



# **PORTUGAL IMPLEMENTATION REPORT**

**On the Delegated Act 2017/1926 of 31 May 2017  
supplementing Directive 2010/40/EU of the European Parliament and of the Council  
with regard to the provision of EU-wide multimodal travel information services (MMTIS)**

**NOVEMBER.2019**

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## SUMMARY

The **Portuguese NAP for Priority Action A is being developed under the Connecting Europe Facility (CEF) action No2018-PT-TM-099-S (Cooperative Streets)**. The NAP development will be tendered in the first semester of 2020 and is estimated to be operational by the end of the year.

A NAP for a road usage perspective, with data exchanged by road operators and in line with the Commission Delegated Regulation (EU) 2015/962 and the Commission Delegated Regulation (EU) No 886/2013 is presently being established within the context of C-Roads Portugal. The Roadway NAP is estimated to be operational by the end of the first semester of 2020.

**The MMTIS NAP will be built upon/integrated with the Roadway NAP.**

Portugal is running to the CEF PSA MMTIS call to support the early implementation of the delegated regulation 2017/1926 under Directive 2010/40/EU at the national level. The Portuguese proposal was accepted by the Commission and the corresponding PSA action started on 01.01.2018.

Within the CEF PSA MMTIS Action, the first tests on the data integration from two of the major public transport data repositories (Transporlis and STEPP/SIGGESC) were carried out during 2019 with examples of data (**routes/shapes; stops; calendar; frequencies**) from **Bus and Tramways, Trains and Ferryboats**. Examples from Bus and Tramways data were converted to an open data format (**GTFS**). This pilot provided an important knowledge base to speed up the future integration of data from the mentioned data repositories and its incorporation on the NAP as soon as it is available.

To further foster the **gathering of data**, Portugal is also participating on a number of CEF PSA financed projects that will cover different parts of this process, namely: Datex 2; TN-ITS GO; AF data collection (IDACS); Transmodel, NeTEx and SIRI (DATA4PT).

The **NeTEx National profile** is also being developed under the CEF PSA MMTIS Action, following an incremental approach that will build the national profile for public transport, by modules. Part 1 of the NeTEx National profile concerns the Public Transport Network topology and timing concepts and is being built from the most common data features identified on the stakeholders. The sub-parts selected from the standard documentation for the Part 1 of the national profile are logically related to the public transport network topology. There are Data frames related to the public transport network which describe the stop infrastructure, their interconnections and sequences (i.e. routes), and its meaning to the end user/passenger (i.e. line). There are other elements on this draft profile (part 1) that comprise the planning of the operator lines (i.e. Journeys and Services).

To develop a comprehensive map that determines which public and private stakeholders are required to implement the forthcoming delegated act, a **Stakeholder Map** was prepared, within the CEF PSA MMTIS Action. The identified stakeholders were consulted on their commitment to comply with delegated regulation 2017/1926, including their evaluation on their readiness to provide data

in the regulation foreseen formats. The result of this consultation allowed the construction of the below stakeholders' analysis map about stakeholders **interest** and **influence** to accelerate the development, deployment and interoperability of ITS across the European Member States.

During 2018 and 2019 the dissemination of the delegated regulation 2017/1926 was ensured through national public presentations, including one to the top managers of road, rail, ferry and light rail operators and city halls of Lisbon Metropolitan Area.

## CONTEXT

The Commission Delegated Regulation (EU 2017/1926), setting out specifications for the provision of EU-wide multimodal travel information services (MMTIS), was formally published in the EU Official Journal on 21 October 2017.

The regulation is a part of the Delegated Regulations that supplement the Directive 2010/40/EU (ITS Directive) of the European Parliament and of the Council, of 7 July 2010, on the framework for the deployment of Intelligent Transport Systems (ITS) in the field of road transport (Priority Action A, as defined by the Article 3 of the ITS Directive).

<b>Framework of delegated regulations</b>		
<b>Priority Action</b>	<b>Delegated Regulations</b>	<b>Description</b>
<b>A</b>	1926/2017 (31 May 2017)	Supplementing Directive 2010/40/EU of the European Parliament and of the Council with regard to the provision of EU-wide multimodal travel information services.
<b>B</b>	962/2015 (18 December 2014)	Supplementing Directive 2010/40/EU of the European Parliament and of the Council with regard to the provision of EU-wide real-time traffic information services.
<b>C</b>	886/2013 (15 May 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.
<b>D</b>	305/2013 (26 November 2012)	Supplementing Directive 2010/40/EU of the European Parliament and of the Council with regard to the harmonised provision for an interoperable EU-wide eCall.
<b>E</b>	885/2013 (15 May 2013)	Supplementing ITS Directive 2010/40/EU of the European Parliament and of the Council with regard to the provision of information services for safe and secure parking places for trucks and commercial vehicles.
<b>F</b>	To be published	Supplementing ITS Directive 2010/40/EU of the European Parliament and of the Council with regard to the provision of reservation services for safe and secure parking places for trucks and commercial vehicles.

The present report states the Portuguese measures undertaken to ensure the implementation of the Delegated Act 2017/1926, and complies with the Member States report obligations as stated on Point 1, of Article 10, of the mentioned Delegated Act.

## NATIONAL ACCESS POINT - NAP

### From the C-Roads NAP to the MMTIS (Cooperative Streets) NAP

The **Portuguese NAP for Priority Action A is being developed under the Connecting Europe Facility (CEF) action No2018-PT-TM-099-S (Cooperative Streets)**. The NAP development will be tendered in the first semester of 2020 and is estimated to be operational by the end of the year.

A NAP for a road usage perspective, with data exchanged by road operators and in line with the Commission Delegated Regulation (EU) 2015/962 and the Commission Delegated Regulation (EU) No 886/2013 is presently being established within the context of C-Roads Portugal. The Roadway NAP is estimated to be operational by the end of the first semester of 2020.

The Cooperative Streets action will build upon this Roadway NAP, but implementing an Urban Component which foresees the exchange of data for public transport but also parking and traffic information, thus creating a multimodal NAP to answer the challenges of the MMTIS Delegated Act, with both road and urban components. The action will also prolong the Roadway NAP from the core road system to the urban areas, extending its coverage from private vehicles to different types of public transport.

The development of an integrated NAP platform where there will be two vertical components, Road and Urban (MMTIS Delegated Act) will provide a simple seamless access to the upload of the required data and to the "End-points" of each MMTIS pilot being developed within Cooperative Streets. To ensure the correct implementation of the End-Points by each pilot:

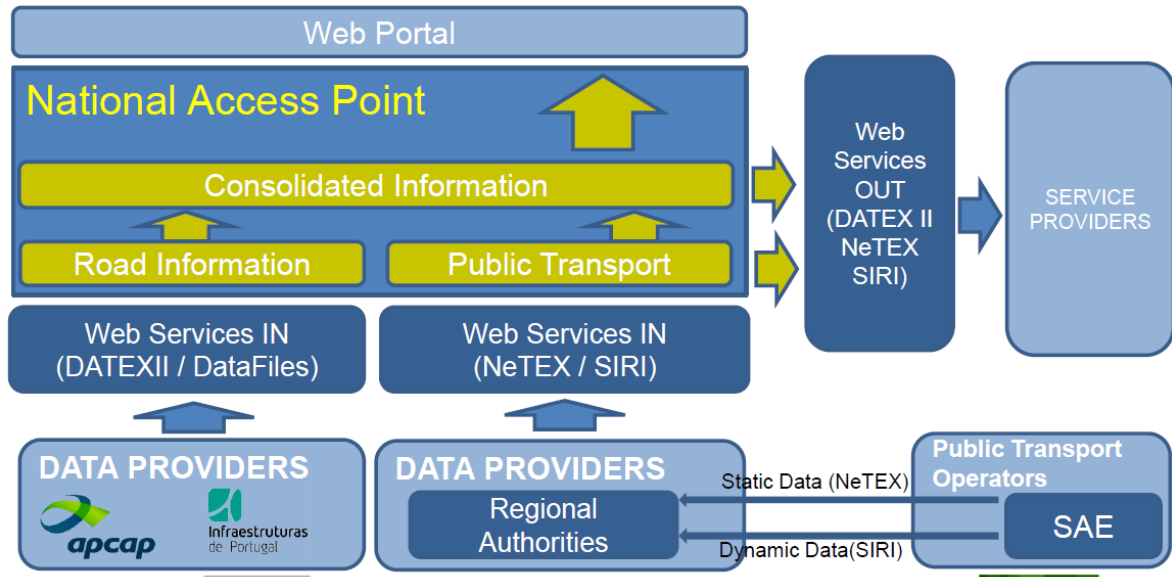
- Each Cooperative Streets pilot will have to implement the established NAP protocols and send information, or make the links available in the various protocols;
- It will be possible, in the future, to evolve the current solution and gradually integrate the information according to a wider strategy of aggregating the information in NAP itself. However, for the pilot deployment a lighter solution with end-points has been identified as a better short-term strategy.

The Cooperative Streets action will also be fundamental to the NAP development by ensuring that:

- The various pilots will be harmonized and monitored to confirm that the various implementations of the various protocols follow good practices, making sure at this stage and in the future, that there is genuine data exchange and interoperability between the various entities;
- A transversal monitoring team will be established for all MMTIS pilots to guarantee this task, which will help ensure the correct implementation of the protocols and produce an implementation guide for the future.

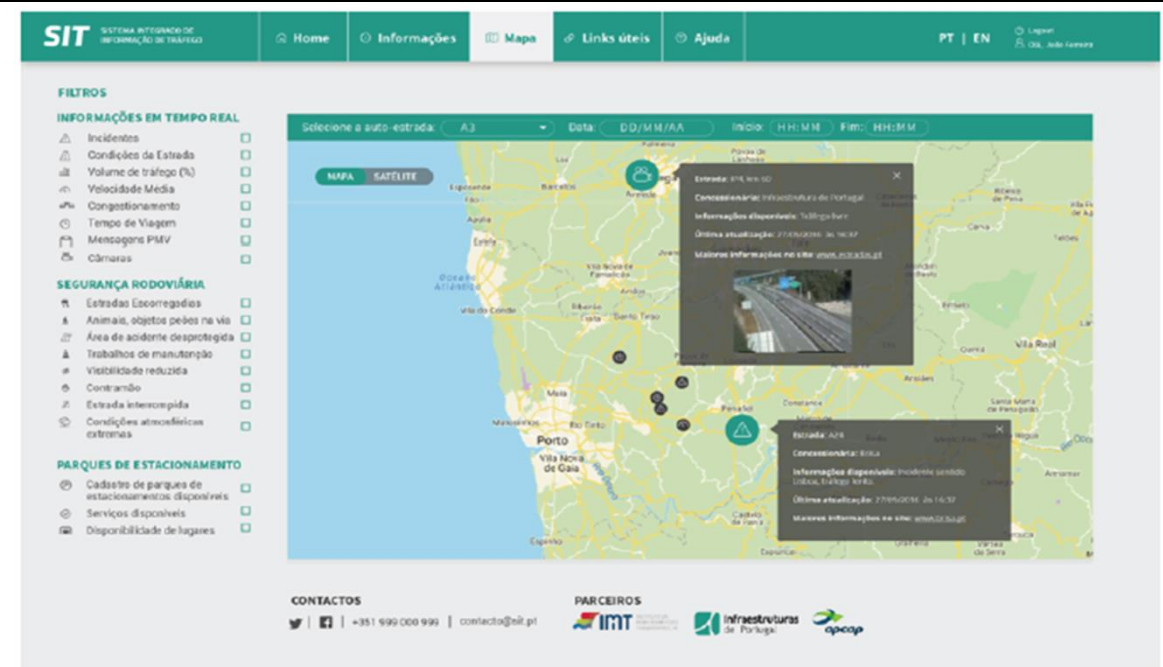
## NAP Architecture

The architecture foreseen to the NAP is the following:



The NAP will be integrated with the Roadway NAP (mock-up below) :

## ROADWAY NAP (mock-up)



## NeTEx National Profile

The NeTEx (Network Timetable Exchange) standard is a CEN standard (CEN TS 16614-1, 16614-2 and 16614-3) for exchanging public transport data, based on Transmodel (EN 12896-1 to 9), aim at standardizing the way of exchanging data between the information systems involved in public transport. It is based on open technologies (XML, XSD, and UML) and enable service operators and authorities to represent public transport data anywhere in Europe using common formats, standard rules, and uniform protocols. NeTEx is divided into three parts:

- Part 1: Network topology (CEN TS 16614-1)
- Part 2: Timing information and Scheduled Timetables (CEN TS 16614-2)
- Part 3: Description of the tariffs (CEN TS 16614-3)

Standards are, by their nature and definition, broad documents that incorporate a very large spectrum of requirements that are beyond local needs and specific implementations. This means that standards' documents are quite large and detailed and somewhat difficult to use for practical (partial) applications complying with it. In addition, some local or national specificities can lead to a specific use or a specific codification to be used for certain information or legacy data formats that may be meaningless for all other applications. Finally, in order to use NeTEx, a set of choices need to be made: some elements proposed by the standards are optional and it must be decided if these items are to be used or not. All this means that the use of profiles is mandatory to adjust the use of a standard to a specific context and a specific use case. The profile may contain information such as:

- details of services,
- details of the fixed objects,
- details on the options proposed by the standard,
- details on optional elements,
- precision on the codifications to be used,
- ...

From a practical point of view, profiles can be seen as implementation guidelines for a certain standard.

### Work and experience so far

The **present development of the national NeTEx profile is being carried out within CEF PSA MMTIS Action**. This profile is focused on the specific needs of Portugal but fully covering them. Since the option to produce a fully comprehensive coverage of all the needs of a country was deemed as risky, the national NeTEx profile for public road transport is being incrementally developed by modules.



For Part 1, which is the Public Transport Network topology and timing concepts, only some topics of the complete model which is composed by innumerable fields were considered, as expected. Therefore, the selection took into consideration the most common features available from the identified stakeholders.

The selected sub-parts from the standard documentation, for the Part 1 of the national profile, are logically related to the public transport network topology. There are Data frames related to the public transport network which describe the stop infrastructure, their interconnections and sequences (i.e. routes), and its meaning to the end user/passenger (i.e. line). There are other elements on this draft profile (part 1) that comprise the planning of the operator lines (i.e. Journeys and Services).

Summing up, the core standard frames for the first iteration on the national public transport profile are:

#### **NeTEx Part 1 National Profile - Public Transport Network topology**

- **Network Description**
  - Network Infrastructure
  - Line Network
  - Route
- **Fixed Object**
  - Site
  - Stop Place
  - Equipment Description
- **Tactical Planning Components**
  - Journey Pattern
  - Service Pattern

The next two parts, Timetables and Fares, will undergo by the same process of filtering and assessment of the valued and relevant frames to be included in the complete national profile for public road transport.

The **main difficulties** that faced, so far, seem to fall into three main categories:

- the size of the task at hand
- reach an agreement on elements involved
- the quality of the data available

Regarding the size of the task at hand, the very large spectrum of requirements that the elements in the standard specification must cover means that there is a lot of work involved in matching the standard with the specific requirements of this application (defining the national profile) and selecting the potential elements that must be in the profile to have a complete coverage of the needs of all stakeholders.

This is also related to the second difficulty, naturally: involving all relevant stakeholders to understand their data needs and data availability, retro-feeding the first task of defining the need subset of the standard.

Despite the availability of standards and the growing trend towards open data, in real life a number of issues affect the data quality:

- datasets have different information,
- different data attributes,
- different purposes or incomplete data,
- the datasets do not contain all the expected information,
- there is lack of accuracy where the information does not reflect the 'true' situation;
- lack of data versioning where a system may not be using the latest available data and is therefore at risk of misrepresenting the 'live' situation,
- lack of coherence, i.e. that the data is not compatible and internally consistent (e.g. a set of summer timetables and stops that are operated in the winter), and
- lack of compliance, i.e. that the data does not match the rules of the format, just to name but a few issues with real data.

#### Foreseen difficulties

The extension of the work done so far to other transport modes and the other parts of the NeTex standard will present some difficulties, specially the later, since Part 2 and Part 3 are less mature and less familiar to the involved stakeholders and Part 3 of the standard also deals with more sensitive information (tariffs).

The biggest issue will still be quality of the available data. Another problem will be the limited access to data in the desired format (e.g. data for public transport modes typically exists for large conurbations and cities but is not necessarily available in a suitable format to other parties unless data access policies have been adopted). For many services, though not all, it is simpler to take a set of data that has already been processed into a common format, rather than taking numerous raw feeds from many sources which would require aggregation and a higher level of data quality checking. The data that is offered in the open data portal or the NAPs does not have any data quality checks or data expiration dates (for instance, the positional coordinates for stops are sometimes outdated).

Moreover, **there is the issue of the costs of scaling up: providing sources of dynamic data** (e.g. SIRI real time feeds) **or existing travel information services, requires a supporting business model.**

Finally, despite the fact that cities and operators sometimes have their own continuously improved databases, which they have refined and corrected using much of their own resources and day-to-day operation knowledge, this data is very valuable and cannot be easily obtained from them (i.e., data divergent for the one available through NAP or Open Data).

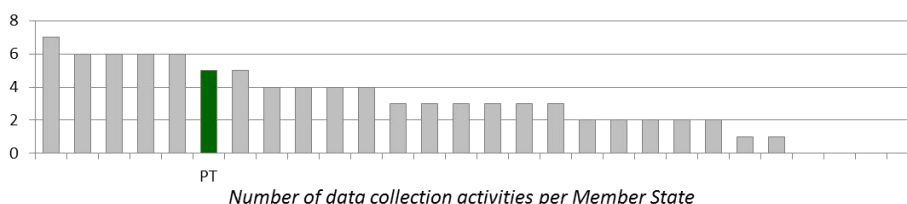
## DATA FOR MULTIMODAL TRAVEL INFORMATION SERVICES

The Portuguese CEF PSA MMTIS Action is the main project that is preparing the MMTIS data for a future NAP integration.

In addition, to further foster the gathering of data, Portugal is also participating on a number of CEF PSA financed projects that will cover different parts of this process, namely: Datex 2; TN-ITS GO; AF data collection (IDACS); Transmodel, NeTEx and SIRI (DATA4PT).

### DATA COLLECTION ACTIVITIES

DATEX 2 (CEF PSA)																						
AT	BE		HR				FR	DE	EL		IT			NL	PT	RO		ES	SE	UK		
TN-ITS GO (CEF PSA)																						
	BE		CY		EE	FI	FR		EL	HU	IE		LT		NL	PT		SI	ES	SE	UK	
FRAME NEXT (CEF PSA)																						
AT			CZ				FR	DE		HU				NL	PL				SE	UK		
MMTIS (17 CEF PSAs)																						
AT	BE		HR		DK	EE	FI	FR	DE		IE		LT		NL	PL	PT		SI	ES	SE	UK
AF data collection (CEF PSA)																						
AT	BE		HR		CZ			FR	DE	EL	HU		LT	LU	NL	PL	PT		SI	ES		
Transmodel, NeTEx and SIRI (CEF PSA)																						
AT			HR		CZ	DK		FR				IT					PT		SI	ES	SE	
Data Task Force																						
AT							FI	FR	DE					LU	NL				ES	SE		



It is important to stress that the Portuguese effort on this subject can be witnessed by the fact that it is amongst the group of member states that are implementing most data collection activities simultaneously (as seen in the above bar chart).

### CEF PSA MMTIS Action - Testing the interoperability of Static Scheduled Data

The integration of the data available at the Transporlis database (including data from public operators from all modes in the metropolitan region of Lisbon) and the STEPP/SIGGESC database, the largest (road) public transport database, is an important process to evaluate the interoperability of the available Static Scheduled Data that should be uploaded in the NAP as it becomes operational. This evaluation is being carried out as the Pilot 1 of the CEF PSA MMTIS Action.

## Analysis and Design

Before the application development of any component of the pilot, the first activity was to perform an initial survey of the overall project needs and secondly to perform the specific survey regarding the requirements for the creation of Pilot 1.

Since the CEF PSA MMTIS Action comprises several pilots, the focus was not only on the Pilot 1 requirements but also on preparing at the same time the development of a platform that could continue to support the demonstration and usability of the Pilot on the phases.

Hence a major work of initial analysis and design was carried out, namely on:

- Identifying the sources of information to use and the ways on how to access the information (i.e., webservices, direct access to databases, files, etc.)
- The available information for use in the project and finding the best solutions of integrating it the project (i.e., encodings, buses, stops, schedules, etc.)
- The current international versions of the GTFS and NeTEx standards
- The initial applicational architecture of the platform
- The initial structure of the database of the platform
- A single data importation model to allow in later phases of this project to export this data to the other formats (i.e., GTFS, NetEx).

## Importation of the datasets

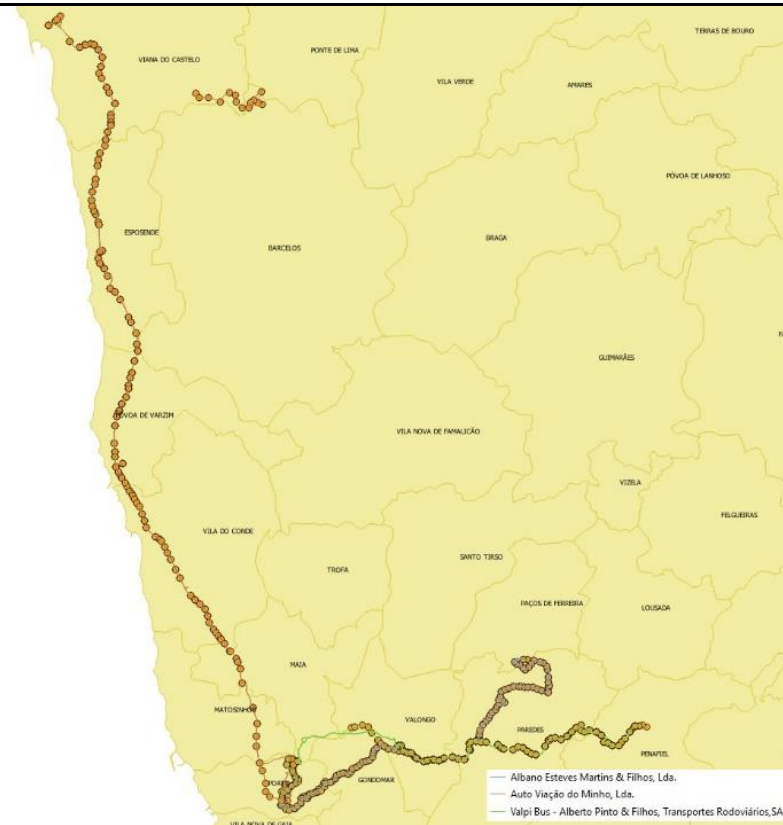
After examples of all transport operator's information were collected and analysed, an importation model for Pilot 1 was designed to allow the importation of all the different data available.

The data received and integrated in Pilot 1 came from two different sources:

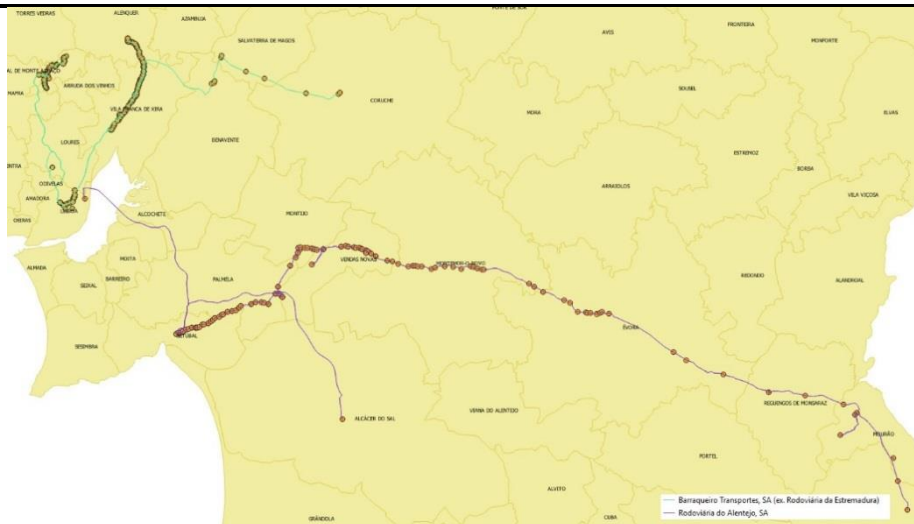
- From TRANSPORLIS: A partial set was included in Pilot 1 with information of local operators in the Lisbon Metropolitan Area. The sample include information about routes, stops, operators and timetables. TRANSPORLIS data model only have mandatory information and no other types of information such as stop or vehicle classification, number of seats, vehicle type or others.
- From STEPP/SIGGESC: A sample with about 20 different routes from 5 different transport operators from the Oporto Metropolitan Area and Lisbon Metropolitan Area were also included in Pilot 1.

In the following figures it is shown some representation examples of the received and integrated data in Pilot 1.

## ROUTES BY OPERATOR IN OPORTO METROPOLITAN AREA



## ROUTES BY OPERATOR IN LISBON METROPOLITAN AREA



Since STEPP/SIGGESC data had more attributes than TRANSPORLIS, such as the number of seats, number of standing places and type of vehicle, the data model of the Pilot was simplified to match the information available in both sources and included the importation of the sample information about routes, stops, operators and timetables.

Overall the following operators and routes were imported and were made available in Pilot 1:

### Bus and Tramways

- Barraqueiro Transportes, SA (ex. Rodoviária da Estremadura)
  - Alenquer - Lisboa (CG) P/ AE do Norte
  - Alenquer - Lisboa (CG) P/ AE Alverca
  - Lisboa (CG) - Sobral Monte Agraço (sem desvio a Ho
  - Coruche - Lisboa (Rápida AE)
- Rodoviária do Alentejo, SA
  - EVORA - LISBOA
- Auto Viação do Minho, Lda.
  - POIARES - VIANA DO CASTELO
- Albano Esteves Martins & Filhos, Lda.
  - MODELOS - PORTO (PELAS A4 E A3)
  - MODELOS (CRUZAMENTO) – PORTO
- Valpi Bus - Alberto Pinto & Filhos, Transportes Rodoviários, SA
  - Milhundos - Porto
  - Penafiel - Porto
- ABCD
  - Lisboa (Sete Rios) - Porto (Campo 24 de Agosto)
  - Porto (Campo 24 de Agosto) - Lisboa (Sete Rios)
  - Lisboa (Sete Rios) - Porto (Campo 24 de Agosto)
  - Porto (Campo 24 de Agosto) - Lisboa (Sete Rios)

### Trains

- CP
  - Castanheira do Ribatejo - Alcântara
  - Santa Apolónia - Azambuja
  - Azambuja - Santa Apolónia
  - Alcântara - Castanheira do Ribatejo (du)
  - Alcântara - Azambuja
  - Alverca - Sintra (du)
  - Sintra - Alverca (du)
  - Cais do Sodre - Cascais
  - Cascais - Cais do Sodré
  - Cais do Sodre - Oeiras (du)
  - Oeiras - Cais do Sodré (du)
  - Barreiro - Setúbal
  - Setúbal - Barreiro
  - Barreiro - Praias do Sado A
  - Praias do Sado A - Barreiro
  - Oriente - Sintra
  - Sintra - Oriente
  - Rossio - Sintra

- Sintra - Rossio
- Alverca - Sintra (du)
- Sintra - Alverca (du)
- Rossio - Mira Sintra-Meleças
- Mira Sintra-Meleças - Rossio

## Application development

### Base platform

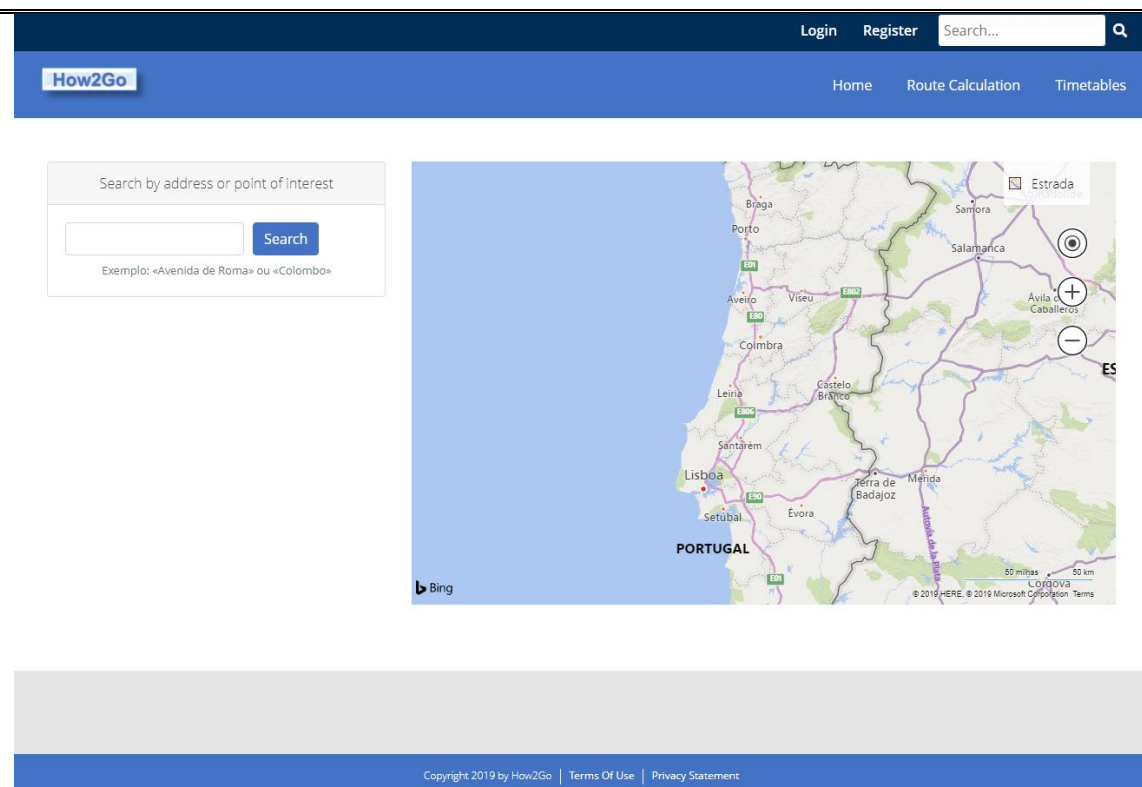
Several components were developed in order to create a base platform that could meet the requirements for Pilot 1 but also for upcoming pilots. The How2Go (the name of the Portuguese CEF PSA MMTIS Action) platform was developed as a website, using an opensource .NET framework and the Bing Maps API.

Made available as a website (for now private) project users can test and verify the features created for each pilot.

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## HOME PAGE OF THE HOW2GO PROJECT - PILOT 1

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In the next phase, for Pilot 2, the site will also provide access to all data exported to GTFS - some data is already available on GTFS format.

## Timetables

The timetables page was developed to make available all the information that was previously imported from TRANSPORLIS and SIGGESC.

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### PAGE OF THE TIMETABLES - PILOT 1

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How2Go[Home](#)   [Route calculation](#)   [Timetables](#)

#### **Bus and Tramways**

- Barraqueiro Transportes, SA (ex. Estremadura Bus Station)
- Alentejo Bus Station, SA
- Auto Viação do Minho, Ldª.
- Albano Esteves Martins & Filhos, Ldª.
- Valpi Bus - Alberto Pinto & Sons, Road Transport, SA
- A B C D

#### **Bus and Tramways**

- > Barraqueiro Transportes, SA (ex. Estremadura Bus Station)
- > Alentejo Bus Station, SA
- > Auto Viação do Minho, Ldª.
- > Albano Esteves Martins & Filhos, Ldª.
- > Valpi Bus - Alberto Pinto & Sons, Road Transport, SA
- > A B C D

#### **Underground**

no information

#### **Trains**

CP

#### **Ferry boats**

no information

#### **Airports**

no information

In this page all the collected and imported information from the transport operators, regarding operators, routes, stops and timetables can be consulted.

When a route is selected it is displayed all the details of that route, in a graphic and on the interactive map. Some options are also available in order to show a schedule of better preference of the user by allowing to change the time of the trip to consult the route or change to non-working days.

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## DETAIL OF A TRANSPORT OPERATOR'S ROUTE

How2Go
Home   Route calculation   Timetables

**Bus and Tramways**

Barraqueiro Transportes, SA (ex. Estremadura Bus Station)

Alentejo Bus Station, SA

Auto Viação do Minho, Ldª

Albano Esteves Martins & Filhos, Ldª

Valpi Bus - Alberto Pinto & Sons, Road Transport, SA

A B C D

**Underground**

no information

**Trains**

CP

**Ferry boats**

no information

**Airports**

no information

**Bus and Tramways**

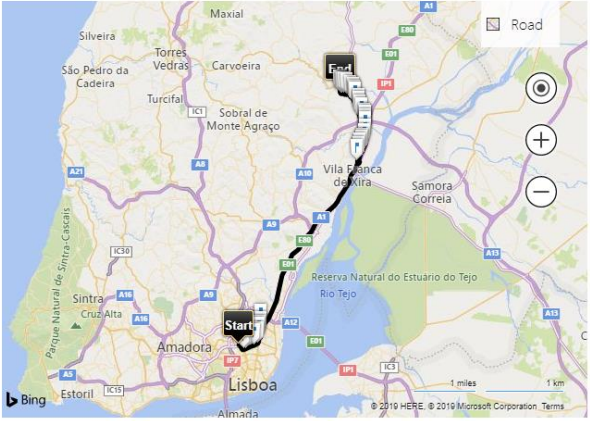
*Barraqueiro Transportes, SA (ex. Estremadura Bus Station)*

**Alenquer - Lisbon (CG) P / AE do Norte**

6:00 PM		<b>LISBON - CAMPO GRANDE TERMINAL</b>
6:04 PM		<b>LISBON - CRUZTº CAMPO GRANDE</b>
6:08 PM		<b>LISBON - JULIO DE MOSOS HOSPITAL</b>
6:12 PM		<b>LISBON - WATER POT</b>
6:16 PM		<b>LISBON - WATCH ROUND</b>
6:19 PM		<b>LISBON - METRO / AIRPORT</b>
6:23 PM		<b>LISBON - AIRPORT</b>
6:27 PM		<b>LISBON - NAV</b>
6:31 PM		<b>LISBON - OLD PRIOR CROSS</b>
7:06 PM		<b>PEOPLE - GULBENKIAN NEIGHBORHOOD</b>
7:09 PM		<b>SANDS - LIDL / CRUZTº HOSPITAL</b>
7:13 PM		<b>SANDS - SAND FARM</b>
7:16 PM		<b>EPAL</b>
7:20 PM		<b>CASTANHEIRA - FOOTBALL FIELD</b>

If you wish a different timetable change date and time

Working days    Saturday    Sunday    Holiday    hour  



### Importation Modules

After an initial analysis of the sources and data available to use in the Pilot 1, a base data importation model was designed aiming to congregate several types of different data and sources into an unique database model.

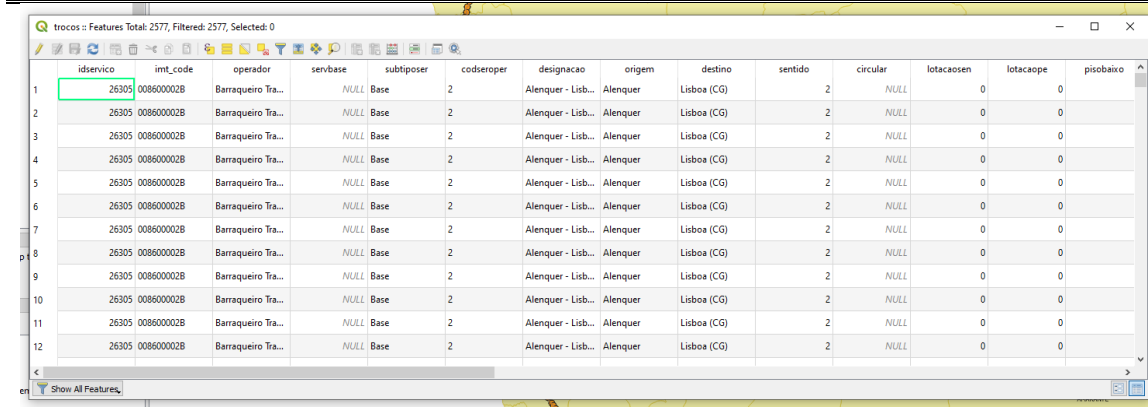
Afterwards specific data importation modules were designed, developed, tested and successfully deployed in Pilot 1:

- Importation module of TRANSPORLIS data
- Importation module of SIGGESC data
- Importation (conversion) module for GTFS data (in preparation of the platform for Pilot 2)

## Database Structure

**SIGGESC source of information** - SIGGESC information is received as a group of ESRI shape \ DBF files that includes Stops, Services, Routes and Frequencies.

### SAMPLE FROM STEPP/SIGGESC'S DATABASE STRUCTURE



idservico	imt_code	operador	servbase	subtiposer	codseroper	designacao	origem	destino	sentido	circular	lotacaosen	lotacaope	pisobatro
26305	008600002B	Barraqueiro Tra...	NULL	Base	2	Alenquer - Lisb...	Alenquer	Lisboa (CG)	2	NULL	0	0	
26305	008600002B	Barraqueiro Tra...	NULL	Base	2	Alenquer - Lisb...	Alenquer	Lisboa (CG)	2	NULL	0	0	
26305	008600002B	Barraqueiro Tra...	NULL	Base	2	Alenquer - Lisb...	Alenquer	Lisboa (CG)	2	NULL	0	0	
26305	008600002B	Barraqueiro Tra...	NULL	Base	2	Alenquer - Lisb...	Alenquer	Lisboa (CG)	2	NULL	0	0	
26305	008600002B	Barraqueiro Tra...	NULL	Base	2	Alenquer - Lisb...	Alenquer	Lisboa (CG)	2	NULL	0	0	
26305	008600002B	Barraqueiro Tra...	NULL	Base	2	Alenquer - Lisb...	Alenquer	Lisboa (CG)	2	NULL	0	0	
26305	008600002B	Barraqueiro Tra...	NULL	Base	2	Alenquer - Lisb...	Alenquer	Lisboa (CG)	2	NULL	0	0	
26305	008600002B	Barraqueiro Tra...	NULL	Base	2	Alenquer - Lisb...	Alenquer	Lisboa (CG)	2	NULL	0	0	
26305	008600002B	Barraqueiro Tra...	NULL	Base	2	Alenquer - Lisb...	Alenquer	Lisboa (CG)	2	NULL	0	0	
26305	008600002B	Barraqueiro Tra...	NULL	Base	2	Alenquer - Lisb...	Alenquer	Lisboa (CG)	2	NULL	0	0	
26305	008600002B	Barraqueiro Tra...	NULL	Base	2	Alenquer - Lisb...	Alenquer	Lisboa (CG)	2	NULL	0	0	

**TRANSPORLIS source of information** - TRANSPORLIS use a relational Sql Server database with the Operators, Stops, Routes and Frequencies. Geographical information about stops and route segments is stored in Autodesk SDF files format.

**How2Go Database Structure** - The How2Go database model was primarily based on TRANSPORLIS data model but some changes were introduced, one of them was that spatial information is now stored in the database and not anymore in external files.

Some concepts:

- Times (hours of the day)
  - All times in the database are stored in seconds;
  - In the case of time of day, the amount that is saved is the number of seconds since midnight;
  - When a bus path starts before midnight and ends after midnight times are saved as 86400 + seconds since midnight. The same applies when the bus path starts after midnight, but this is considered as the time from the previous day.

Most important Tables:

- Table tOperadores
  - One record per operator

- Table tRegimesFreq
  - Frequency: Field Regime is char(28);  $28 = 4 * 7$
  - 7 for 7 days of the week(Sunday=1, Saturday=7)
  - For 4 different types of days: normal, holiday, day after holiday, and day before holiday

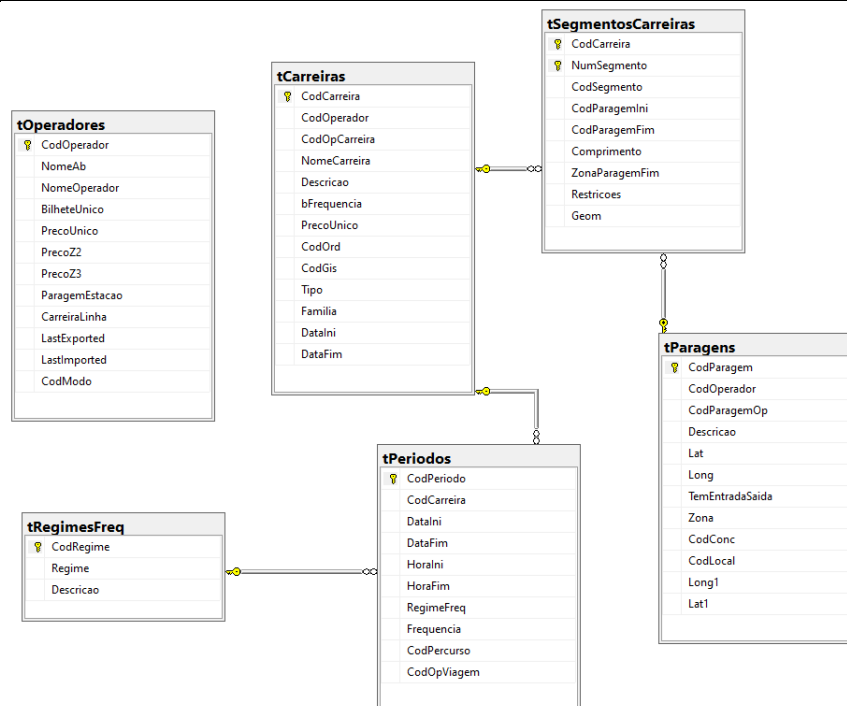
Examples:

- position 2 means Monday, normal day
- position 10 means Tuesday, holiday
- position 28 means Saturday, day before holiday

In each position, X means that career operates on that day (day type)

- Table tCarreiras
  - Route list
- Table tSegmentosCarreiras
  - Route definition. Contains one record for each segment of each route.
  - It also stores the segments geometry in a SQL Spatial field.
- Tabela tSegmentosTempos
  - Contains trip times between stops and waiting times at stops. For a route, time can vary throughout the day. Also, it is possible that a bus makes only a part of the entire route (e.g. at night or on the weekend). Each of these routes (incomplete) and each set of times in different segments should be defined in this table.
- Table tPeriodos
  - Contains schedules. When a period of day has a line route and time constants, and the interval between rounds is constant, it generates a record in this table. Field frequency (absolute value) is the interval between departures; if the value is negative then frequency is used; if the value is positive, then there are departures at StartTime, StartTime + Frequency, ... StartTime + n \* Frequency, ... , EndTime.
- Table tParagens
  - Has the stops of each operator.

## HOW2GO DATABASE STRUCTURE DIAGRAM



### Issues and Challenges found

A few issues were found during the development of Pilot 1, mostly related to the state of the information of the operators and to some limitations to the exporting functionalities of one of the sources of information.

The development of the data importation model required more time than initially expected, since the information received about different types of operators had different data models and **even the geographical information doesn't follow the same rules between the different data sets**. These situations were solved by requiring more time of analysis and further attention to the design of the model but the issue was **overcome successfully with the development of a data importation module in Pilot 1 which now considers all these particularities of each source of information and operator**.

The second data set received from STEPP/SIGGESC, with the interregional transport operator information didn't contain the geographic relation between route segments and stops that is mandatory for our data model. In STEPP/SIGGESC (interregional expressos) the routes are stored as an unique segment connecting the point of origin to the arrival. With that kind of data, the importation wasn't possible, and it would also not allow to calculate journeys successfully. After analysis, our **importation model needed to be redesign in a way that made possible the creation of the required segments**, breaking the lines at stops locations and permitting that in future this information is prepared for the following pilots.

### **CEF PSA MMTIS Action Pilot 1 Conclusions**

The overall development of Pilot 1 was successfully developed and completed under the timeline calendarized for the task, from the 1st February 2018 to 31st August 2019.

A **demonstration video of Pilot 1 is available online** for the project partners to consult any time. The address is:

[http://gismedia2.no-ip.org/how2go/Video/Pilot1/how2Go\\_Pilot1.html](http://gismedia2.no-ip.org/how2go/Video/Pilot1/how2Go_Pilot1.html)

Currently the **website with Pilot 1 is available** privately for project users to verify at the following address:

<http://how2go.gismedia.pt>

The login credentials are:

**Username:** traveller

**Password:** zkal#9di8

As for next steps, the deployment of Pilot 2 is in the final works with the GTFS conversion module already in an advanced testing phase for producing outputs with the information from Pilot 1. Further understanding regarding the completion status is needed about the state of the national NeTEx profile.

## Other MMTIS Data Sources

### Cooperative Streets

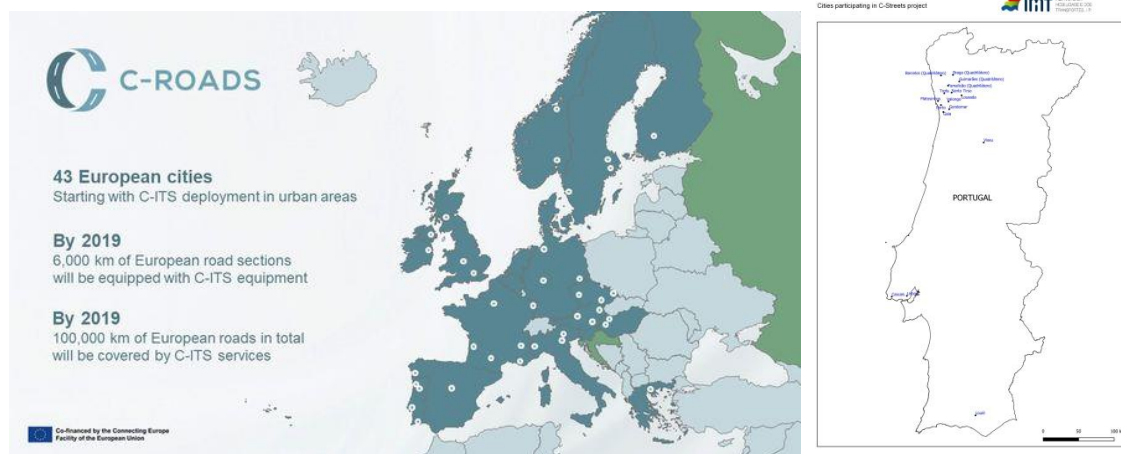
Cooperative Streets project, according to its Grant Agreement, aims to fulfill several policy goals, standing out decarbonisation, by the promotion of public transport use and the development of “mobility as a service solutions”. The key objective is to establish a pilot case for the evolution of the NAP, extending it to accommodate different mobility systems.

This project has 27 Implementing bodies, including **12 cities and one association of four cities (Associação Quadriláetro)**, in different Portuguese regions (nuts III) including Porto Metropolitan Area, Lisboa Metropolitan Area, Viseu-Dão Lafões region and Algarve.

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## COOPERATIVE STREETS CITIES

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From the activities foreseen in the project, most of them concerns with priority action (a) and are divided in several macro pilots which have always in mind the extended NAP development. The pilots and underneath sub-pilots are:

- "Extended Multimodal National Access Point (NAP)"
- "From C-Roads to C-Streets", including:
  - Contracts Performance Monitoring
- "Cooperative Streets", including:
  - Bike Sharing
  - MaaS
  - On demand Transport
  - Public Transport
  - X-Sharing
- "MMTIS", including:
  - Contracts Performance Monitoring
  - Public Transport Information Systems

## IDACS

IDACS, meaning “*ID and Data Collection for Sustainable fuels in Europe*” is a PSA that aims, amongst other objectives, to “*gather missing data and ensure that all data of infrastructure for electricity and hydrogen, are made available through the National Access Points, which are defined in the Directive 2010/40/EU on Intelligent Transport Systems (ITS Directive) and the Commission Delegated Regulations...*”. The provision of this data through NAP is contemplated in Delegated Regulation A and also in Delegation Regulation B. In Delegated Regulation A Annex is described in “1.2. Level of service 2”, paragraph (iv): “Publicly accessible refueling stations for petrol, diesel, CNG/LNG, hydrogen powered vehicles, charging stations for electric vehicles”.

In Delegated Regulation B Annex, is described in number 1, paragraph j): “location of charging points for electric vehicles and the conditions for their use”.

In such circumstances and considering that NAP related to Delegated Regulation B will be deployed earlier, the **information gathered in IDACS project will be first integrated on the Roadway NAP**.

## OPENROADS – Datex II Database

The OpenRoads platform (<https://www.youtube.com/watch?v=ZZwJs6sB5-8>) allows IMT to know, **based on DATEX II extensions**, what is happening on the road network, with a granularity of 100 mts, on each motorway, each lane, each day, every hour, based on information collected by each concessionary and reported to IMT on a “Datex II wrapping”. To achieve IMT’s mission it has to:

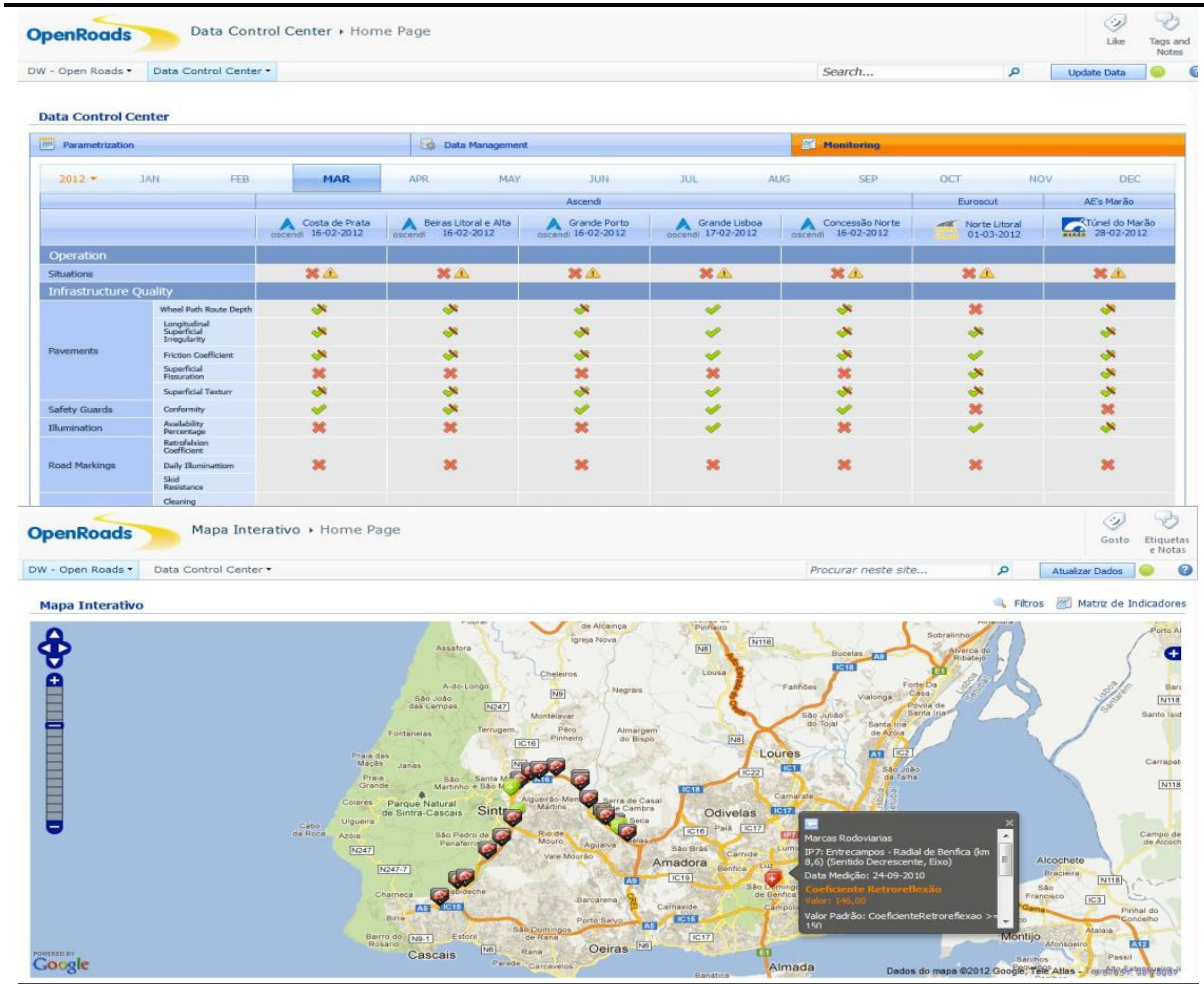
1. Gather and analyse huge amounts of information (Traffic data, Incidents, Quality of infrastructure)
2. Supervise and manage concessions (Availability of roads, Operating indicators, Quality of infrastructure)
3. Act promptly! (With DATEX II which allows collecting information, with assurance and reliability)
4. Inform (IMT) the operators (The availability of the road and any necessary improvement to the road network)

The development of the OpenRoads methodology consisted so far on three steps:

1. The definition of the national vehicle for data exchange DATEX II, ensuring bilateral transparency between and the concessionaires, automated and non manipulative methods for the collection and subsequent processing of information.
2. Definition of an open and scalable functional architecture, both for storage and processing, and allowing its extension to other contracts or partners and new indicators.

3. The development and implementation of the architecture and its components were properly tested and calibrated on a test site with the involvement of the partners. It has been also created DATEX II Infrastructure extensions: - Road Infrastructure Table Publication – Catalogue of road infrastructures - Road Infrastructure Quality of Service Publication – Measures of QoS for the infrastructure catalogue

## OPENROADS DASHBOARD



The implementation of the Openroads solution has won the award for the overall most interesting and attractive DATEX II implementation, on the Datex II Forum 2018.



## STAKEHOLDER ENGAGEMENT

The stakeholder engagement process was mainly developed as part of the Portuguese CEF PSA MMTIS call, as a collaborative process of research, debate and discussion that draws from multiple perspectives to determine a key list of stakeholders across the entire stakeholder spectrum. The work has been developed in a three steps approach:

- Stakeholder Identification: Identifying public and private stakeholders directly and indirectly affected by the project (only entities with some interest or level of influence that can impact How2Go have been classified as a stakeholder); Identifying key groupings and sub- groupings taking into consideration that some groups might be pre-determined by regulatory requirements were defined;
- Stakeholders analysis: understanding stakeholder perspectives and interests;
- Stakeholder mapping: identifying key stakeholders with an interest in How2Go and their likely concerns and visualizing relationships to project objectives and activities and also to other stakeholders.

The work was developed in a national stepwise approach through a brainstorming process to collect an exhaustive list of groups/organizations/people and based on results of the EC Stakeholders Workshops in the framework of the Delegated Act on EU-Wide Multimodal Travel Information Services.

### Stakeholder Identification

The Stakeholders were identified having taken into consideration their key interests, their role in the process, their potential level of impact to the project and identifying the data types they can provide (when data is required).

It was kept in mind that it was not possible to keep confined to the geographic boundaries of How2Go project pilots, since indirect impacts may extend well beyond this area.

A spreadsheet was prepared in a stepwise approach: Identifying public and private stakeholders directly and indirectly affected by the project (including its identification, person contacted and their role).

In a 1st phase this spreadsheet was the subject of debate during a Project Management Meeting and progressively completed taking into account the answers of stakeholders to the issues listed above.

Carried out through one-to-one interviews and meetings involving a subset of stakeholders, it was identified new stakeholders to be included in the initial “stakeholder Identification List” and recognized the interest to categorize them into groups and subgroups bringing together those with similar levels of influence and interest.

**Stakeholder Identification List**

Group	Sub-Group	Entity	URL
<b>National Authorities</b>		AMT - Autoridade da Mobilidade e dos Transportes	<a href="https://www.amt-autoridade.pt/">https://www.amt-autoridade.pt/</a>
		IMT - Instituto da Mobilidade e dos transportes	<a href="http://www.imt-ip.pt/">http://www.imt-ip.pt/</a>
		ANAC - Autoridade Nacional de Aviação Civil	<a href="https://www.anac.pt/">https://www.anac.pt/</a>
<b>Local Authorities</b>		AML – Área Metropolitana de Lisboa	<a href="http://www.aml.pt/">www.aml.pt/</a>
		AMP - Área Metropolitana do Porto	<a href="http://www.amp.pt/">www.amp.pt/</a>
		CIM Região Coimbra	<a href="http://www.cim-regiaodecoimbra.pt">www.cim-regiaodecoimbra.pt</a>
		CIRA - CIM Região Aveiro	<a href="http://www.regiaodeaveiro.pt">www.regiaodeaveiro.pt</a>
		CM Almada - President and Mobility Councilman	<a href="http://www.m-almada.pt/">www.m-almada.pt/</a>
		CM Aveiro - Mobility Councilman	<a href="http://www.cm-aveiro.pt">www.cm-aveiro.pt</a>
		CM Cascais	<a href="http://www.cm-barreiro.pt">www.cm-barreiro.pt</a>
		CM Barreiro - Mobility Councilman	-
		CM Coimbra - Urban Management Councilman	<a href="http://www.cm-coimbra.pt">www.cm-coimbra.pt</a>
		CM Lisboa – Mobility Councilman	<a href="http://www.cm-lisboa.pt/">www.cm-lisboa.pt/</a>
		CM Porto – Mobility Councilman	<a href="http://www.cm-porto.pt/">www.cm-porto.pt/</a>
		CM Setúbal, Palmela, Sesimbra, Montijo, Moita, Seixal, Alcochete	-
		Turismo de Lisboa	<a href="http://www.visitlisboa.com">www.visitlisboa.com</a>
<b>Public Transport Operators and Infrastructure Managers</b>	<b>Road</b>	AveiroTUR	<a href="http://www.aveirotur.pt">www.aveirotur.pt</a>
		CARRIS	<a href="http://www.carris.pt/">www.carris.pt/</a>
		Espírito Santo	<a href="http://www.espiritosanto.com.pt">www.espiritosanto.com.pt</a>
		ETGondomarense	<a href="http://www.gondomarense.pt/">www.gondomarense.pt/</a>
		RL	<a href="http://www.rodoviariadelisboa.pt">www.rodoviariadelisboa.pt</a>
		SCOTTURB	<a href="http://www.scotturb.com/pt/">www.scotturb.com/pt/</a>
		SMTUC	<a href="http://www.smtuc.pt">www.smtuc.pt</a>
		STCP	<a href="http://www.stcp.pt">www.stcp.pt</a>
		TCB	<a href="http://www.tcbarreiro.pt">www.tcbarreiro.pt</a>
		Transportes de Aveiro - Aveiro Bus	<a href="http://www.aveirobus.pt">www.aveirobus.pt</a>
		TST	<a href="http://www.tsuldotejo.pt/">www.tsuldotejo.pt/</a>
		Valpi	<a href="http://www.valpi.pt">www.valpi.pt</a>
		VIMECA	<a href="http://www.vimeca.pt">www.vimeca.pt</a>
	<b>Light Rail</b>	Metro do Porto	<a href="http://www.metroporto.pt/">www.metroporto.pt/</a>

		Metropolitano de Lisboa	<a href="http://www.metrolisboa.pt/">www.metrolisboa.pt/</a>
		MTS - Metro Transportes do Sul	<a href="http://www.mts.pt">www.mts.pt</a>
	Rail	CP	<a href="http://www.cp.pt">www.cp.pt</a>
		FERTAGUS	<a href="http://www.fertagus.pt">www.fertagus.pt</a>
		Infraestruturas de Portugal	<a href="http://www.infraestruturasdeportugal.pt/">www.infraestruturasdeportugal.pt/</a>
	Air	ANA	<a href="http://www.ana.pt/pt">www.ana.pt/pt</a>
		TAP	<a href="http://www.tapairportugal.com/pt">www.tapairportugal.com/pt</a>
Ferry	TT/SL	<a href="https://ttsl.pt/">https://ttsl.pt/</a>	
Associations / Group of Companies	Public Road Transport association	ANTROP	<a href="http://www.antrop.pt/">www.antrop.pt/</a>
	Multimodal Non-Profit Associations	ITS Portugal	<a href="http://www.its-portugal.com/">www.its-portugal.com/</a>
		TRANSPORLIS	<a href="http://www.transporlis.pt">www.transporlis.pt</a>
	Others	Associação Quadrilátero	<a href="http://www.quadrilatero.eu">http://www.quadrilatero.eu</a>
		Andante	<a href="http://www.linhandante.com">www.linhandante.com</a>
		OTLIS	<a href="https://www.portalviva.pt/lx/pt/homepage/sobre-a-otlis/a-otlis.aspx">https://www.portalviva.pt/lx/pt/homepage/sobre-a-otlis/a-otlis.aspx</a>
		ADENE	<a href="http://www.adene.pt">www.adene.pt</a>
		APDSI	<a href="http://www.apdsi.pt/">www.apdsi.pt/</a>
Transport Solutions Service Providers	Service Providers	City Mapper	<a href="https://citymapper.com/">https://citymapper.com/</a>
		Moovit	<a href="https://moovitapp.com/lisboa">https://moovitapp.com/lisboa</a>
		TomTom	-
		Ubirider	<a href="https://www.linkedin.com/company/ubirider/">https://www.linkedin.com/company/ubirider/</a>
		Google	-
		Here Maps	<a href="https://upload.here.com/">https://upload.here.com/</a>
		Via Verde	<a href="http://www.viaverde.pt/">www.viaverde.pt/</a>
	Industry	AMI – Tecnologias para Transportes	<a href="http://www.datacar.eu">www.datacar.eu</a>
		ARMIS	<a href="http://www.armis.pt">www.armis.pt</a>
		Card4B - Systems	<a href="https://www.card4b.pt/pt/">https://www.card4b.pt/pt/</a>
		EMEL	<a href="http://www.emel.pt/pt/">www.emel.pt/pt/</a>
		Gismédia	<a href="https://www.gismedia.pt/">https://www.gismedia.pt/</a>
		Link Consulting	<a href="https://www.linkconsulting.com/">https://www.linkconsulting.com/</a>
		Novabase	<a href="http://www.novabase.pt/">www.novabase.pt/</a>
		OPT	<a href="http://www.opt.pt/">http://www.opt.pt/</a>
		Powerqubit	-
		Siemens	
		Thales	<a href="http://www.thalesgroup.com/pt-pt/portugal/global-presence-europe/portugal">www.thalesgroup.com/pt-pt/portugal/global-presence-europe/portugal</a>
Universities and Consulting	CERIS – (IST)	<a href="http://ceris.pt/">ceris.pt/</a>	
	FEUP	-	
	Público	<a href="http://www.publico.pt">www.publico.pt</a>	
	TIS	<a href="http://www.tis.pt/">www.tis.pt/</a>	
	Transportes em Revista	<a href="http://www.transportesemrevista.com">www.transportesemrevista.com</a>	

		Universidade Católica	-
		Universidade da Beira Interior	<a href="https://www.ubi.pt/Entidade/Departamento_de_Ciencias_Aeroespaciais">https://www.ubi.pt/Entidade/Departamento_de_Ciencias_Aeroespaciais</a>
		VTM	<a href="http://vtm-global.com/">http://vtm-global.com/</a>

To help identify the potential list of stakeholders that should be involved and to extract their interest and concern in the provision of EU-wide multimodal travel information services, after explaining How2Go project to potential stakeholders, it was formally asked to them questions about a MMITS information system, such as:

- Are you familiar to this European initiative?
- What are your expectations of How2Go project?
- Do you foresee to provide data in the formats foreseen in the UE regulation 2017/1926? NeTeX , DATEX II, SIRI
- Which are the constraints you could face to provide data in the formats foreseen in the regulation?
- How could you be engaged, considering a two-way interchange of issues, comments and aspirations, data transfer, ...
- Are you a potential beneficiary? How?
- Who are the potential beneficiaries?
- What could be your role in this Project?
- Who are the groups/organizations/people that you believe may be interested in this Project
- Who has power to influence and promote it?
- Who may impact (positive or negative) How2Go?
- Could you be adversely impacted by a MMITS information system?
- Do you have or who could have, in your opinion, constraints about this initiative?

## Stakeholder Analysis

Once identified the list of stakeholders, further analysis is needed to better understand their relevance and the perspective they offer, to understand their relationship to the project and each other, regarding namely the elements required for the implementation of How2Go and identifying the data types they can provide (when data is generated), their role in the process, their key interests, potential level of impact to the project, and priority in relation to other stakeholders. To ensure this a Stakeholder Analysis table was filled by/with a representative set of stakeholders including the following fields:

STAKEHOLDER ANALYSIS FIELDS	
<b>Stakeholder</b>	<i>Name and website</i>
<b>Impact</b>	<i>Does the stakeholder have data, information, counsel or expertise that could be helpful to the project? (Low, Medium, High)</i>

<b>Influence</b>	<i>How much influence do they have over the project? "What" or "who" they influence? (Low, Medium, High)</i>
<b>Why the project is important to the stakeholder?</b>	<i>To anticipate standardisation procedures, networking, to influence project development, etc...</i>
<b>What could be the stakeholder role in the project?</b>	<i>Availability of H Resources, Reviewer, Data provider, Activity Responsible, Consultation, Dissemination, etc..</i>
<b>Readiness to provide data in the regulation foreseen format</b>	<i>Knowledge about it, planned development, development constraints</i>
<b>Details of Interest</b>	<i>Direct Involvement in Project Pilots, Involvement in Specific Activities, etc...</i>
<b>Influence level</b>	<i>Direct Involvement in Project Pilots, Involvement in Specific Activities, etc...</i>
<b>Interest level</b>	<i>The influencer has interest in the organization?</i>
<b>Power level</b>	<i>The influencer can influence the influence the organization?</i>
<b>Contact / Necessity of Involvement</b>	<i>Upon request, specific activities only, a milestones only, etc.</i>
<b>Additional Notes</b>	<i>Work style, attitude, influence, experience, etc.</i>

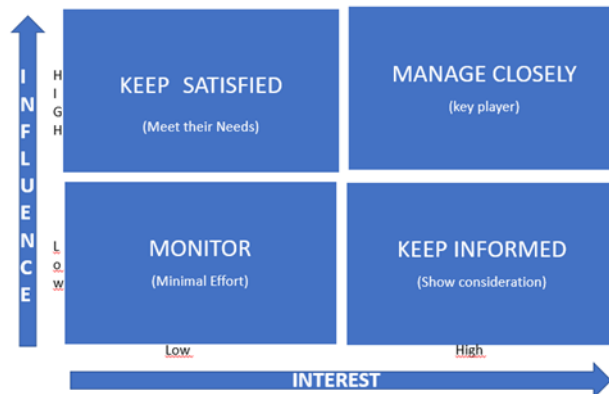
Tracking globally the progress in the exercise above it turns out that:

- a) With the exception of national authorities and Lisbon larger road operator the **other stakeholders were not familiar to this European initiative**;
- b) **Greater responsiveness from transport operators to scheduled/static information availability rather than to real-time information**, although it is the information most desired by users whether they are citizens or service providers.
- c) Data in public transport is a complex issue, coming from an ever-growing variety of sources and having different practical uses: from a seamless EU multimodal door-to-door travel information system integrating different passenger transport modes to the development of several other applications such as transport network planning. **This requires high quality data which has raised issues such as:**
  - **Who controls the quality of data?**
  - **Who owns it?**
  - **Who should be able to access it?**
  - **How to access to the data? Bulk downloads shall be prevented to anonymous users.**
  - **How to refer to a group of stops in the same local with different designations.**
  - **Who should bear the costs of data conversion to EU standards?**

## Stakeholder Mapping

Once completed the above exercises, there was enough information for assessing project stakeholders and their needs, enabling their prioritization based on their relative usefulness for How2Go engagement. Using a matrix which prioritizes stakeholders according to their influence

and interest allowed to draw a picture of the stakeholders level of involvement, that will demonstrate the type of engagement needed to have with them.



The position allocated to the stakeholder on the grid (see matrix above) shows the actions project management team needs to take with them:

- **High power, highly interested people (Manage Closely):** you must fully engage these people and make the greatest efforts to satisfy them.
- **High power, less interested people (Keep Satisfied):** put enough work in with these people to keep them satisfied, but not so much that they become bored with your message.
- **Low power, highly interested people (Keep Informed):** adequately inform these people and talk to them to ensure that no major issues are arising. People in this category can often be very helpful with the detail of your project.
- **Low power, less interested people (Monitor):** again, monitor these people, but don't bore them with excessive communication.

Using the interests and influence of key stakeholders to help shape the project it is possible to gain resources, prioritize competing demands for resources or timelines, and clear potential risks.

Therefore, these key stakeholders are important to identify and manage well for the implementation of Priority Action A. The stakeholder analysis map and the prioritization matrix prepared can help to see who needs to be managed in what way for the implementation process to have the best outcomes.

On the following graphic the stakeholder evaluation, group(s) and subgroups according the analysis performed.

### STAKEHOLDER ENGAGEMENT MATRIX

Stakeholder evaluation	National Authorities		Local Authorities			Public Transport Operators and Infrastructure Managers						Associations / Group of Companies			Transport Solutions Service Providers		
	AMT	ANAC	Metropolitan areas	Municipalities	Turism	Road operators	Carris	C2	C3	C4	C5	D1	D2	D3	E1.1	E1.2	E2
INTEREST	5	1	5	4		4	5	3,5	4	3	3		4,5	5	2	4,25	4,8
INFLUENCE	5	1	4,5	4,5		3,5	4	3,5	4	3,5	4		4,5	3,7	1,25	4	4,5
IMPORTANCE	1	1	2	18		12	1	3	3	4	1		2	8	3	3	11



The Prioritization Matrix showed a **positive level of interest from all groups of stakeholders** and a direct correlation between the influence and the interest of the stakeholders. Several of the public transport operators were amongst the groups with the lowest levels of interest and, as such, they should constitute a primary target for future dissemination actions. As expected the national authorities (IMT and AMT) were the ones that registered a combined higher level of Influence/Interest.