **“lane”** from class **“AffectedCarriagewayAndLanes”** wherever possible. Doing this forces you to specify the **“carriageway”** attribute, too. If there is no better match, use the value **“mainCarriageway”** there.

In the following chapters, the DATEX II representation for each category of Road-Safety-Related Traffic Content and its subcategories is presented, divided by DATEX II objects.

3.2. Component “Conditions”

Figure 4 shows the DATEX II class diagram for the following subcategories of Road-Safety-Related Traffic Content specified by the component “Conditions”:

- a2) Danger of aquaplaning
- a3) Surface water hazard
- a4) Slippery road
- a5) Mud on road
- a6) Loose chippings
- a7) Oil on road
- a8) Petrol on road
- a9) Ice
- a10) Black ice
- a11) Snow drifts

- a12) Icy patches
- e1) Visibility reduced
- e2) Smoke hazard
- e3) Dense fog
- e4) Patchy fog
- e5) Blowing snow
- e6) Low sun glare
- h1) Heavy snowfall
- h2) Heavy rain
- h3) Strong force winds
- h4) Strong winds
- h5) Crosswinds
- h6) Strong winds affecting high-sided vehicle

For each of these subcategories, exactly one of the literals shown in the dark blue enumerations must be used.

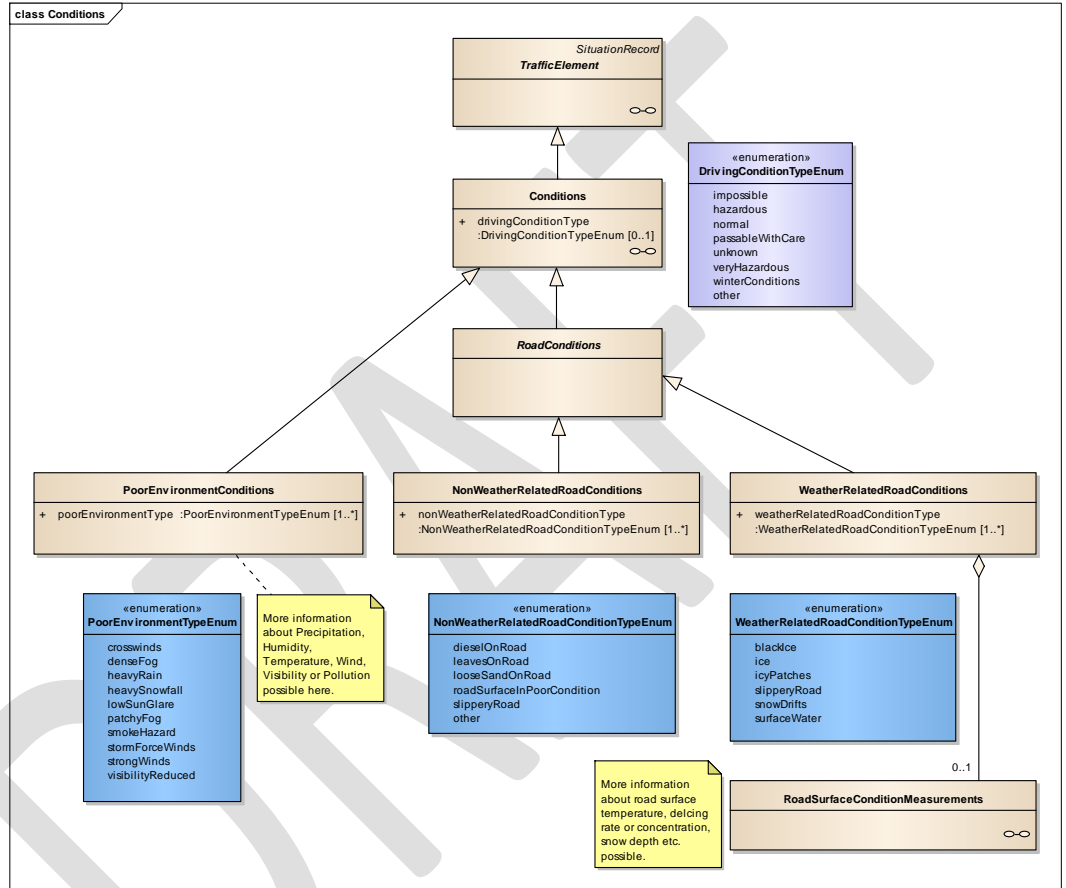


Figure 4: Component Conditions

The following figure shows, which optional attributes are recommended to be used, when specifying a Road-Safety-Related Traffic Content with the component “Conditions” (key see figure afterwards):

Conditions	SituationRecord and its aggregations										Conditions						
	SituationRecord		Comment		Impact			Cause			Further attributes and classes						
	safetyRelatedMessage	situationRecordObservationTime	probabilityOfOccurrence	severity	generalPublicComment	nonGeneralPublicComment	capacityRemaining	numberOfLanesRestricted	numberOfOperationalLanes	originalNumberOfLanes		residualRoadWidth	trafficConstructionType	causeDescription	causeType	managerCause	Conditions-drivingConditionType
a2 Danger of aquaplaning	true	●	riskOf	●	①	①						②	①			①	
a3 Surface water hazard	true	●		●	①	①							③	①			① Use waterFilmThickness, if information available
a4 Slippery road	true	●		●	①	①							③	①	[accident]	③	①
a5 Mud on road	true	●		●	①	①	②	②	②	②	②	③	①	[accident]	③	①	①
a6 Loose chippings	true	●		●	①	①	②	②	②	②	②	③	①	[accident]	③	①	①
a7 Oil on road	true	●		●	①	①	②	②	②	②	②	③	①	[accident]	③	①	①
a8 Petrol on road	true	●		●	①	①	②	②	②	②	②	③	①	[accident]	③	①	①
a9 Ice	true	●		●	①	①							③	①	frost	①	①
a10 Black ice	true	●		●	①	①							③	①	frost	①	①
a11 Snow drifts	true	●		●	①	①	②	②	②	②	②	③	①	poorWeather		①	①
a12 Icy patches	true	●		●	①	①	②	②	②	②	②	③	①	[frost]		①	①
e1 Visibility reduced	true	●		●	①	①							③	①	[poorWeather]	①	① Use class Visibility, if information available
e2 Smoke hazard	true	●		●	①	①							③	①		①	① Use class Visibility, if information available
e3 Dense fog	true	●		●	①	①							③	①	poorWeather	①	① Use class Visibility, if information available
e4 Patchy fog	true	●		●	①	①							③	①	poorWeather	①	① Use class Visibility, if information available
e5 Blowing snow	true	●		●	①	①							③	①	poorWeather	①	①
e6 Low sun glare	true	●		●	①	①							③	①	poorWeather	①	① Use class Visibility, if information available
h1 Heavy snowfall	true	●		●	①	①							③	①	poorWeather	①	① Use class PrecipitationDetail, if information available
h2 Heavy rain	true	●		●	①	①							③	①	poorWeather	①	① Use class PrecipitationDetail, if information available
h3 Strong force winds	true	●		●	①	①							③	①	poorWeather	①	① Use class Wind, if information available
h4 Strong winds	true	●		●	①	①							③	①	poorWeather	①	① Use class Wind, if information available
h5 Crosswinds	true	●		●	①	①							③	①	poorWeather	①	① Use class Wind, if information available
h6 Strong winds affecting high-sided vehicle	true	●		●	①	①							③	①	poorWeather	①	① Use class Wind, if information available

Figure 5: Optional elements for component Conditions

value	Recommendation to use the given value
[value]	Recommendation to use the given value if applicable
●	Recommendation to use this attribute
①	Optional, if useful information available
②	Optional, provide as much information as possible
③	Optional, provide if applicable

Figure 6: Key for figure above

3.3. Component “Obstruction”

Figure 7 shows the DATEX II class diagram for the following subcategories of Road-Safety-Related Traffic Content specified by the component “Obstruction”:

- a1) Flooding
- b1) Objects on the road
- b2) Obstructions on the road
- b3) Shed loads
- b4) Fallen trees
- b5) Avalanches
- b6) Rockfalls
- b7) Landslips
- b8) Animals on the road
- b9) People on roadway
- b10) Children on roadway
- b11) Cyclists on roadway
- b12) Large animals on roadway
- b13) Herds of animals on roadway
- b15) Broken down vehicles
- c1) Unprotected accident area(s)
- d1) Clearance work
- d3) Slow moving maintenance vehicle(s)
- f1) Vehicle(s) on wrong carriageway

For each of these subcategories, exactly one of the literals shown in the dark blue enumerations must be used.

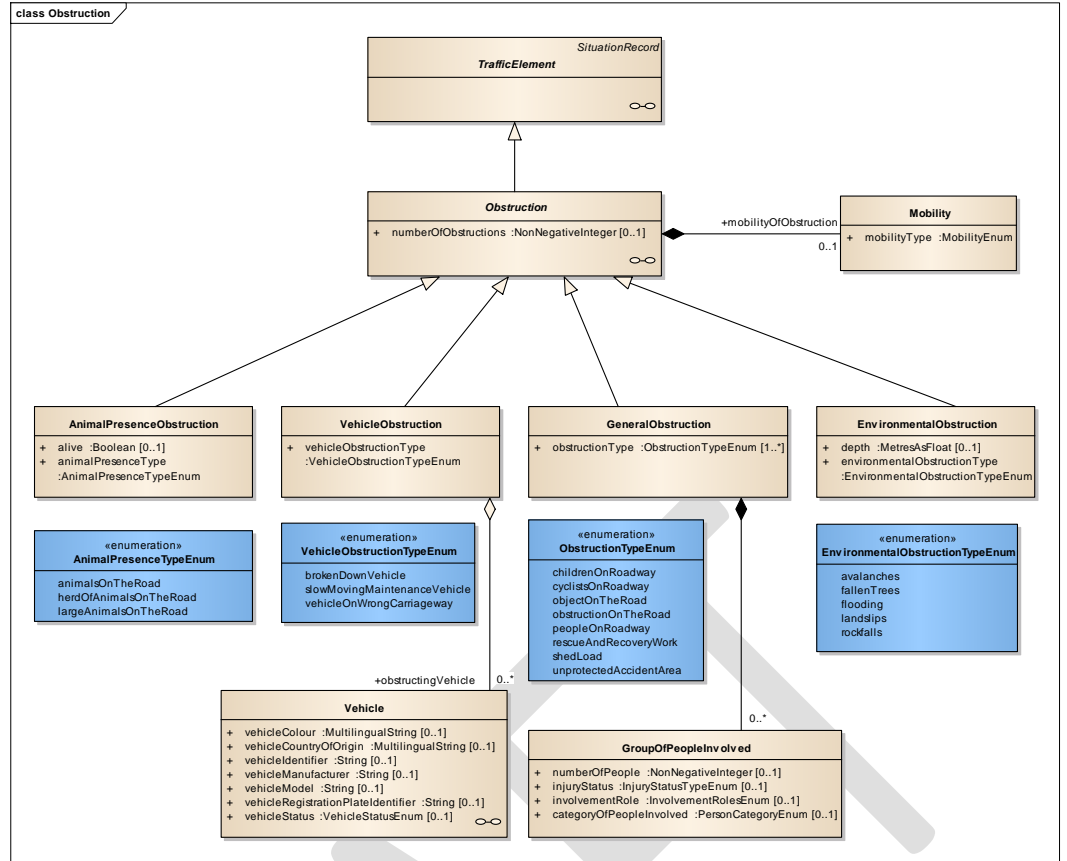


Figure 7: Component Obstructions

The following figure shows, which optional attributes are recommended to be used, when specifying Road-Safety-Related Traffic Content with the component “Obstruction” (key see above):

Obstructions	SituationRecord and its aggregations										Obstructions									
	SituationRecord		Comment		Impact			Cause			numberOfObstructions	mobilityType	AnimalPresenceObstruction - alive	obstructingVehicle - vehicleStatus	GroupOfPeopleInvolved - numberOfPeople					
	safetyRelatedMessage	situationRecordObservationTime	probabilityOfOccurrence	severity	generalPublicComment	nonGeneralPublicComment	capacityRemaining	numberOfLanesRestricted	numberOfOperationalLanes	originalNumberOfLanes	residualRoadWidth	trafficRestrictionType	causeDescription	causeType	managerCause					
a1 Flooding	true	●	●	●	①	①	②	②	②	②	③	①				①	stationary			
b1 Objects on the road	true	●	●	●	①	①	②	②	②	②	③	①			③	①	①			
b2 Obstructions on the road	true	●	●	●	①	①	②	②	②	②	③	①	obstruction			①	①			
b3 Shed loads	true	●	●	●	①	①	②	②	②	②	③	①				①				
b4 Fallen trees	true	●	●	●	①	①	②	②	②	②	③	①				①				
b5 Avalanches	true	●	●	●	①	①	②	②	②	②	③	①								
b6 Rockfalls	true	●	●	●	①	①	②	②	②	②	③	①								
b7 Landslips	true	●	●	●	①	①	②	②	②	②	③	①								
b8 Animals on the road	true	●	●	●	①	①					③	①				①	mobile	①		
b9 People on the roadway	true	●	●	●	①	①					③	①	[accident]		③	①	mobile			①
b10 Children on roadway	true	●	●	●	①	①					③	①				①	mobile			①
b11 Cyclists on roadway	true	●	●	●	①	①					③	①				①	mobile			①
b12 Large animals on roadway	true	●	●	●	①	①					③	①				①	mobile	①		
b13 Herds of animals on roadway	true	●	●	●	①	①					③	①				①	mobile	①		
b15 Broken down vehicles	true	●	●	●	①	①	②	②	②	②	③	①	[accident]		③	①	①			①
c1 Unprotected accident area(s)	true	●	●	●	①	①	②	②	②	②	③	①	accident			③	①			
d1 Clearance work	true	●	●	●	①	①	②	②	②	②	③	①	[earlierAccident]			③	①	①		
d3 Slow moving maintenance vehicle(s)	true	●	●	●	①	①	②	②	②	②	③	①				③	①	mobile		
f1 Vehicle(s) on wrong carriageway	true	●	●	●	①	①					③	①				①	mobile			

Figure 8: Optional elements for component “Obstructions”

3.4. Component “TrafficElement”

Figure 9 shows the DATEX II class diagram for the subcategory b14): “People throwing objects onto the road”. The literal “attackOnVehicle” is to be used.

Optionally, the “mobilityType” can be used to describe whether the attack is stationary or whether people and/or vehicle are moving.

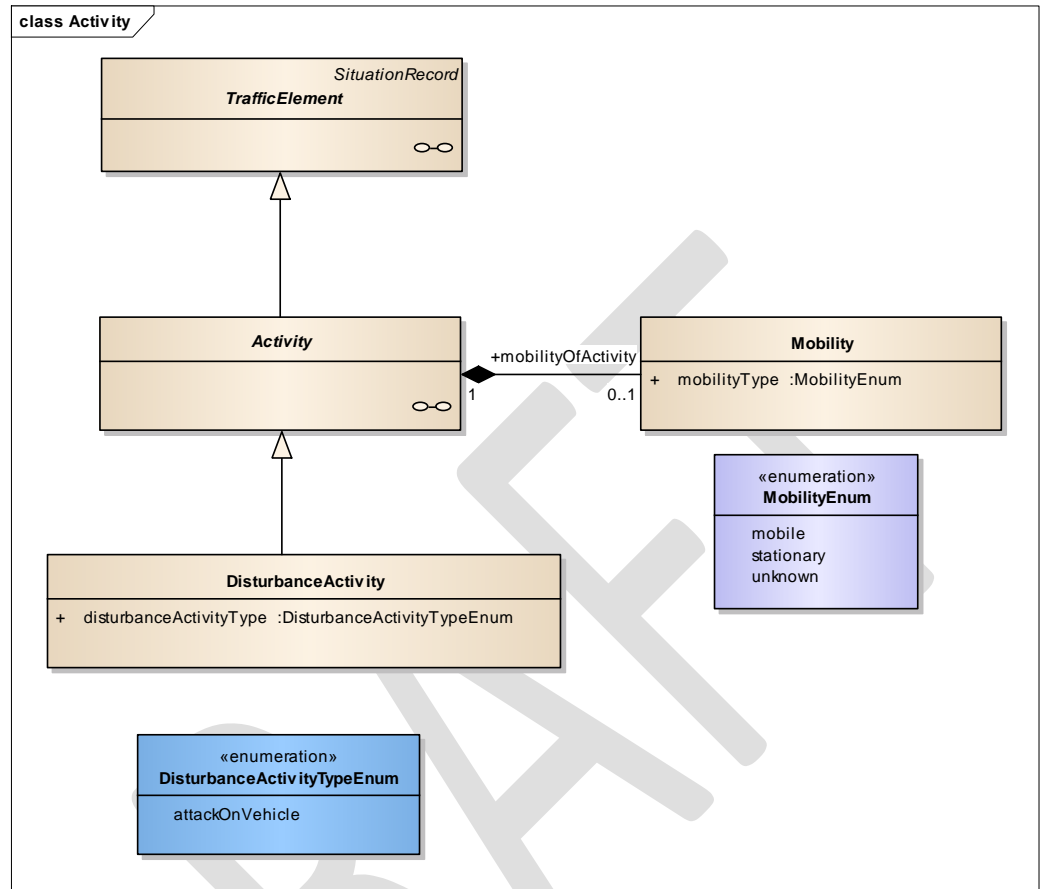


Figure 9: Component TrafficElement (People throwing objects onto the road)

The following figure shows, which optional attributes are recommended to be used, when specifying subcategory b14): “People throwing objects onto the road” (key see above):

TrafficElement	SituationRecord and its aggregations											TrafficElement				
	SituationRecord				Comment	Impact				Cause						
	safetyRelatedMessage	situationRecordObservationTime	probabilityOfOccurrence	severity	generalPublicComment	nonGeneralPublicComment	capacityRemaining	numberOfLanesRestricted	numberOfOperationalLanes	originalNumberOfLanes	residualRoadWidth	trafficConstrictionType	causeDescription	causeType	managedCause	mobilityType
b14 People throing objects on the road	true	●		highest	①	①						③				①

Figure 10: Optional elements for TrafficElement (People throwing objects onto the road)

3.5. Component “OperatorAction”

Figure 11 shows the DATEX II class diagram for the following subcategories of Road-Safety-Related Traffic Content specified by the component “OperatorAction”:

- d2) Maintenance work
- d4) Road marking work

For each subcategory, exactly one of the two literals shown in the dark blue enumeration must be used.

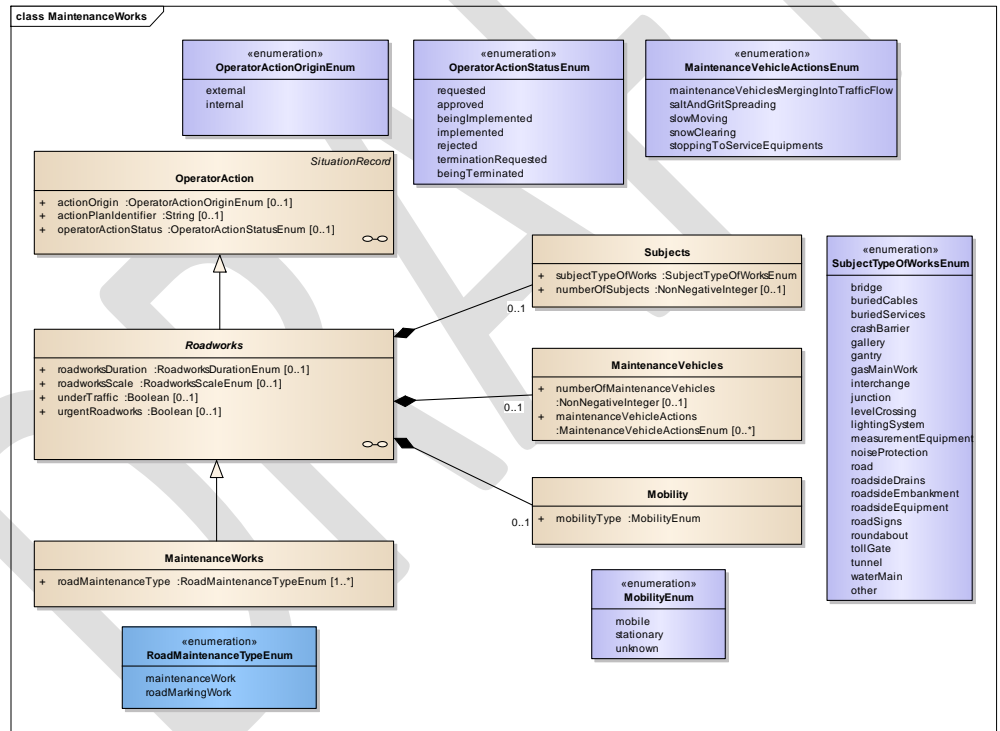


Figure 11: Component “OperatorAction”

The following figure shows, which optional attributes are recommended to be used, when specifying Road-Safety-Related Traffic Content with the component “OperatorAction” (key see above):

Operator Action	SituationRecord and its aggregations											OperatorAction												
	SituationRecord				Comment	Impact				Cause	Roadworks		Subjects	M'Vehicles	Mobility									
	safetyRelatedMessage	situationRecordObservationTime	probabilityOfOccurrence	severity	generalP ublicComment	nonGeneralPublicComment	capacityRemaining	numberOfLanesRestricted	numberOfOperationalLanes	originalNumberOfLanes	residualRoadWidth	trafficConstrictionType	causeDescription	causeType	managedCause	roadworksDuration	underTraffic	urgentRoadworks	SubjectTypeOfWorks	numberOfWorksSubjects	numberOfMaintenanceVehicles	maintenanceVehiclesActions	mobilityType	
d2 Maintenance work	true	●		●	①	①	②	②	②	②	②	③			③	shortTerm	①	①	①	①	①	①	①	①
d4 Road marking work	true	●		●	①	①	②	②	②	②	②	③			③	shortTerm	①	①			①			mobile

Figure 12: Optional elements for component “OperatorAction”

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3.6. Unmanaged blockage of a road

Figure 13 shows the DATEX II class diagram for 'Unmanaged blockage of a road' with the following subcategories:

- g1) blocked
- g2) bridge blocked
- g3) tunnel blocked
- g4) exit blocked
- g5) connecting carriageway blocked
- g6) entry blocked

Note that for this type of content the type of the concrete instance of the abstract "SituationRecord" class is irrelevant. The class "Impact" is directly aggregated to the SituationRecord class.

The literal "roadBlocked" is to be used, and in addition

- for g2), g3), g5) a location descriptor
- for g4), g6) a carriageway

(see enumerations in the figure).

As the Road-Safety-Related Traffic Content in this chapter does not define a SituationRecord itself but is only part of some SituationRecord of any kind, there are a number of additional mandatory or optional attributes, depending on the SituationRecord. Thus, those elements cannot be denoted or recommended here.

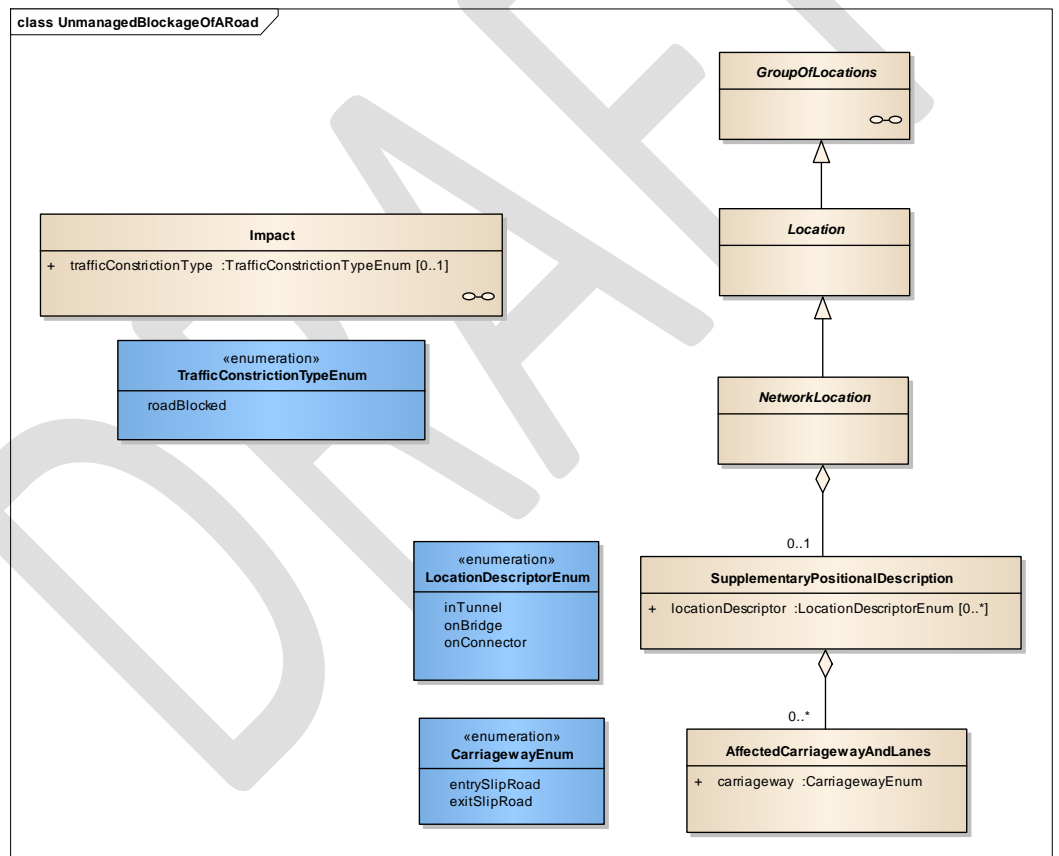


Figure 13: Unmanaged blockage of a road

ANNEX



4. Annex

4.1. Table Of Figures

<i>Figure 1: Safety related indicator</i>	6
<i>Figure 2: Situation Publication</i>	8
<i>Figure 3: Component Situation Record</i>	9
<i>Figure 4: Component Conditions</i>	10
<i>Figure 5: Optional elements for component Conditions</i>	11
<i>Figure 6: Key for figure above</i>	11
Figure 7: Component Obstructions.....	12
Figure 8: Optional elements for component "Obstructions".....	12
Figure 9: Component TrafficElement (People throwing objects onto the road).....	13
Figure 10: Optional elements for TrafficElement (People throwing objects onto the road).....	14
Figure 11: Component "OperatorAction".....	14
Figure 12: Optional elements for component "OperatorAction".....	15
Figure 13: Unmanaged blockage of a road.....	16

DRAFT