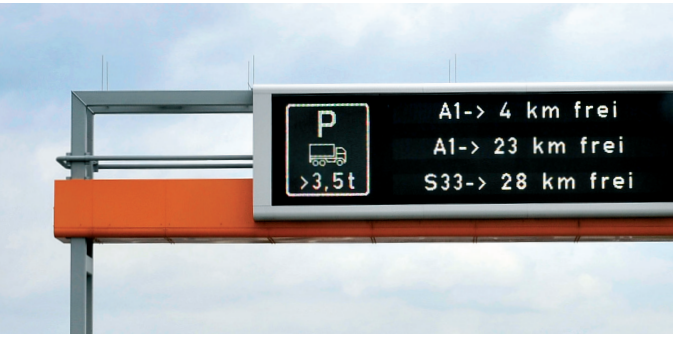
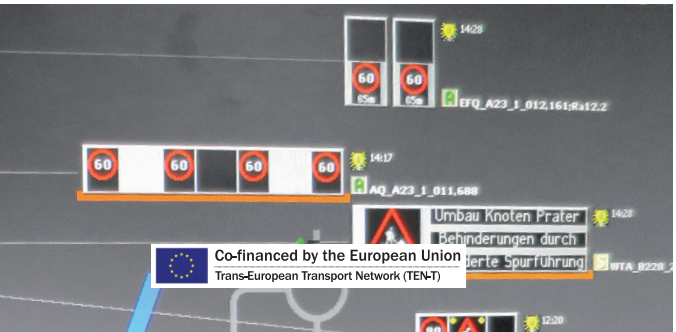
HARMONISATION OF DATA EXCHANGE

RESULTS OF THE CROCODILE PROJECT





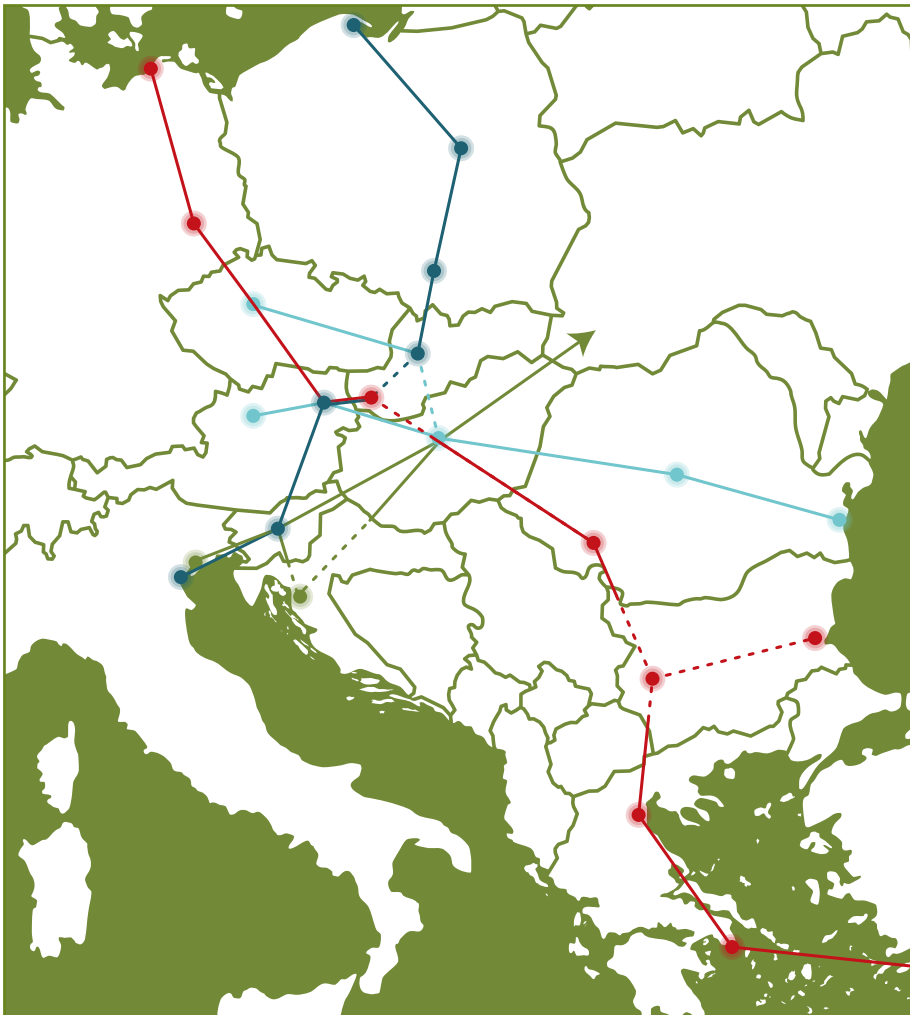


TABLE OF CONTENTS

I The CROCODILE Corridor: Many Challenges, one solution . . 4
II The Importance of Data exchange and harmonisation 5
III Traffic data availability and data exchange in CROCODILE . . 7
IV Success Stories 9
V Next Steps 11

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ABOUT CROCODILE

- **10 partners** (Austria, Cyprus, Czech Republic, Germany, Greece, Hungary, Italy, Poland, Romania, Slovenia)
- **3 observers** (Bulgaria, Croatia, Slovakia)
- **Duration:** 01/01/2013 – 31/12/2015
- **Budget:** € 31,420,180
- **EU contribution:** € 6,284,036

In the past major traffic events have led to congestion and traffic breakdown in Central and East European cross-border areas repeatedly. This region comprises several smaller countries with different languages and lots of cross-border traffic. Consequently cooperation and harmonised information exchange is a real must.

CROCODILE is the resulting initiative, focussing on overcoming organisational barriers as well as setting up and operating an infrastructure for providing information on road traffic flows along the whole service chain. It will allow the exchange of data and information based on common standards, ultimately leading to high-quality end user information services and more efficient traffic flows. Partners work together in an integrative manner, encompassing workshops for elaborating coordinated approaches and solutions for implementation.

OBJECTIVES

- Fostering **cross-border coordination**
- Implementing infrastructure for **data collection** (CCTV, sensors)
- Implementing infrastructure for **data processing** (upgrading traffic management centres)
- Implementing infrastructure for **data access** (DATEX II nodes)
- Providing safety critical **traffic information**
- Providing information to truck drivers on **parking space availability** along the CROCODILE corridors

I. THE CROCODILE CORRIDOR: MANY CHALLENGES, ONE SOLUTION

Within CROCODILE public authorities, road administrations and traffic information service providers from Austria, Bulgaria, Croatia, Cyprus, Czech Republic, Germany, Greece, Hungary, Italy, Poland, Romania, Slovakia and Slovenia are working together to improve cross-border traffic and transport on the high-level road network in the corridor area. Partners and stakeholders are committed to setting up and operating a data exchange infrastructure based on DATEX II. This infrastructure will allow a more efficient data and information exchange between all public and private stakeholders. The overall goal is to provide end-users with harmonised cross-border traveller information services along the whole corridor.

The CROCODILE corridor comprises road network elements of 13 Central and Eastern European countries with different network characteristics and crosses bi-national borders at more than 15 locations. Thus it ensures a coordinated approach towards traffic management and control as well as towards offering harmonised traveller information services of highest quality on the most important east-west road corridor in an enlarged Europe. The basis for the CROCODILE corridor is the existing TEN-T core network presented in 2013.

CROCODILE covers three main TEN-T core network corridors and one additional corridor (Mediterranean) to fill the gaps:

Baltic – Adriatic
(Poland – Czech Republic – Slovakia – Austria – Slovenia – Italy)

Rhine – Danube (Germany – Czech Republic – Austria – Slovakia – Hungary – Romania – Bulgaria)

Orient/East-Med (Germany – Czech Republic – Austria – Slovakia – Hungary – Romania – Bulgaria – Greece – Cyprus)

Mediterranean
(from Italy/Venice – Slovenia – Croatia – Hungary)

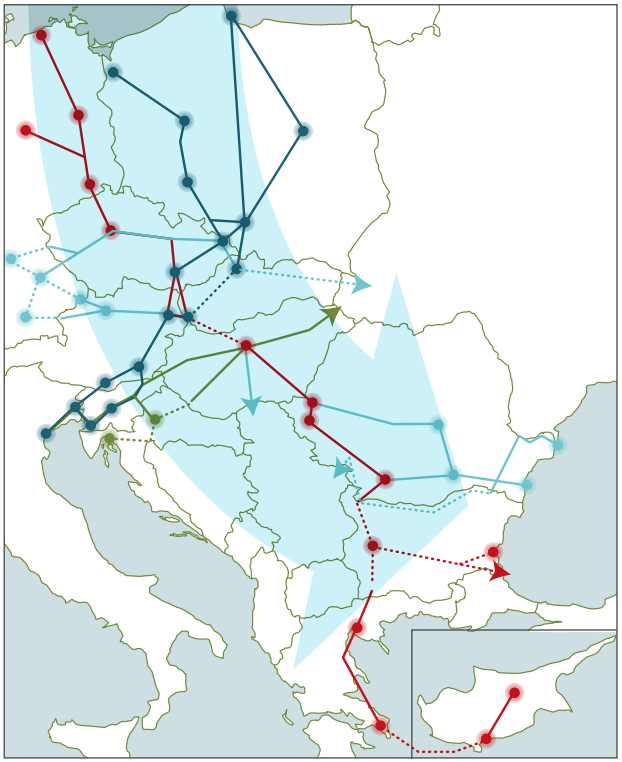

Figure 1: CROCODILE covers a comprehensive set of TEN-T corridors

II. THE IMPORTANCE OF DATA EXCHANGE AND HARMONISATION

Based on the EasyWay Deployment Guidelines (especially on DTX-DG01 - DATEX II) CROCODILE will mainly focus on the implementation of DATEX II nodes for data availability and exchange as required in the relevant EU legislation. By exchanging data via DATEX II between road operators and stakeholders of different countries CROCODILE partners are committed to the objectives of the EU ITS Directive (2010/40/EU) and their resulting delegated acts. This also includes data necessary for the provision of safety critical road services and the information on available truck parking spaces. This encompasses especially the Delegated Regulations for priority actions c (886/2013) and e (885/2013) of the EU ITS Directive. The CROCODILE end-user service will consequently focus on providing users with road safety related minimum universal traffic information free of charge as well as with information services for safe and secure parking places for trucks and commercial vehicles.

CROCODILE has followed a participative approach in collecting the necessary requirements for mastering the way from fragmented information provision up to harmonised data exchange across regional and national borders, starting at the organisational and legal framework. The first CROCODILE workshop in autumn 2014 addressed the transposition of the EU ITS Directive with regard to the establishment of national bodies, national access points (NAPs) and the availability of traffic data in general. There was common sense visible that a national body has to be part of the public administration in order to ensure impartiality and this national body shall be attached to an already existing organisation. Recent initiatives for NAPs can be seen as a

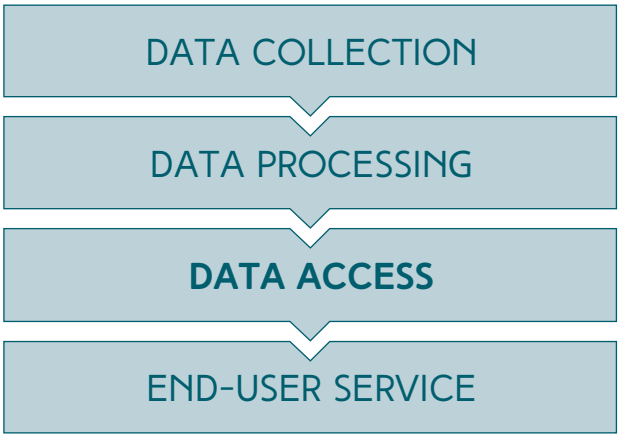

Figure 2: The core activities of CROCODILE, attributing crucial importance to data access

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DEFINING A MINIMUM REFERENCE DATA SET.

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starting point. Their expandability must be agreed upon early on national and cross-border level. The discussion about data availability revealed the necessity of bilateral agreements between Member States on traffic data. A first proposal for a minimum set of traffic data to be exchanged between CROCODILE MS (on the TERN) has been worked out.

SMOOTH AND SEAMLESS

To ensure the availability of the necessary data, additional data collection infrastructure has been deployed on specific road sections along the CROCODILE corridor for detecting events or identifying potentially dangerous conditions on the road. All data will be made available by the CROCODILE Member States through national access points that will be set up in accordance with the relevant EU legislation.

The second CROCODILE workshop in early 2015 was focused on organisational and technical issues for data exchange related to the EU ITS Directive. Participants discussed their approaches together with representatives from the DATEX II Strategic Group. A questionnaire conducted after the first workshop has revealed that many static and dynamic traffic data are already available in the CROCODILE Member States. But due to the splintered responsibilities (e.g. different road operators) it is sometimes unclear which data are available from which side and in what level of quality.

Out of cooperation and agreements between Croatia, Italy and Slovenia there are Traffic Management Plans operational for the main travelling times and in case of major events related to severe weather conditions. DATEX II will be the main tool to be adopted by the road operators in order to ensure smooth and seamless data exchange. Based on the data available, a so-called middleware specification was developed to support harmonised data exchange, covering a minimum set of required SRTI and truck parking messages. The middleware specification provides a master data types which are used for rendering differently assigned DATEX II attributes into commonly understood ones. Thus there will be a simplification of data types by establishing master values within available DATEX II classes.

Figure 3: CCTV and other sensors are the first link in the service chain of collecting and distributing high-quality traffic information

III. TRAFFIC DATA AVAILABILITY AND DATA EXCHANGE IN CROCODILE

Mainly road operators and administrations, infrastructure providers and service providers are addressed to deploy the DATEX II standard within Europe in order to harmonise 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 priority actions c and e of the EU ITS Directive. In this context the CROCODILE data exchange specification mainly aims at defining a minimum reference data set which allows for a translation of differently used situation-publication types between differently implemented national DATEX II profiles and thus avoiding exchange-limitations.

Based on the European standard for road traffic data and information exchange (DATEX II) all available road information being provided in CROCODILE are agreed to be exchanged. In general the DATEX II standard itself 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. Wherever Member States having applied DATEX II for distributing traffic and transport information, standardised data elements are currently differently selected and used. This makes it necessary to harmonise data elements in order to provide a sufficient DATEX II-exchange of available traffic data between different Member States. Therefore a so-called middleware specification was developed providing a commonly agreed minimum set of DATEX II data elements.

In the first step reference literature providing information about data classes and enumeration types used within DATEX II was 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. Safety related message sets being matched to DATEX II version 2.3 by the TISA[1] organisation are used as main inputs for developing an universal safety related CROCODILE middleware specification. →Figure 4

CROCODILE PROVIDES THE MISSING LINK

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 specification covering at least all SRTI related main topics was conducted. As a result a generic list covering the found minimum set of reference data was elaborated based on the results of the selection of safety related data types. All partners were asked to provide status information on which safety related data elements are available for the exchange.

[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)

Figure 4: 3-step approach of finding and defining a common safety related exchange specification

In the last step all partners were additionally asked to describe their availability status of the corresponding SRTI topics and subtopics. 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 with no DATEX II nodes installed could consequently avoid data exchange limitations by implementing and considering all minimum set of safety related traffic information definitions.

The specification itself provides a systematic and structured way of defining and exchanging preselected and prioritised 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. →Figure 5

In this example between two road operators (publisher and client sites) the safety related information of 'Black Ice' should be forwarded to operator 'B', having established for instance a publisher-push-on-occurrence web-service. Unfortunately client 'B' cannot understand the information content of 'Black Ice' as there is no data type of 'Black Ice' within the DATEX II directory of B available. In this case the operator's software at B does not know how to handle the information content. Here 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 'WeatherRelated RoadCondition'. Having filtered and matched the specific data to corresponding master data enables machine readability at the client.

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.

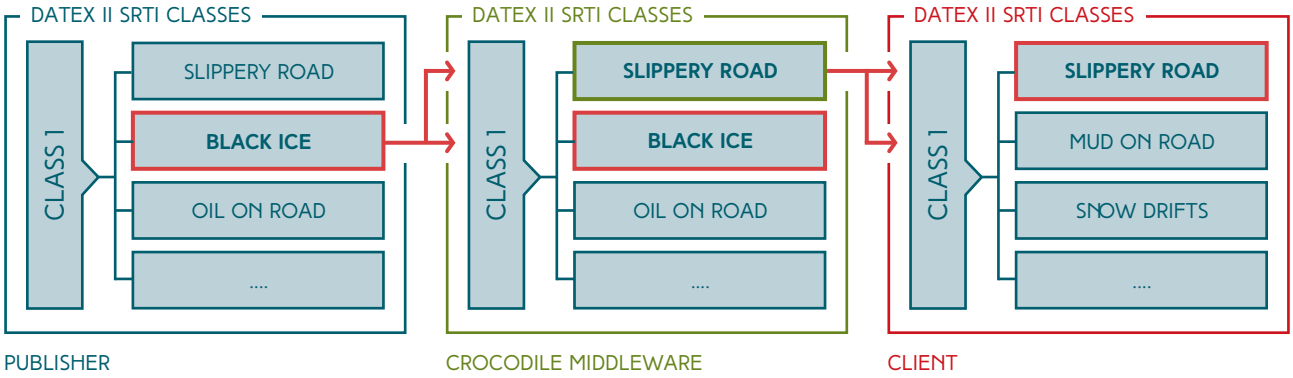

Figure 5: Safety related traffic data exchange between Publisher and Client (i.e. two different road operators), based on the commonly used middleware specification

IV. SUCCESS STORIES

AUSTRIA: ASFINAG EVENT MANAGEMENT

The Austria road operator ASFINAG has been developing a system for recognising, displaying and communicating events on their infrastructure. This Event Data Base (EDB) is embedded into the overall ASFINAG system landscape for content management and analysing traffic situations, simplifying the location and verification of an event.

As sole operator of the Austrian high-level road network ASFINAG has taken advantage of this position and was able to set up effective structures for data collection, processing and exchange. The massive amount of available traffic data within the ASFINAG system ensures a maximum of comprehensiveness. This is further enhanced by staying in touch with emergency forces that operate on site. The system proposes a traffic message which is verified, enhanced by further information

Figure 6: ASFINAG's traffic control centre represent a central hub function in collecting and distributing traffic information

and recommendations and distributed to a central data hub as well as to internal and external partners. In this way EDB depicts and incorporates the whole information chain.

All this has been part of ASFINAG's activities for exchanging data across national borders via DATEX II. Parts of the architecture are already operational and along with the remaining preparatory activities, there will ultimately be a substantial increase in quality and efficiency along the whole service chain of traffic information on European level. →Figure 6

SLOVENIA: CROSS-BORDER COOPERATION AND INFORMATION DISPLAY

In 2014, DARS, the Slovenian road operator, undertook the necessary activities for coordinated traffic management cooperation in the exchange of traffic information with all neighbouring countries. The result is one MoU (Memorandum of Understanding), signed by Austria, Croatia, Hungary, Italy, and Slovenia. It represents a formal basis for the exchange of traffic information and for the development of individual TMPs (Traffic Management Plan).

Follow-up activities included an operational agreement on information exchange between the TMCs (Traffic Management Centre) in other Member States, thus enabling ad-hoc agreements on unforeseen complications. A TMP for the summer season was agreed between Italy, Croatia, and Slovenia concerning the traffic from Venetia to Croatian Istria. Constant exchange of traffic information has been carried out between DARS, ASFINAG, and Autovie Venete. For presenting information from neighbouring motorway operators, DARS drew a road map and integrated it into its central system for displaying and entering traffic information throughout the entire Slovenian road network.

The central system has been designed to allow the centralised entry and review of the situation on all Slovenian roads with one single tool. Its map currently displays traffic information on Austrian motorways (ASFINAG), also available on www.promet.si. A gradual

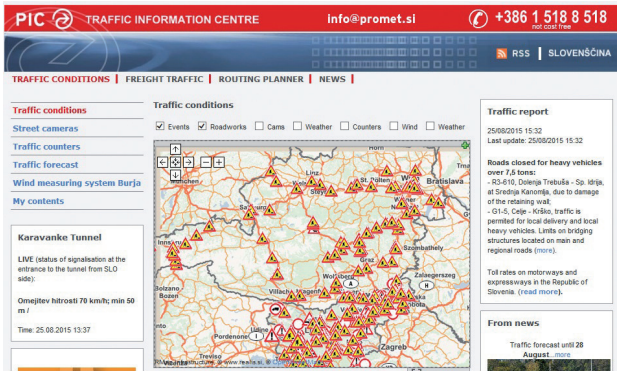

Figure 7: The platform promet.si as a tool for displaying cross-border traffic information

integration of individual traffic management tools, currently used by traffic controllers in separated systems, is planned. →Figure 7

GERMANY: MOBILITY DATA MARKETPLACE

An important objective of German state administrations has always been the digital availability of high quality traffic data for the population. Taking into account the EU ITS Directive (2010/40/EU) the German Bundesländer have worked in cooperation with the federal government on the creation of open DATEX II interfaces.

In the first step this will enable traffic control centres to provide available traffic data for public and private interested parties while promoting economic interest at the same time. The Mobility Data Marketplace (www.mdm-portal.de) established by the federal government serves as a medium for the exchange of all relevant data. Thus it constitutes the German approach for setting up a national access point as required by the relevant EU legislation. In a second step, the pan-European cross-border data exchange will be realised which will not only improve the European traffic flow but will also protect the environment for the most flexible, safe and environmentally friendly mobility.

CZECH REPUBLIC: SCENARIOS FOR DATA ACCESS

In terms of DATEX II, activities in the Czech Republic prior to and in the course of CROCODILE focus on the implementation of a national access point and identification of traffic information sources. The study "Proposal of DATEX II implementation in Czech National Traffic Information Centre (NDIC)" elaborates in detail the requirements and proposes an implementation scenario for a national access point. A national registry shall list relevant traffic information sources and provide sufficient information for establishing a suitable system architecture. A distribution interface will provide actual data integrated from all internal sources at NDIC.

The study also opened opportunity to use dynamic location referencing (OpenLR) for describing traffic information locations. This will allow for easier use of published traffic information for all types of clients (having different map data) and will also enable smoother map data updates in NDIC itself. The study and the resulting preparatory activities will pave the way for implementing the national access point in the course of CROCODILE 2.

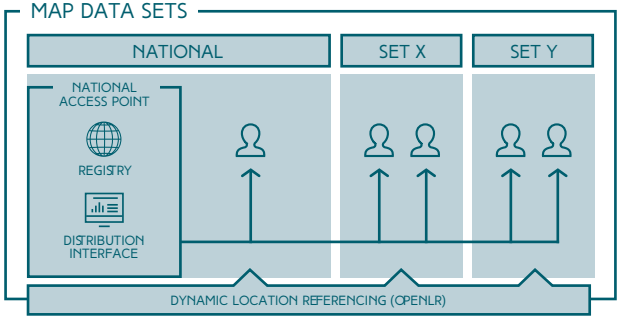

Figure 8: Czech map data sets and dynamic location referencing

V. NEXT STEPS

While working in the field of truck parking and safety-relevant traveller information services, the deployment within the CROCODILE corridor also serves as preparation activity for implementations in accordance to priority action b (provision of EU-wide real-time traffic information services). and a (provision of EU-wide multimodal travel information services). In this respect the CROCODILE corridor deployments will support Member States and partners to carry out harmonised deployment while contributing to the policy objectives of the European Commission even after project finalisation. This will also include further development and enhancement of DATEX II nodes, based on the outcomes of CROCODILE. Additionally CROCODILE partners are committed to provide evaluation data to the European ITS Platform Project (EIP). This is important for analysing performance and contribution to the transport policy objectives concerned (i.e. safety, efficiency and environmental sustainability).

Cooperation will be continued and enhanced in CROCODILE 2. The focus will be on ensuring continuity in cross-border activities and cooperation, encompassing the assessment of cross-border data content and quality based on the outcomes of CROCODILE. Preparatory activities on implementing NAPs have been carried out. CROCODILE 2 will finalise the implementation of a national access point and a national body competent to assess compliance with the requirements of the relevant Delegated Regulations in each participating Member State.

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KICKING OFF IMPLEMENTION OF INFRASTRUCTURE AND PROCESSES ACCORDING TO EUROPEAN LEGISLATION

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