Definition of traffic data availability and data exchange in CROCODILE (based on DATEX II)

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crocodile

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1 Data availability within Crocodile according to Priority Action c) and e) of the ITS Directive

1.1 First CROCODILE workshop

The first CROCODILE workshop in Vienna in September 2014 addressed the transposition of the EU ITS Directive with regard to the establishment of **national bodies**, **National Access Points** (NAP) for traffic data and the **availability of such data** in general. During the discussions there was a common sense visible that a Nominated Body has to be part of the public administration in order to ensure impartiality and shall be attached to an already existing organisation. So far it seems to be clear that there has to be a joint Nominated Body for all specifications represented by one organisation and it should rather be one national organisation each than a common organisation for several or all EU Member States.

Current initiatives for National Access Points can be seen as a starting point. Their expandability must be agreed upon early on national and cross-border level. A migration strategy will be necessary that goes beyond single contracts obliging all contractors to forward data to the NAP. In order to ensure that different data contributors will be able to maintain a predefined level of quality proper tools for entering data will be of crucial importance.

A lot of static and dynamic traffic data is already available however there is still a lack of data exchange within and between the single Member States. Due the splintered responsibilities in the Member States (e.g. different road operators) it is sometimes unclear which data are available from which side and in what level of quality. In some countries traffic data are currently given to the private sector (e.g. TomTom, Garmin, Google), but not properly exchanged among national stakeholders which underlines the fragmented status quo.

The discussion once more revealed the necessity of bilateral agreements between Member States on traffic data which should be exchanged. The workshop participants worked out a first proposal for a minimum set of traffic data which needs to be exchanged between CROCODILE MS (on the TERN), containing the following:

- Short-term road works
- Unprotected accident area
- Exceptional weather condition
- Truck parking possibilities (static/dynamic if available)

In spite of legislative and organisational differences in the respective countries the discussions unveiled numerous commonalities in past and future activities. Because of this it was possible to agree upon a draft necessary minimum of traffic data every set of transnationally exchanged data will have to contain. It was stated that the project CROCODILE will be an important catalyst in

defining the technical and legislative preconditions for the operation of Nominated Bodies and National Access Points.

1.2 Questionnaire on data availability

Following the discussions and outcomes of the Vienna workshop a questionnaire was created with the purpose to draw a clear and detailed picture of the data availability in the CROCODILE Member States. Predominantly, data availability was enquired against the background of the specifications for Priority Actions b), c) and e) of the EU ITS Directive, incorporating also qualitative criteria like network coverage, conditions of use or availability in DATEX II format. The following figures and tables will show some of the most important results of the questionnaire.

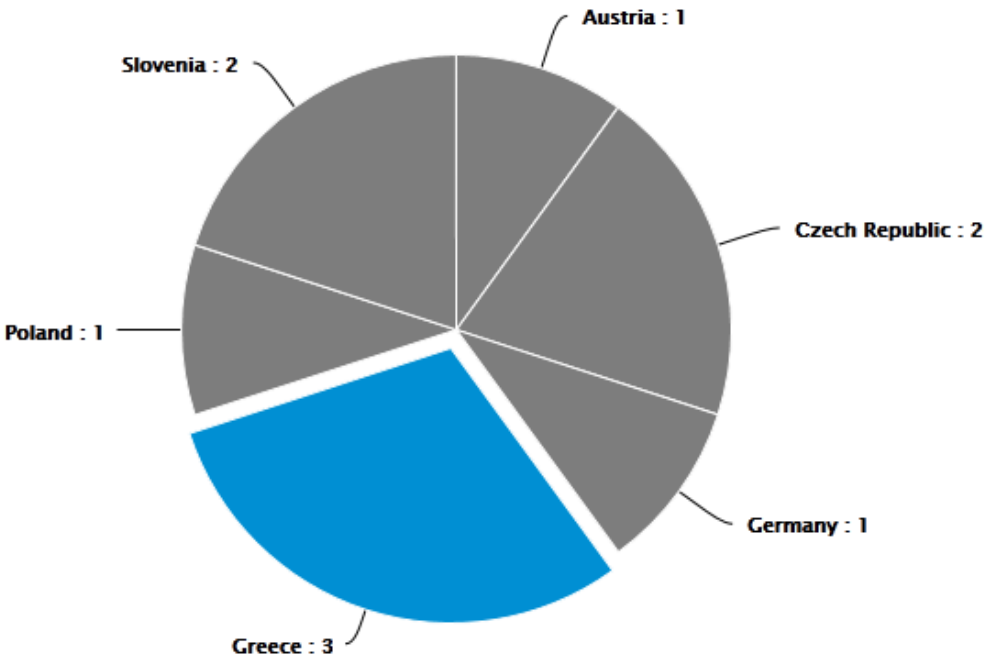

Figure 1: Participation (missing: Cyprus, Hungary, Italy, Romania)

	Availability	DATEX II format
Temporary slippery road	80%	12,5%
Animal, people, obstacles, debris on the road	70%	28,6%
Unprotected accident area	40%	50,0%
Short-term road works	80%	12,5%
Reduced visibility	90%	22,0%
Wrong-way driver	60%	16,7%
Unmanaged blockage of a road	50%	20,0%
Exceptional weather conditions	70%	22,0%

Table 1: Data availability in accordance with Priority Action c)

	Availability	DATEX II format
Identification information of parking area	60%	20%
Location information of the entry point in the parking area (latitude/longitude)	50%	20%
Primary road identifier1/direction and Primary road identifier2/direction if same parking accessible from two different roads	20%	20%
If needed, the indication of the Exit to be taken/Distance from primary road	30%	20%
Total number of free parking places for trucks	20%	20%
Price and currency of parking places	20%	20%

Table 2: Static data available in accordance with Priority Action e)

All in all the results of the questionnaire revealed that a lot of static and dynamic data are already available however there is still a lack in terms of data exchange between single Member States. A possible minimum set of data could include (the percentage in the brackets indicating the current availability in those Member States that participated in the questionnaire):

- Temporary slippery road (80%)
- Animal, people, obstacles, debris on the road (70%)
- Short-term road works (80%)
- Reduced visibility (90%)
- Exceptional weather conditions (70%)
- Identification information of parking area (60%)

1.3 Second CROCODILE workshop

The outcomes furthermore served as input for the discussions in the course of the second CROCODILE workshop on DATEX II which took place on the 18th and 19th of February in Warsaw. It was focused on organisational issues (such as setting up MoUs) as well as on technical issues for data exchange related to the EU ITS Directive. Participants from several CROCODILE Member States together with representatives from the DATEX II Strategic Group discussed their approaches to these topics.

The first day of the workshop concentrated on available data in the CROCODILE Member States.

Priority action c (road safety related data)	AT	CY	CZ	DE	GR	HU	IT	PL	RO	SI
Temporary slippery road	x	x	x	x	x	x	x	x		x
Animal, people, obstacles, debris on the road	x	x		x		x	x	x	x	x
Unprotected accident area			x	x		x	x	x		
Short-term road works	x	x	x	x	x	x	x	x	x	x
Reduced visibility	x	x	x	x	x	x	x	x		x
Wrong-way driver	x		x			x	x	x		x
Unmanaged blockage of a road	x		x			x	x	x		x
Exceptional weather conditions	x	x	x		x	x	x	x		

Table 3: Data available in accordance to the categories defined in 886/2013

Priority action e (truck parking information)	AT	CY	CZ	DE	GR	HU	IT	PL	RO	SI
Identification information of parking area	x		x	x	x	x	x	x	x	
Location information of the entry point in the parking area (latitude/longitude)			x	x	x	x	x	x	x	
Primary road identifier1/ direction and primary road identifier2/ direction if same parking accessible from two different roads			x	x	x	x		x	x	
If needed, the indication of the Exit to be taken/ Distance from primary road			x	x		x		x		
Total number of free parking places for trucks	x			x	x	x	x	x	x	
Price and currency of parking places	x			x		x		x	x	
Dynamic data on availibility of parking places	x			x		x				

Table 4: Data available in accordance to the categories defined in 885/2013

The discussion once more revealed the necessity of bilateral agreements between Member States on traffic data which should be exchanged. The first signed Memorandum of Understanding (MoU) between AT-IT-HU-SI-HR can be seen as a starting point for cross-border data exchange between MS.

The second day was focused on the role of DATEX II within CROCODILE. Bard de Vries, as chair of the DATEX II Strategic Group, presented the current status of DATEX II and the possibilities for a common CROCODILE DATEX II solution. Currently the CROCODILE Member States are on a different level, but none has a final solution for cross-border data exchange up to now. Therefore the participants of the workshop decided to set up a dedicated working group within CROCODILE to work on a common CROCODILE DATEX II solution to be implemented and used.

2 Approach to data exchange in CROCODILE based on DATEX II

Based on the European standard for road traffic data and information exchange, called DATEX II, all available road information being provided in CROCODILE will be encoded to DATEX II. The DATEX II standard is defined within the CEN/TS 16157 and represents a common set of data exchange specifications in order to deploy seamless interoperable and cross-border exchange of traffic and transport information. Mainly road operators/administrations, infrastructure providers and service providers are addressed to deploy the DATEX II standard within Europe in order to harmonize traffic data and information. The results of the data survey have shown a strong trend towards available safety related traffic information and truck parking information exchange, covering the priority areas c and e. All consecutive data specifications are based on DATEX II version V2.3. In this context the main aim of the CROCODILE data exchange specification is to define a minimum reference data set which provides a translation of differently used situation-publication types between differently implemented national DATEX II profiles and thus avoiding exchange-limitations.

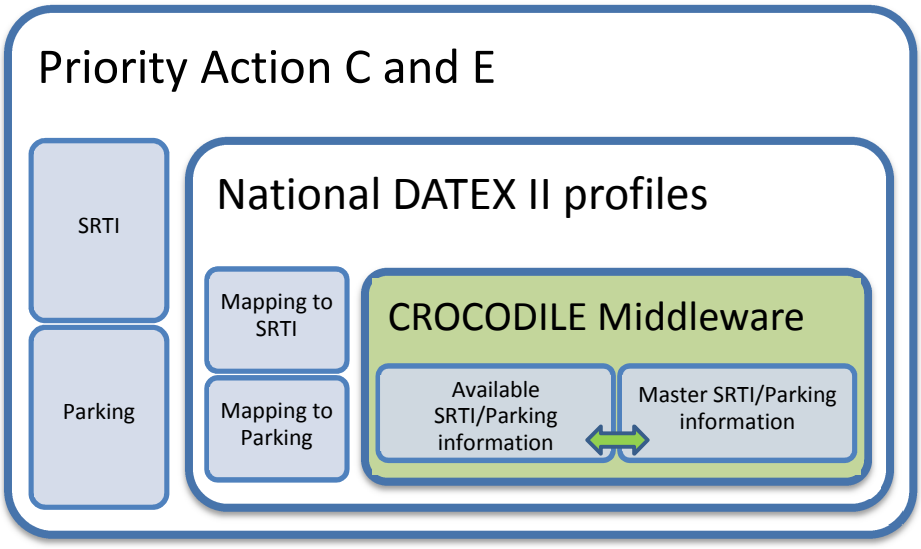

Figure 2: Framework for implementing DATEX II based CROCODILE exchange considering safety related traffic (SRTI) and truck parking information

Further based on the results of the data availability survey, a so-called middleware specification is setup, providing harmonised data exchange, covering safety related traffic information as well as truck parking information. The middleware specification itself provides a systematic and structured way of defining and exchanging preselected and prioritised data types (available in DATEX II as enumeration data types) which are covered by the corresponding Member States. Under these circumstances members of the CROCODILE DATEX II working group having currently different data elements implemented are able to communicate via this commonly agreed

CROCODILE middleware specification. In detail the middleware specification covers a minimum set of required SRTI and truck parking topics which is able to be exchanged and understood by all group members. In this context the specification allows the exchange of different information by providing master data types which are used for interpreting differently assigned DATEX II attributes into commonly understood ones. In other words there will be a simplification of data types by establishing master values within available DATEX II classes. Taking for instance the SRTI-DATEX II data type of 'slippery road', coded within the DATEX II class of 'WeatherRelatedRoadCondition' and matched to the Priority Action c main topic of 'temporary slippery road' would imply already a master SRTI data type which covers all other data types of the same class (including for instance danger of aquaplaning, surface water hazard, ice, black ice, snow drifts and icy patches). Therefore the common vocabulary for describing for example 'black ice', which represents a 'temporary slippery road' element as well, will then be expressed by its corresponding master data type, which is 'slippery road'. In the following the process of finding and defining all master data types for providing universal and minimum data elements coded in DATEX II and applied to data exchange within CROCODILE is depicted.

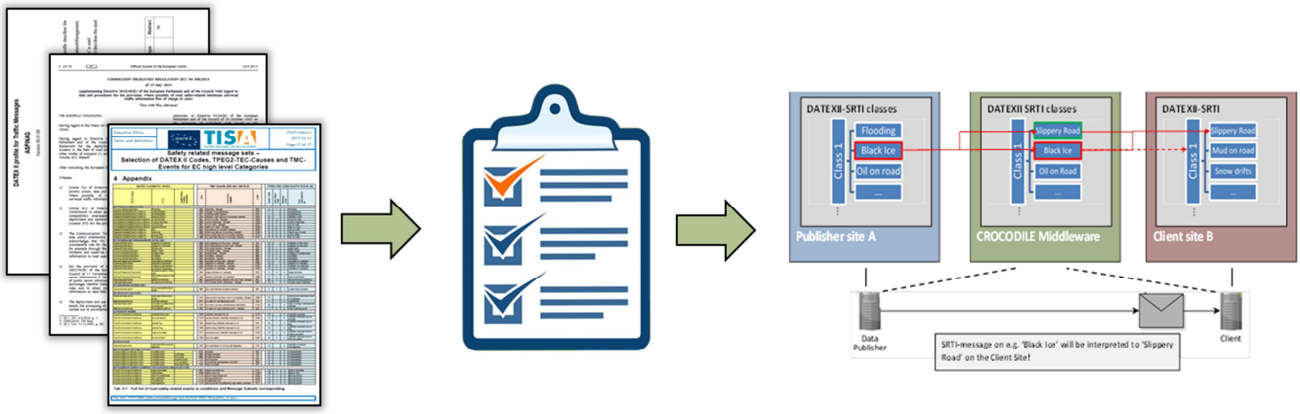

Figure 3: 3-step approach of finding and defining a common safety related exchange specification

In the first step reference literature providing information about data classes and enumeration types used within DATEX II are reviewed. Besides the main definition of safety related data described in Priority Action c (886/2013), already available and implemented DATEX II profiles established in Member States, and safety related message sets being matched to DATEX II version 2.3 by the TISA[1] organisation are used as main inputs for developing and selecting an universal safety related CROCODILE middleware specification.

After having found and agreed upon the most important SRTI data elements being available in the DATEX II standard, a survey on data types being used for the provision of a minimum and universal safety related traffic information covering at least all SRTI related main topics is conducted.

[1] Safety related message sets – DATEX II Codes, TPEG2-TEC-Causes and TMC-Events, DATEX II/TISA http://www.datex2.eu/content/safety-related-message-sets-%E2%80%93-datex-ii-codes-tpeg2-tec-causes-and-tmc-events (Status: 23.03.2015)

The following eight safety-related traffic information categories are covered within CROCODILE reflecting the needs of Delegated Regulation 886/2013:

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

As a result a generic list covering the found minimum set of reference data is elaborated based on the results of the selection of important safety related data types. Besides, all partners are asked to provide status information on which safety related data elements are available for the exchange. Further the elaborated list (the full list can be found in the annex of this document) provides a matching between SRTI- and DATEX II types and gives a detailed 1-by-1 analysis on how to translate required SRTI-topics into DATEX II specific situation-publications.

In the last step all partners are additionally asked to specify all SRTI topics and subtopics based on four different availability-criteria (implemented/planned/considered/not planned). As there were hardly any commonalities in currently available DATEX II deployments resulting, the decision for developing a middleware specification was determined using DATEX II. In this case the ability of exchanging (reading and distributing) different traffic messages between different publisher and client sites (and correspondingly between different Member States respectively road operators) is able to be considerably increased. Especially partners having currently still no DATEX II nodes established are able to avoid data exchange limitations in future deployments by implementing and considering all minimum set of safety related traffic information definitions. Further information about the logical setup and the functionality of the middleware specification will be provided in the following.

In general the middleware specification does not imply the setup of a new DATEX II profile where all Member States are encouraged to fulfil additional profile requirements. It rather gives the chance to fulfil simplified, minimum exchange requirements without issuing a new DATEX II profile.

Neither the DATEX II specifications nor the Delegated Regulation clearly specifies what option for exchange should be use. In DATEX II terms an Access Point defined in the Delegated Regulation is, at least, a PULL service. The Delegated Regulation 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 of highly importance.

3 DATEX II based exchange specification

3.1 CROCODILE – middleware specification

Basically CROCODILE relies on the DATEX II modelling approach of using the so-called 'Layer A' model when developing the middleware specification. The 'Layer A' model in DATEX II represents a deployment approach where no further extensions and new data elements have to be defined in order to exchange in this case safety related data. Applications that have no content requirements beyond what this substantial model already has to offer do not need to consider interoperability problems. Since the main idea of this middleware specification is to provide a common approach on which data will be exchanged, the middleware aims at using predefined DATEX II specifications, instead of redefining available specifications. Figure 4 provides an overview of the process when exchanging traffic messages via the CROCODILE middleware specification.

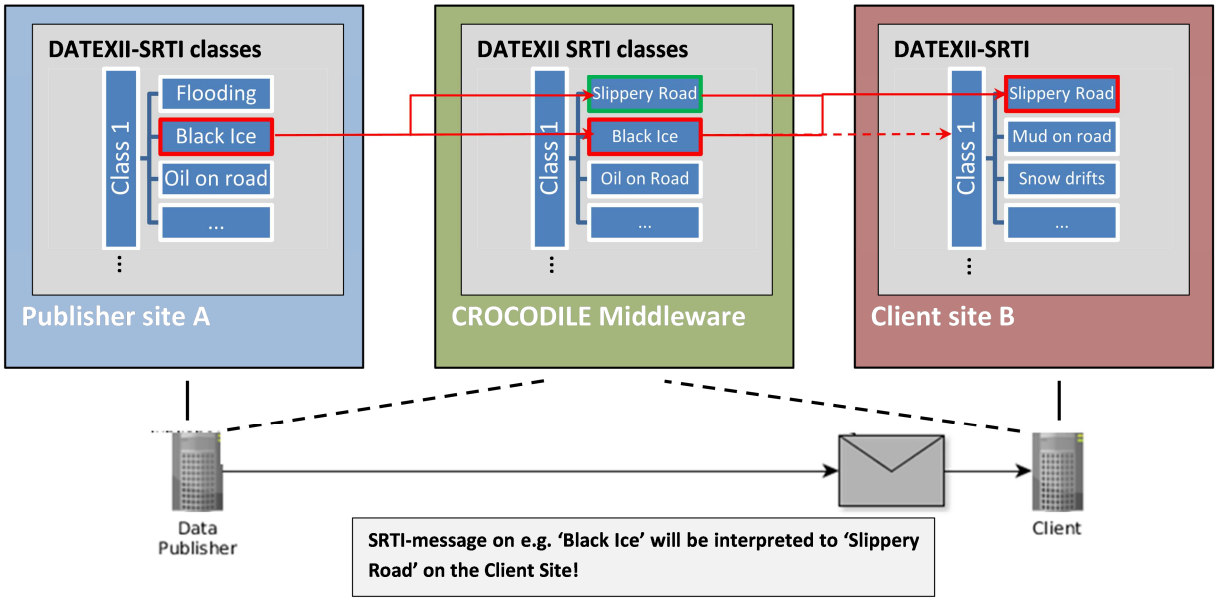

Figure 4: Safety related traffic data exchange between two different Publisher and Client sites (between different road operators), based on the commonly used middleware specification

In this example between two road operators (publisher and client sites) there should be the safety related information of 'Black Ice' forwarded to operator B having established for instance a publisher push on occurrence web service. Unfortunately the client site B cannot understand the information content of 'Black Ice', which is received at site B, as there is no data type of 'Black Ice' within the DATEX II directory of B available. In this case the operators' software at site B does not know how to deal with the information content. But now the CROCODILE middleware comes into operation by filtering all unreadable data elements, in this case 'Black Ice', and matching them to their corresponding master data types, in this case 'slippery road' which is located in the same DATEX II class of 'WeatherRelatedRoadCondition'. Having filtered and matched the specific data to corresponding master data enables the machine readability at the client site. In the case of exchanging data elements that are readable on both sites, no additional middleware is needed.

In detail the process of exchanging different DATEX II-SRTI types between different publisher and client sites involves the following steps:

- Step 1: Everyone participating in the exchange of safety related traffic information implements at least all selected master enumeration types (e.g. Slippery Road) within the own data directories.
- Step 2: The software on the receiving side is able to filter and match different data types to its master values. (in Figure 4 e.g.' Black Ice' would represent the actual enumeration type, and its corresponding master enumeration type is consequently 'Slippery Road')
- Step 3: If the receiver/client site has no exact matching to the specific enumeration type (e.g. 'Black Ice') only its master value is shown (in this case e.g. Slippery Road)
- Step 4: If the receiver has neither: This scenario cannot happen. At least all master enumeration types have to be implemented and known by the receiver site. This minimum requirement of using all safety related master data types within the deployed DATEX II directory enables harmonised data exchange.
- Step 5: If the multiplicity of the enumeration type is set to 1, which means every enumeration type must be implemented by all participants, consequently no common DATEX II based data exchange can be achieved. Under these circumstances the middleware specification enables a common exchange schema where all participants are able to be accounted equally.

3.2 Exchange requirements on Publisher/Client sites

The following technical and organisational requirements have to be tackled by the publisher/client sites respectively by all participating Member States:

- All partners involved in exchanging SRTI data have to comply with the CROCODILE – middleware specification. Especially all client sites have to arrange with the middleware concept in order to receive and process successfully DATEX II messages complying with the commonly agreed minimum set of SRTI data.
- National "Technical prove-of-concept" has to be acquired individually by all participating partners and results are among the DATEX II working group in order to exchange experiences and provide learning effects.
- There have to be bilateral agreements made available, describing requested operating modes for data delivery. Basically three different possible operating modes for exchanging data via web and/or http services are provided by the DATEX II standard, including Publisher Push on occurrence, Publisher Push periodic, and Client Pull services.
- The CROCODILE middleware will meet with all DATEX II modelling Layer A requirements. This means there will not be any further extensions/definitions, beyond the predefined UML-model within DATEX II version 2.3, needed.

- There are no restrictions in exchanging any additional DATEX II elements on a bilateral level as far as both (publisher and client sites) are able to deliver and read corresponding data elements.

3.3 Selection of DATEX II – SRTI master data types

Based on the results of the data availability survey and data selections, the following 10 safety related master data types are chosen as master types being used for exchanging SRTI data on a web service interface that supports subscriptions between different Publisher and Client sites (between different road operators).

SRTI Main-Topic	SRTI Sub-Topic	DATEX II Type	Selection of master types based on DATEX II
Temporary Slippery Road	Flooding	flooding	
	Danger of aquaplaning	surfaceWater	
	Surface water hazard	surfaceWater	
	Slippery road	**slipperyRoad**	**x**
	Mud on road	mudOnRoad	
	Loose chippings	looseChippings	
	Oil on road	oilOnRoad	
	Petrol on road	petrolOnRoad	
	Ice	Ice	
	Black ice	blackIce	
	Snow drifts	snowDrifts	
	Icy patches	icyPatches	
Animal/people/obstacles/debris on the road	**Objects on the road**	**objectOnTheRoad**	**x**
	Obstructions on the road	objectOnTheRoad	
	Shed loads	shedLoad	
	Fallen trees	fallenTrees	
	Avalanches	avalanches	
	Rockfalls	rockfalls	
	Landslips	landslips	
	Animals on the road	animalsOnTheRoad	
	People on roadway	peopleOnRoadway	
	Children on roadway	childrenOnRoadway	
	Cyclists on roadway	cyclistsOnRoadway	
	Large animals on roadway	largeAnimalsOnTheRoad	
	Herds of animals on roadway	herdOfAnimalsOnTheRoad	
	People throwing objects onto the road	attackOnVehicle	
	Broken down vehicles	brokenDownVehicle	
	Broken down vehicles	brokenDownHeavyLorry	
Unprotected accident area(s)	**Unprotected accident area(s)**	**UnprotectedAccidentArea**	**x**

Short term road works	Clearance work	rescueAndRecoveryWork	
	Maintenance work	**maintenanceWork**	**x**
	Slow moving maintenance vehicle(s)	SlowMovingMaintenanceVehicle	
	Road marking work	RoadMarkingWork	
Reduced visibility	**Visibility reduced**	**visibilityReduced**	**x**
	Smoke hazard	smokeHazard	
	Dense fog	denseFog	
	Patchy fog	patchyFog	
	Blowing snow	heavySnowfall	
	Low sun glare	lowSunGlare	
Wrong-way driver	**Vehicle(s) on wrong carriageway**	**vehicleOnWrongCarriageway**	**x**
Unmanaged blockage of a road	**blocked**	**roadBlocked**	**x**
	bridge blocked	roadBlocked	
	tunnel blocked	roadBlocked	
	exit blocked	roadBlocked	
	connecting carriageway blocked	roadBlocked	
	entry blocked	roadcarriagewayBlocked	
	entry blocked	roadBlocked	
Exceptional weather conditions	**Heavy snowfall**	**Snowfall**	**x**
	Heavy rain	**heavyRain**	**x**
	Storm force winds	stormForceWinds	
	Strong winds	**strongWinds**	**x**
	Crosswinds	crosswinds	
	Strong winds affecting high-sided vehicles	crosswinds	

Table 5: Selected SRTI DATEX II master types, applied to the middleware specification

The 'Exceptional weather conditions' represents the only SRTI topic which has more than one master data type selected. Because there are different impacts related to driving and correspondingly to the safety, if snowfall, rain or wind are occurring,

Detailed description of selected master values being used for the CROCODILE middleware specification based on the main SRTI topics:

DATEX II Class	DATEX II Type	DATEX II Definition
a.) Temporary Slippery Road		
WeatherRelatedRoadCondition	slipperyRoad	The road surface is slippery due to bad weather conditions.
b.) Animal/people/obstacles/debris on the road		
GeneralObstruction	objectOnTheRoad	The road may be obstructed or traffic hindered due to objects laying on the roadway.
c.) Unprotected accident area		
GeneralObstruction	UnprotectedAccidentArea	An accident area which has not been protected and may present a hazard to road users.
d.) Short term road works		
MaintenanceWorks	maintenanceWork	Maintenance of road, associated infrastructure or equipment.
e.) Reduced visibility		
PoorEnvironment	visibilityReduced	Environmental conditions causing reduced visibility.
f.) Wrong-way driver		
VehicleObstruction	vehicleOnWrongCarriageway	A vehicle is travelling the wrong way along a divided highway (i.e. on the wrong side).
g.) Unmanaged blockage of a road		
<SituationRecord>:.impact:trafficConstrictionType	roadBlocked	The road is totally obstructed, for all vehicles in both directions, due to an unplanned event.
h.) Exceptional weather conditions		
• PoorEnvironment • PoorEnvironment • PoorEnvironment	• Snowfall • heavyRain • strongWinds	• Dense falling snow, limiting visibility to 50m or less. • Heavy rainfall, limiting visibility to 50m or less. • Winds between 40 km/h and 60 km/h.

Table 6: Detailed description of selected master SRTI data types within DATEX II

3.4 Selection of DATEX II – Truck parking master-data types

Based on available truck parking data, results of the European truck parking standardisation and following European access point specifications, mainly four topics summarize all available and planned truck parking information: Static data related to the parking areas, Information on safety and equipment of the parking area, Dynamic data and Truck Parking Priority Zone. In the first step the following truck parking classes and attributes are mandatory to be used within the CROCODILE member states in order to come up with the implementation of the Delegated Regulation 885/2013. These are: Static data related to the parking areas and Information on safety and equipment of the parking area.

EU Truck Parking Main-Topic	Corresponding Sub-Topic	DATEX II attribute / role names	Selection of master types based on DATEX II
Identification Information	Name, address of parking area	ParkingName	x
	Name, address of parking area	parkingAlias	x
	Name, address of parking area	parkingSiteAddress	x
Location Information of entry point	Single/ Multiple Entrance points: Vehicle entrance, Vehicle exit, Emergency exit, etc.	Latitude/Longitude	x
Primary Road identifier1/ direction and Primary Road Identifier2/ direction	Number/identifier of road, road destination as direction (e.g. city name), opt. 2nd road identifier	roadName	x
	Number/identifier of road, road destination as direction (e.g. city name), opt. 2nd road identifier	roadIdentifier	x
	Number/identifier of road, road destination as direction (e.g. city name), opt. 2nd road identifier	roadDestination	x
	Number/identifier of road, road destination as direction (e.g. city name), opt. 2nd road identifier	distanceToThisRoad	x

Exit	Indication of the exit, distance from primary road (integer 3) in km or miles.	junctionName	x
Number of free parking places for trucks	static data related to the parking areas	parkingNumberOfVacantSpaces	x
Price and currency of parking places	boolean free-of-charge information, currency, charges	charge	x
	boolean free-of-charge information, currency, charges	chargeInterval	x
	boolean free-of-charge information, currency, charges	chargeCurrency	x
	boolean free-of-charge information, currency, charges	maximumDuration	x
Description of security, safety and service equipment	security/ supervision/ service facility/ safety types and common definitions	parkingSecurity	x
	security/ supervision/ service facility/ safety types and common definitions	parkingAddtionalSecurity	x
	security/ supervision/ service facility/ safety types and common definitions	parkingSecurityNationalClassification	x
	security/ supervision/ service facility/ safety types and common definitions	labelSecurityLevel	x
	security/ supervision/ service facility/ safety types and common definitions	labelServiceLevel	x

	security/ supervision/ service facility/ safety types and common definitions	labelSecurityLevelSelfAssessment	x
	security/ supervision/ service facility/ safety types and common definitions	labelServiceLevelSelfAssessment	x
	security/ supervision/ service facility/ safety types and common definitions	parkingSupervision	x
	security/ supervision/ service facility/ safety types and common definitions	certifiedSecureParking	x
	security/ supervision/ service facility/ safety types and common definitions	dateOfCertification	x
Number of parking places for refrigerated goods vehicles	Number of parking places for refrigerated goods vehicles	loadType2	x
Information on specific equipment or services for specific goods vehicles and other	Information on specific equipment or services for specific goods vehicles and other	otherEquipmentOrServiceFacility	x
Contact information of the parking operator	contact person name	contactPersonName	x
	contact person name	contactPersonFirstName	x
	Telephone number	contactDetailsTelephoneNumber	x
	E-mail address	contactDetailsEMail	x
	Consent of the operator to make his contact information public	publishingAgreement	x

Table 7: Selected Truck parking DATEX II master types, applied to the middleware specification

Detailed description of selected master values being used for the CROCODILE middleware specification based on the main truck parking topics:

DATEX II Class	DATEX II attribute / role names	DATEX II Definition
Identification Information		
ParkingSite/ParkingRecord	ParkingName	Name of the parking, i.e. name of the parking site or the group of parking sites.
ParkingSite/ParkingRecord	parkingAlias	Alternative name for the parking site or the group of parking sites.
ParkingSite/ParkingRecord/Contact/ContactByReference	parkingSiteAddress	Information about the parking site itself (address etc.). The 'GroupOfLocations' association must not be used for this role.
Location Information of entry point		
PointCoordinates	Latitude/Longitude	For at least one access (single/multiple entry points), a point must be specified by its ETRS89 coordinates
Primary Road identifier1/ direction and Primary Road Identifier2/ direction		
ParkingAccess/Road	roadName	The name of the road.
ParkingAccess/Road	roadIdentifier	Identifier/number of the road.
ParkingAccess/Road	roadDestination	Name of some city, area, compass direction or other identification the road is leading to (to determine the direction in question).
ParkingAccess/Road	distanceToThisRoad	Distance to the road in metres (from the calling component/object).
Exit		
RoadNode	junctionName	Name of the junction.
Number of free parking places for trucks		
ParkingOccupancy	parkingNumberOfVacantSpaces	The total number of currently vacant parking spaces available in the specified parking site, group of parking sites or group of parking spaces.
Price and currency of parking places		
Charge	charge	Charge for the specified interval (for vehicle of defined characteristics, if any specified) up to the maximum defined duration and during the defined period(s).

Charge	chargeInterval	Interval for which the charge applies (e.g. charge applies for 2 hours (to specify in seconds)). If no interval is specified, the price is valid for the whole period (kind of flat fee).
ChargeBand	chargeCurrency	A three-character code according to ISO 4217 for the currency in which the parking charge is specified (e.g. EUR, GBP, SEK, CZK).
ChargeBand	maximumDuration	The maximum duration (e.g. of parking) for which the specified charge is applicable.
Description of security, safety and service equipment		
ParkingStandardsAndSecurity	parkingSecurity	Specifies security measures related to the parking site or particular spaces.
ParkingStandardsAndSecurity	parkingAddtionalSecurity	Security equipment of the parking site that is not covered by the enumeration 'ParkingSecurityEnum'.
ParkingStandardsAndSecurity	parkingSecurityNationalClassification	A national classification of the parking security.
ParkingStandardsAndSecurity	labelSecurityLevel	Formal assessment for the security level defined by the LABEL project http://truckparkinglabel.eu.
ParkingStandardsAndSecurity	labelServiceLevel	Formal assessment for the service level defined by the LABEL project http://truckparkinglabel.eu.
ParkingStandardsAndSecurity	labelSecurityLevelSelfAssessment	Self-assessment for the security level defined by the LABEL project http://truckparkinglabel.eu.
ParkingStandardsAndSecurity	labelServiceLevelSelfAssessment	Self-assessment for the service level defined by the LABEL project http://truckparkinglabel.eu.
ParkingStandardsAndSecurity	parkingSupervision	Defines the kind of supervision of the parking site.
ParkingStandardsAndSecurity	certifiedSecureParking	Presence of a certification for secure parking.
ParkingStandardsAndSecurity	dateOfCertification	Date of certification.
Number of parking places for refrigerated goods vehicles		
VehicleCharacteristicsExtended	loadType2	Extension point for 'VehicleCharacteristics' to support

		additional attributes and literals like additional fuel types, load types etc.
Information on specific equipment or services for specific goods vehicles and other		
ParkingEquipmentOrServiceFacility	otherEquipmentOrServiceFacility	Specifies the additional equipment or service facility, if the enumerations provided do not fit. Use literal 'other' in this case.
Contact information of the parking operator		
ContactDetails	contactPersonName	Name of the contact person.
ContactDetails	contactPersonFirstName	First name of the contact person.
ContactDetails	contactDetailsTelephoneNumber	Telephone Number of contact.
ContactDetails	contactDetailsEMail	E-Mail address of the contact.
ContactDetails	publishingAgreement	Indication, whether the contact accepted publishing its contact information.

Table 8: Detailed description of selected master truck parking data types within DATEX II

4 Annex – Overview of selected SRTI data

SRTI Classification			DATEX II Classification		CROCODILE SRTI Selection	Partner - Matching	
SRTI_Code	SRTI-Main Topic	SRTI-Subtopic	DATEX II class	DATEX II Type	CROCODILE - Selection	Asfinag-Matching	ELSOL
a.)	Temporary slippery road	Flooding	EnvironmentalObstruction	flooding		not planned	implemented
a.)	Temporary slippery road	Danger of aquaplaning	WeatherRelatedRoadCondition	surfaceWater		not planned	not planned
a.)	Temporary slippery road	Surface water hazard	WeatherRelatedRoadCondition	surfaceWater		not planned	not planned
a.)	**Temporary slippery road**	**Slippery road**	**WeatherRelatedRoadCondition**	**slipperyRoad**	**x**	**considered**	**implemented**
a.)	Temporary slippery road	Mud on road	NonWeatherRelatedRoadCondition	mudOnRoad		not planned	implemented
a.)	Temporary slippery road	Loose chippings	NonWeatherRelatedRoadCondition	looseChippings		not planned	not planned
a.)	Temporary slippery road	Oil on road	NonWeatherRelatedRoadCondition	oilOnRoad		not planned	implemented
a.)	Temporary slippery road	Petrol on road	NonWeatherRelatedRoadCondition	petrolOnRoad		not planned	not planned
a.)	Temporary slippery road	Ice	WeatherRelatedRoadCondition	Ice		implemented	implemented
a.)	Temporary slippery road	Black ice	WeatherRelatedRoadCondition	blackIce		implemented	not planned
a.)	Temporary slippery road	Snow drifts	WeatherRelatedRoadCondition	snowDrifts		not planned	not planned
a.)	Temporary slippery road	Icy patches	WeatherRelatedRoadCondition	icyPatches		not planned	not planned
b.)	**Animal/people/obstacles/debris on the road**	**Objects on the road**	**GeneralObstruction**	**objectOnTheRoad**	**x**	**considered**	**implemented**
b.)	Animal/people/obstacles/debris on the road	Obstructions on the road	GeneralObstruction	objectOnTheRoad		not planned	implemented
b.)	Animal/people/obstacles/debris on the road	Shed loads	GeneralObstruction	shedLoad		not planned	not planned
b.)	Animal/people/obstacles/debris on the road	Fallen trees	Environmentalobstruction	fallenTrees		not planned	implemented
b.)	Animal/people/obstacles/debris on the road	Avalanches	Environmentalobstruction	avalanches		implemented	implemented
b.)	Animal/people/obstacles/debris on the road	Rockfalls	Environmentalobstruction	rockfalls		not planned	implemented
b.)	Animal/people/obstacles/debris on the road	Landslips	Environmentalobstruction	landslips		not planned	not planned
b.)	Animal/people/obstacles/debris on the road	Animals on the road	AnimalsPresenceObstruction	animalsOnTheRoad		not planned	implemented
b.)	Animal/people/obstacles/debris on the road	People on roadway	GeneralObstruction	peopleOnRoadway		not planned	not planned
b.)	Animal/people/obstacles/debris on the road	Children on roadway	GeneralObstruction	childrenOnRoadway		not planned	not planned
b.)	Animal/people/obstacles/debris on the road	Cyclists on roadway	GeneralObstruction	cyclistsOnRoadway		not planned	implemented
b.)	Animal/people/obstacles/debris on the road	Large animals on roadway	AnimalsPresenceObstruction	largeAnimalsOnTheRoad		not planned	not planned
b.)	Animal/people/obstacles/debris on the road	Herds of animals on roadway	AnimalsPresenceObstruction	herdOfAnimalsOnTheRoad		not planned	not planned
b.)	Animal/people/obstacles/debris on the road	People throwing objects onto the road	DisturbanceActivity	attackOnVehicle		not planned	not planned
b.)	Animal/people/obstacles/debris on the road	Broken down vehicles	VehicleObstruction	brokenDownVehicle		implemented	not planned
b.)	Animal/people/obstacles/debris on the road	Broken down vehicles	VehicleObstruction	brokenDownHeavyLorry		implemented	not planned
c.)	**Unprotected accident area**	**Unprotected accident area(s)**	**GeneralObstruction**	**UnprotectedAccidentArea**	**x**	**considered**	**considered**
d.)	Short term road works	Clearance work	GeneralObstruction	rescueAndRecoveryWork		not planned	not planned
d.)	**Short term road works**	**Maintenance work**	**MaintenanceWorks**	**maintenanceWork**	**x**	**considered**	**implemented**
d.)	Short term road works	Slow moving maintenance vehicle(s)	VehicleObstruction	SlowMovingMaintenanceVehicle		not planned	not planned
d.)	Short term road works	Road marking work	MaintenanceWorks	RoadMarkingWork		not planned	implemented
e.)	**Reduced visibility**	**Visibility reduced**	**PoorEnvironment**	**visibilityReduced**	**x**	**considered**	**implemented**
e.)	Reduced visibility	Smoke hazard	PoorEnvironment	smokeHazard		not planned	not planned
e.)	Reduced visibility	Dense fog	PoorEnvironment	denseFog		implemented	implemented
e.)	Reduced visibility	Patchy fog	PoorEnvironment	patchyFog		not planned	not planned
e.)	Reduced visibility	Blowing snow	PoorEnvironment	Snowfall		implemented	implemented
e.)	Reduced visibility	Low sun glare	PoorEnvironment	lowSunGlare		not planned	not planned
f.)	**Wrong-way driver**	**Vehicle(s) on wrong carriageway**	**VehicleObstruction**	**vehicleOnWrongCarriageway**	**x**	**implemented**	**implemented**
g.)	**Unmanaged blockage of a road**	**blocked**	**<SituationRecord>:.impact:trafficConstrictionTy**	**roadBlocked**	**x**	**implemented**	**implemented**
g.)	Unmanaged blockage of a road	bridge blocked	<SituationRecord>:.impact:trafficConstrictionTy	roadBlocked		implemented	implemented
g.)	Unmanaged blockage of a road	tunnel blocked	<SituationRecord>:.impact:trafficConstrictionTy	roadBlocked		implemented	implemented
g.)	Unmanaged blockage of a road	exit blocked	<SituationRecord>:.impact:trafficConstrictionTy	roadBlocked		implemented	implemented
g.)	Unmanaged blockage of a road	connecting carriageway blocked	<SituationRecord>:.impact:trafficConstrictionTy	carriagewayBlocked		implemented	implemented
g.)	Unmanaged blockage of a road	entry blocked	<SituationRecord>:.impact:trafficConstrictionTy	roadBlocked		implemented	implemented
g.)	Unmanaged blockage of a road	entry blocked	<SituationRecord>:.impact:trafficConstrictionTy	lanesBlocked		implemented	implemented
h.)	**Exceptional weather conditions**	**Heavy snowfall**	**PoorEnvironment**	**Snowfall**	**x**	**implemented**	**implemented**
h.)	**Exceptional weather conditions**	**Heavy rain**	**PoorEnvironment**	**heavyRain**	**x**	**implemented**	**implemented**
h.)	Exceptional weather conditions	Storm force winds	PoorEnvironment	stormForceWinds		not planned	implemented
h.)	**Exceptional weather conditions**	**Strong winds**	**PoorEnvironment**	**strongWinds**	**x**	**considered**	**implemented**
h.)	Exceptional weather conditions	Crosswinds	PoorEnvironment	crosswinds		not planned	not planned
h.)	Exceptional weather conditions	Strong winds affecting high-sided vehicles	PoorEnvironment	crosswinds		not planned	not planned

5 Annex – Overview of selected Truck Parking data

1.) Static data related to parking areas

EU Truck Parking Regulation				DATEX II Classification			CROCODILE Selection
NR	Main topic	Corresponding attributes	Format	DATEX II applied classes	DATEX II attribute/role name	DATEX II Type	
1	Identification Information	Name, address of parking area	max. 200 characters	ParkingSite/ParkingRecord	ParkingName	MultilingualString	x
1	Identification Information	Name, address of parking area	max. 200 characters	ParkingSite/ParkingRecord	parkingAlias	MultilingualString	x
1	Identification Information	Name, address of parking area	max. 200 characters	ParkingSite/ParkingRecord/Contact/ContactByReference	parkingSiteAddress	MultilingualString	x
2	Location Information of entry point	Single/ Multiple Entrance points: Vehicle entrance, Vehicle exit, Emergency exit, etc.	20 + 20 characters	PointCoordinates	Latitude/Longitude	Float	x
3	Primary Road identifier1/ direction and Primary Road Identifier2/ direction	Number/identifier of road, road destination as direction (e.g. city name), opt. 2nd road identifier	20 characters/20 characters	ParkingAccess/Road	roadName	MultilingualString	x
3	Primary Road identifier1/ direction and Primary Road Identifier2/ direction	Number/identifier of road, road destination as direction (e.g. city name), opt. 2nd road identifier	20 characters/20 characters	ParkingAccess/Road	roadIdentifier	MultilingualString	x
3	Primary Road identifier1/ direction and Primary Road Identifier2/ direction	Number/identifier of road, road destination as direction (e.g. city name), opt. 2nd road identifier	20 characters/20 characters	ParkingAccess/Road	roadDestination	MultilingualString	x
3	Primary Road identifier1/ direction and Primary Road Identifier2/ direction	Number/identifier of road, road destination as direction (e.g. city name), opt. 2nd road identifier	20 characters/20 characters	ParkingAccess/Road	distanceToThisRoad	Metres	x
4	Exit	indication of the exit, distance from primary road (integer 3) in km or miles.	max. 100 characters	RoadNode	junctionName	MultilingualString	x
5	Number of free parking places for trucks	static data related to the parking areas	integer 3	ParkingOccupancy	parkingNumberOfVacantSpaces	NonNegativeInteger	x
6	Price and currency of parking places	boolean freeofcharge, currency, charges	300 characters	Charge	charge	AmountOfMoney	x
6	Price and currency of parking places	boolean freeofcharge, currency, charges	300 characters	Charge	chargeInterval	Seconds	x
6	Price and currency of parking places	boolean freeofcharge, currency, charges	300 characters	ChargeBand	chargeCurrency	CurrencyEnum	x
6	Price and currency of parking places	boolean freeofcharge, currency, charges	300 characters	ChargeBand	maximumDuration	Seconds	x

2.) Information on safety and equipment of the parking area

EU Truck Parking Regulation				DATEX II Classification			CROCODILE Selection
NR	Main topic	Corresponding attributes	Format	DATEX II applied classes	DATEX II attribute/role name	DATEX II Type	
1	Description of security, safety and service equipment	securtiy/ supervision/ service facility/ safety types and common defintions	500 characters	ParkingStandardsAndSecurity	parkingSecurity	ParkingSecurityEnum	x
1	Description of security, safety and service equipment	securtiy/ supervision/ service facility/ safety types and common defintions	500 characters	ParkingStandardsAndSecurity	parkingAddtionalSecurity	MultilingualString	x
1	Description of security, safety and service equipment	securtiy/ supervision/ service facility/ safety types and common defintions	500 characters	ParkingStandardsAndSecurity	parkingSecurityNationalClassification	MultilingualString	x
1	Description of security, safety and service equipment	securtiy/ supervision/ service facility/ safety types and common defintions	500 characters	ParkingStandardsAndSecurity	labelSecurityLevel	LABELSecurityLevelEnum	x
1	Description of security, safety and service equipment	securtiy/ supervision/ service facility/ safety types and common defintions	500 characters	ParkingStandardsAndSecurity	labelServiceLevel	LABELServiceLevelEnum	x
1	Description of security, safety and service equipment	securtiy/ supervision/ service facility/ safety types and common defintions	500 characters	ParkingStandardsAndSecurity	labelSecurityLevelSelfAssessment	LABELSecurityLevelEnum	x
1	Description of security, safety and service equipment	securtiy/ supervision/ service facility/ safety types and common defintions	500 characters	ParkingStandardsAndSecurity	labelServiceLevelSelfAssessment	LABELServiceLevelEnum	x
1	Description of security, safety and service equipment	securtiy/ sueprvision/ service facility/ safety types and common defintions	500 characters	ParkingStandardsAndSecurity	parkingSupervision	ParkingSupervisionEnum	x
1	Description of security, safety and service equipment	securtiy/ sueprvision/ service facility/ safety types and common defintions	500 characters	ParkingStandardsAndSecurity	certifiedSecureParking	Boolean	x
1	Description of security, safety and service equipment	securtiy/ sueprvision/ service facility/ safety types and common defintions	500 characters	ParkingStandardsAndSecurity	dateOfCertification	Date	x
2	Number of parking places for refrigerated goods vehicles	Number of parking places for refrigerated goods vehicles	numerical 4 digits	VehicleCharacteristicsExtended	loadType2	LoadType2Enum	x
3	Information on specific equipment or services for specific goods vehicles and other	Information on specific equipment or services for specific goods vehicles and other	300 characters	ParkingEquipmentOrServiceFacility	otherEquipmentOrServiceFacility	MultilingualString	x
4	Contact information of the parking operator	contact person name	100 characters	ContactDetails	contactPersonName	String	x
4	Contact information of the parking operator	contact person name	100 characters	ContactDetails	contactPersonFirstName	String	x
4	Contact information of the parking operator	Telephone number	20 characters	ContactDetails	contactDetailsTelephoneNumber	String	x
4	Contact information of the parking operator	E-mail address	50 characters	ContactDetails	contactDetailsEMail	String	x
4	Contact information of the parking operator	Consent of the operator to make his contact information public	Yes/No	ContactDetails	publishingAgreement	Boolean	x