EUROPEAN UNION

1st EU-ASEAN Workshop on Intelligent Transport System (ITS)

Marina Mandarin Singapore › 24-25 October 2019

Enhanced Regional EU-ASEAN Dialogue Instrument (E-READI)

ITS and C-ITS Implementations in Portugal

- for (future)Traffic & Asset Management

INSTITUTO DA MOBILIDADE E DOS TRANSPORTES, I.P.

Agenda

- Overview of Portuguese Road Sector Portuguese
- ITS & C-ITS Projects in Portugal
  - European and Portuguese roadmaps
    - Openroads
    - C-Roads Portugal
- New Roles in Future Traffic Management
  - CCAM

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EUROPEAN UNION

IMT

We are:

Public institute

Indirect state administration

Autonomous from a financial and administrative point of view

We depend:

MINISTRY INFRASTRUCTURE and HOUSING

Ministry Internal Affairs

Ministry Environment

Ministry Sea

We do:

Define objectives

Define guidelines

Implementation of ITS (national level)

We do:

Technical regulation

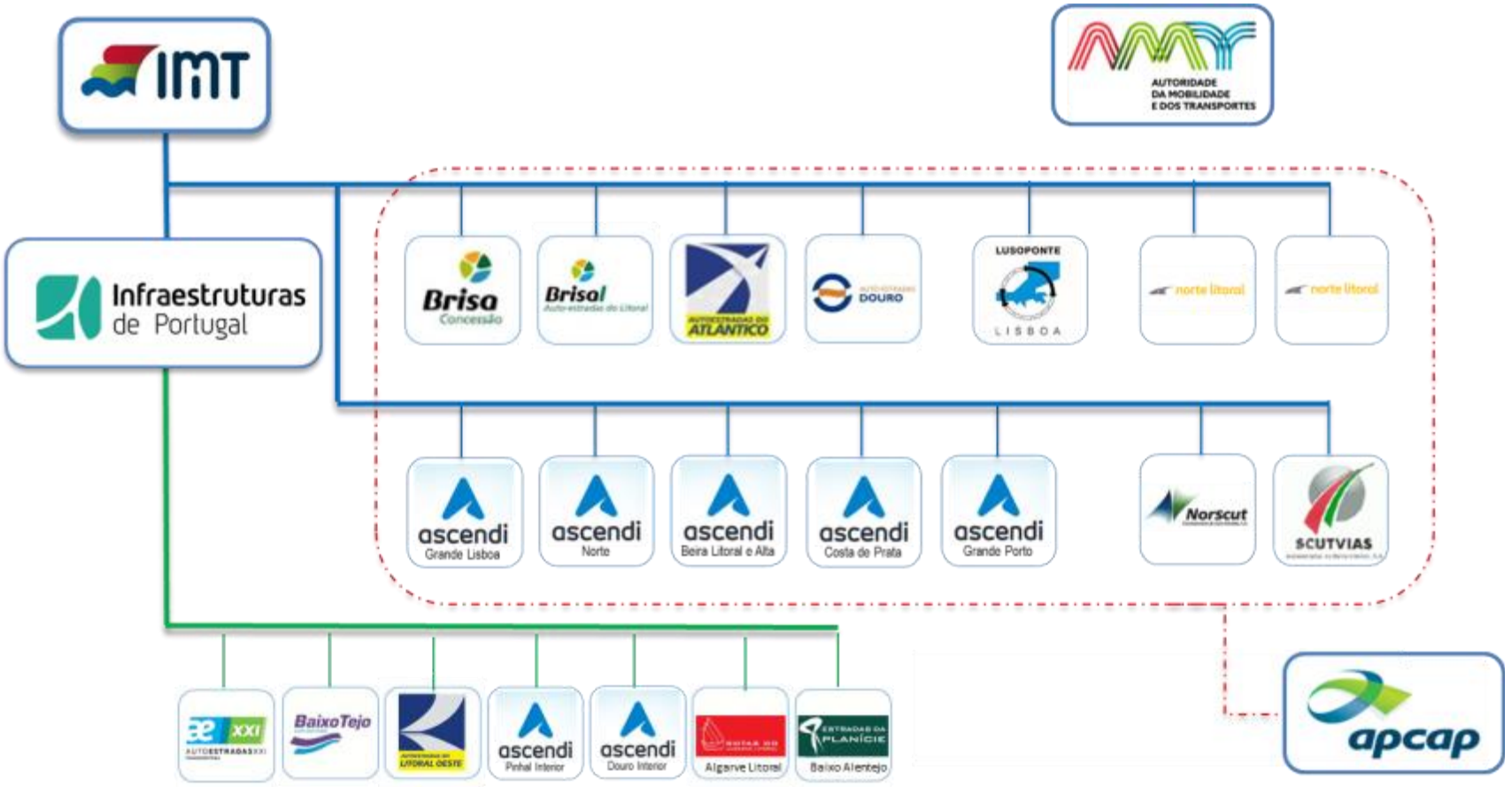
Licensing

Coordination

Supervision and planning

Transport and related infrastructures

Roles of the Road Infrastructure Stakeholders



Roles of the Road Infrastructure Stakeholders

- **THE PUBLIC ROAD SECTOR**
- IMT is a Public Institute for Transport and Mobility, under the Ministry of Infrastructure and Housing, and other 3 Ministrys,
- IMT is responsible for market regulation, network planning and implementation of the National Road Plan while supervising and overseeing the road sector including land transport
- IMT ensures efficiency, equity, quality and safety and user's rights.
  - Manages concession contracts by monitoring and assessing Management and Operation (traffic related issues) and Road Infrastructure's Quality.
  - Assessing contractual impacts and monitoring compliance with their obligations, preventing financial claims and safeguarding state's best interest.
- **It Assess Performance**

Roles of the Road Infrastructure Stakeholders

- **NATIONAL ROAD ADMINISTRATION**
  - IP – Infraestruturas de Portugal, S.A. is a public company whose overall mission is to provide a public service aimed at financing, building, preserving, operating, upgrading and expanding the roads that integrate the current and future Portuguese road network.
  - National Body for traffic management and traffic information.
  - Manages a total of 11700 km on its TCC and more than 2000 equipment's (Cameras, VMS, SOS, Traffic and weather sensors, tunnels, others);
  - Provides ITS services for concessions and sub concessions, each one having a regional TCC;
- **It Performs**

Roles of the Road Infrastructure Stakeholders

- **THE PRIVATE ROAD SECTOR**
- APCAP - Several private Roads Operators
  - To defend and promote the general interests of its members in National and International scope;
  - To support the concessionaires of motorways or bridges with tolls, in several domains such as: Road Safety, Network Operations, ITS - Telematics, Legal, Financial….
  - To promote research and development activities within the scope of its members' business;
  - Within their 3 Permament Committeess (CP1, CP2, CP3).

They also Perform – the business is their Core activity

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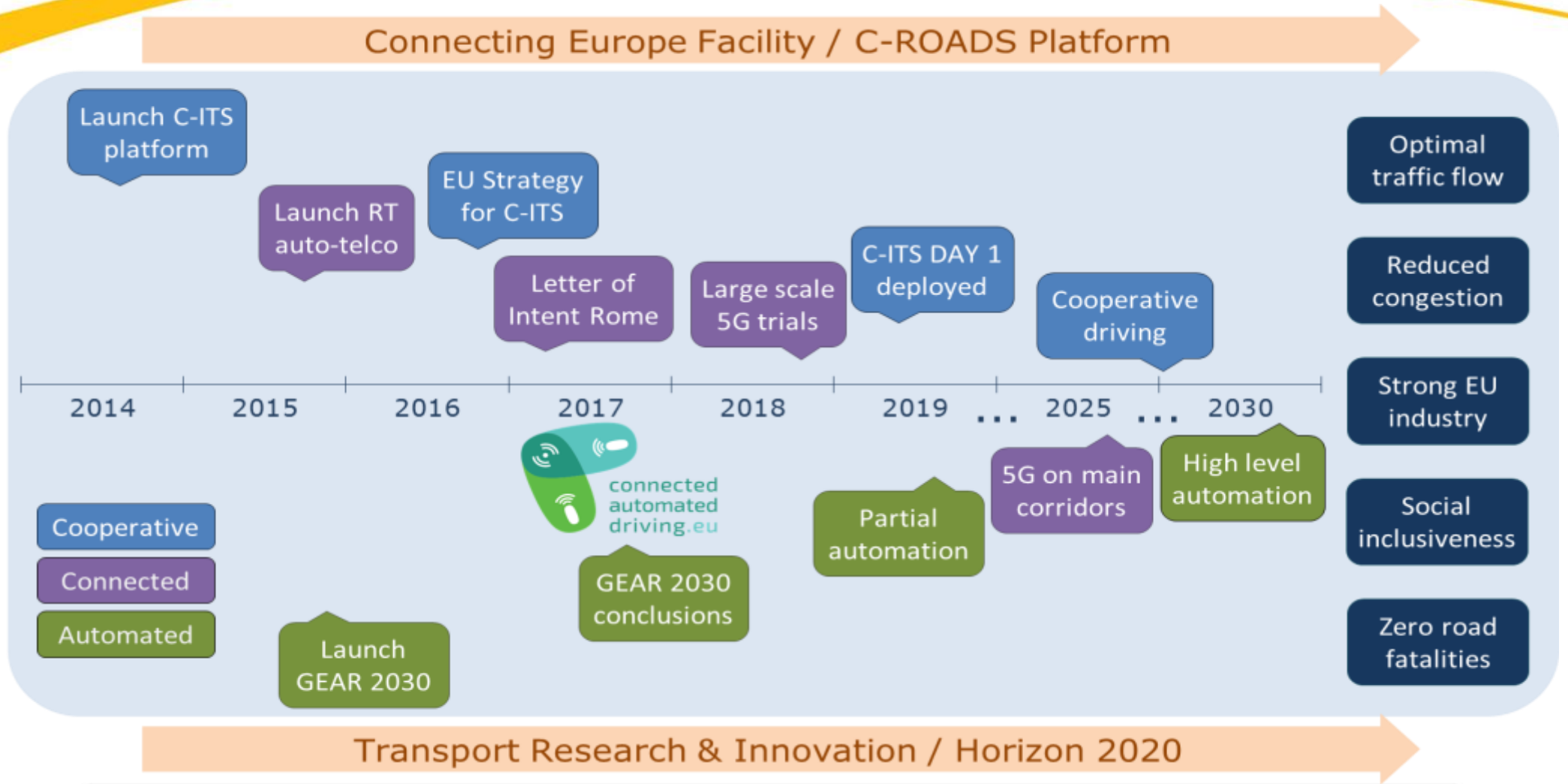
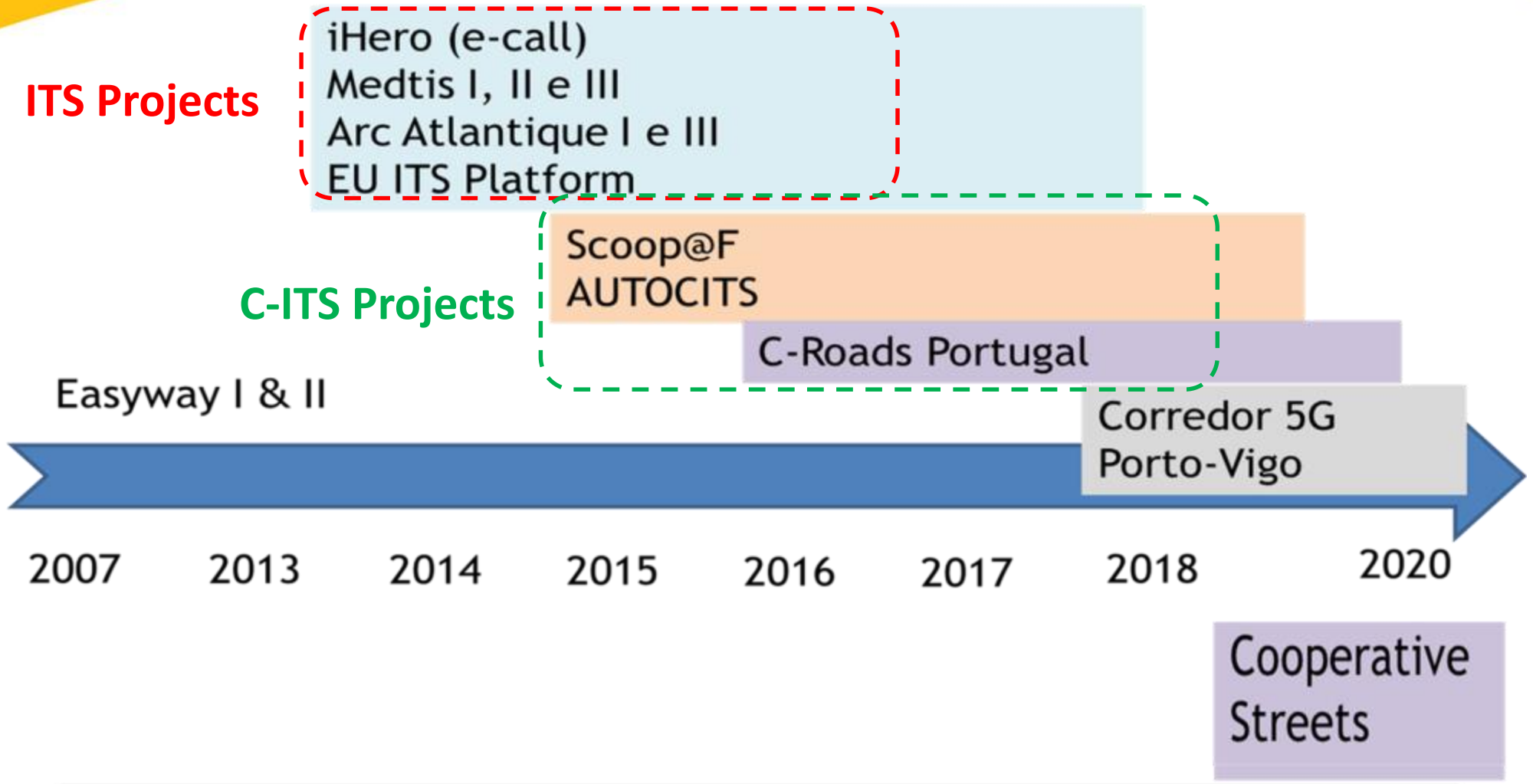

Connecting Europe Facility / C-ROADS Platform
Launch C-ITS platform
Launch RT auto-telco
EU Strategy for C-ITS
Letter of Intent Rome
Large scale 5G trials
C-ITS DAY 1 deployed
Cooperative driving
Optimal traffic flow
Reduced congestion
Strong EU industry
Social inclusiveness
Zero road fatalities
2014
2015
2016
2017
2018
2019
...
2025
...
2030
connected automated driving.eu
GEAR 2030 conclusions
Partial automation
5G on main corridors
High level automation
Cooperative
Connected
Automated
Launch GEAR 2030
Transport Research & Innovation / Horizon 2020


ITS Projects
iHero (e-call)
Medtis I, II e III
Arc Atlantique I e III
EU ITS Platform
C-ITS Projects
Scoop@F
AUTOCITS
C-Roads Portugal
Easyway I & II
Corredor 5G
Porto-Vigo
2007
2013
2014
2015
2016
2017
2018
2020
Cooperative
Streets

ITS Projects in Portugal

ARC ATLANTIQUE CORRIDOR - ATLANTIC – NORTH SEA - MEDITERRANEAN
The Arc Atlantique Action aims at **implementing a series of ITS projects (interventions)** in CEF corridors.

The **Arc Atlantique** is an existing **ITS corridor implemented** by **7 Member States**: Ireland, United Kingdom, France, Belgium (Flanders and Wallonia), Netherlands, Spain and **Portugal**.

Since **2013**, 17 partners comprising strategic road authorities and road operators have formed strong working relationships built on the **common objective of investing in ITS** on the Arc Atlantique network to **achieve improvements** in network efficiency, safety and environmental performance, whilst broadening harmonisation and interoperability of ITS services across the network, supporting the ultimate goal to implement an efficient single transport area.

The third phase (scheduled for the period 2017 – 2020) will impact approximately 29,000 km of the TEN-T Core network (including urban nodes) and supporting comprehensive network with a working programme amounting to 65 m€ investment. A **key feature of this Action will be the coordinated implementation of proven harmonised Traffic Management and Traffic Information Services**, compliant with the EasyWay Deployment Guidelines 2012. Other elements will be greater significance of knowledge exchange as well as the **introduction of C-ITS service deployments**.

https://www.its-platform.eu

ITS Projects in Portugal

MEDTIS - MEDITERRANEAN CORRIDOR DEPLOYING TRAVELLER INFORMATION SERVICES

MedTIS is a deployment project with objective to **implement Road Safety Solutions**, **Traffic Management Services and Traveller Information Services** on the TEN-T Mediterranean Corridor.

Along a 8.000 km **Corridor MedTIS Action** involves **4 Member States** from the European Union: France, Italy, Spain and **Portugal**, in a total of 27 road operators.

MedTIS objectives:

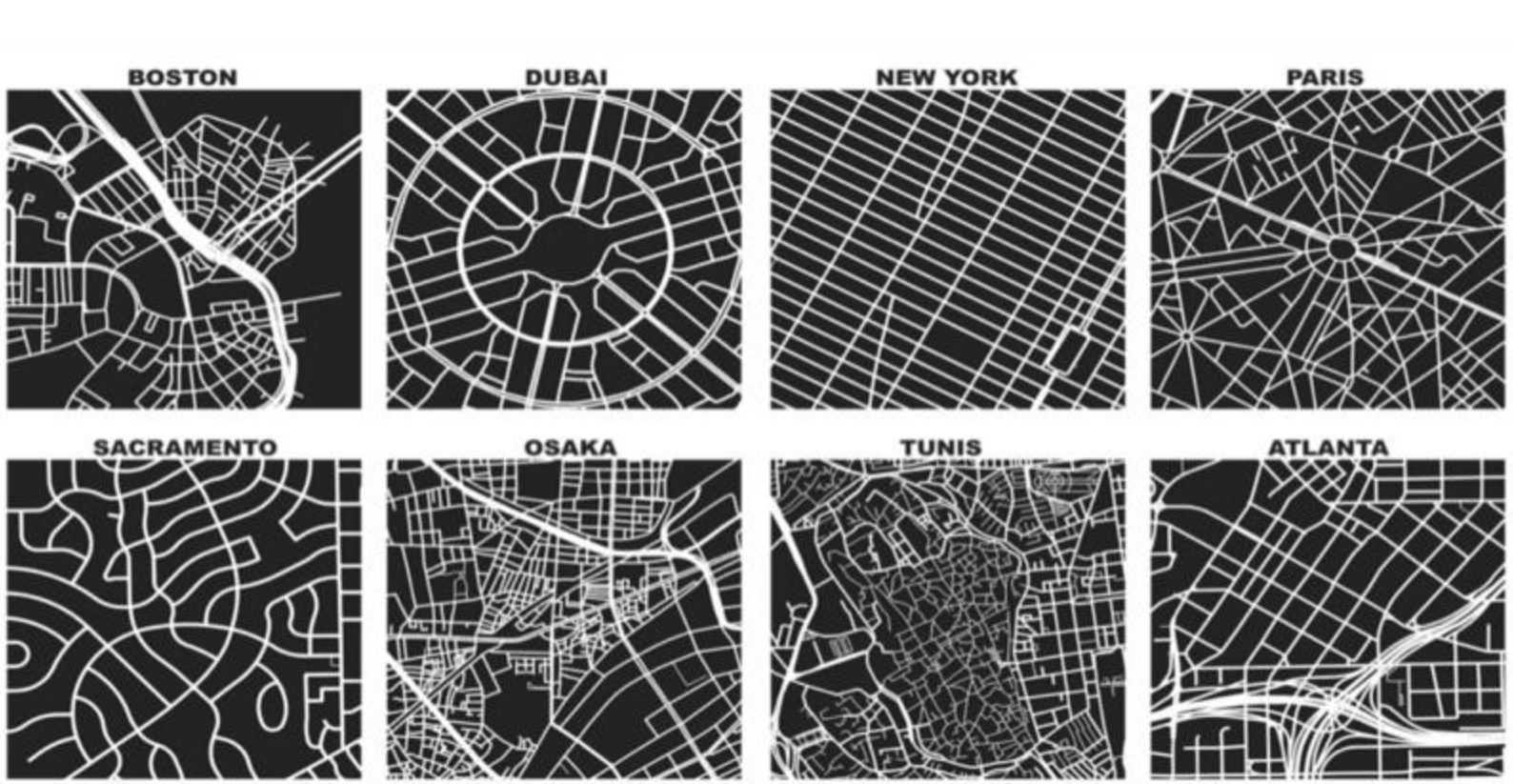
- Improving **interoperability, continuity and seamless mobility**, with a special attention to **cross border sections** (enabling the enforcement of **cross-border Traffic Management Plans)**;
- Improving **road safety on strategic sections** (i.e. tunnels) including cross-border interfaces;
- Improving the **harmonisation of services** across Europe from an **end user perspective**;
- Improving the **operational excellence and cost-efficiency** from a road operator / traffic manager perspective;
- Better **integrate the increasing traffic** to maintain a **high-level network efficiency**, especially on **bottlenecks** and **cross-border sections**;

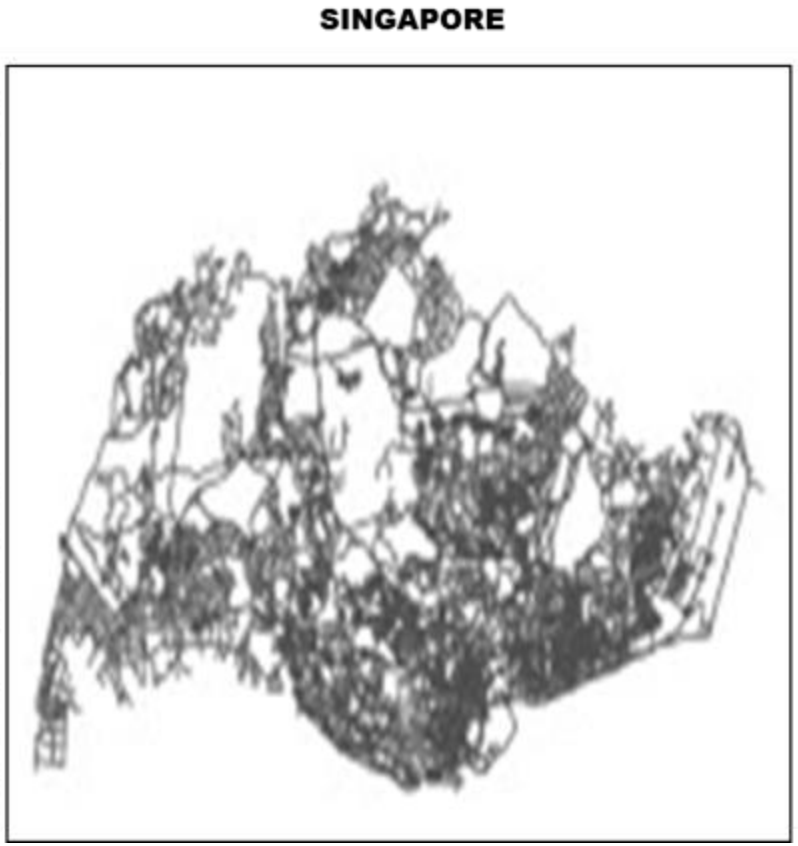
https://www.its-platform.eu

Traffic Management

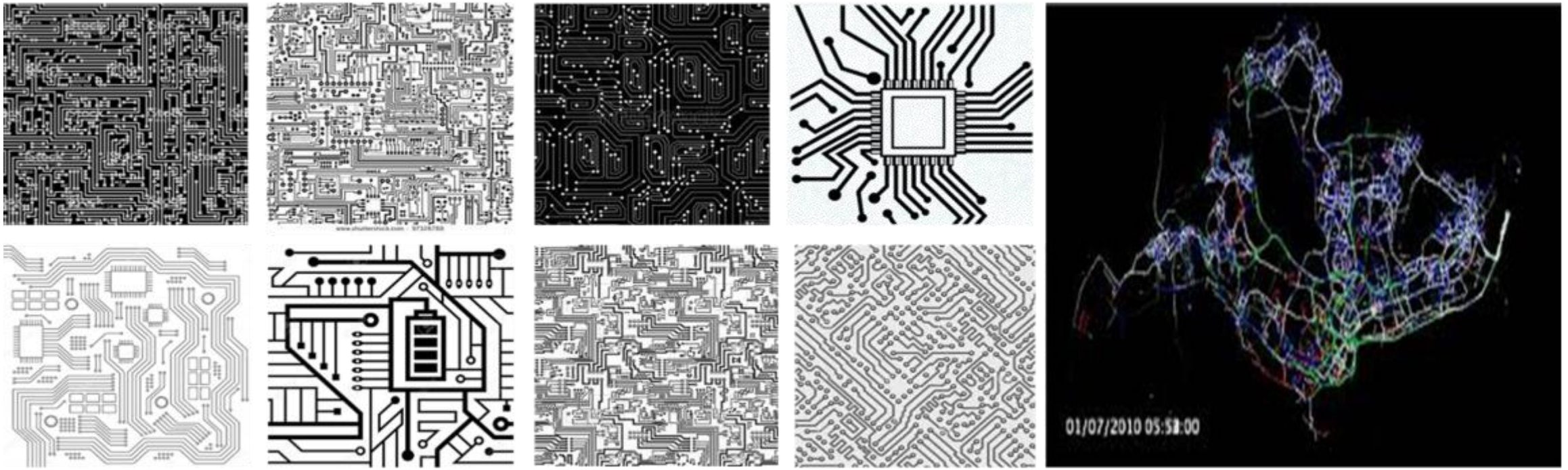
Connecting
Everything
Everyone
Everywhere

Physical fingerprint



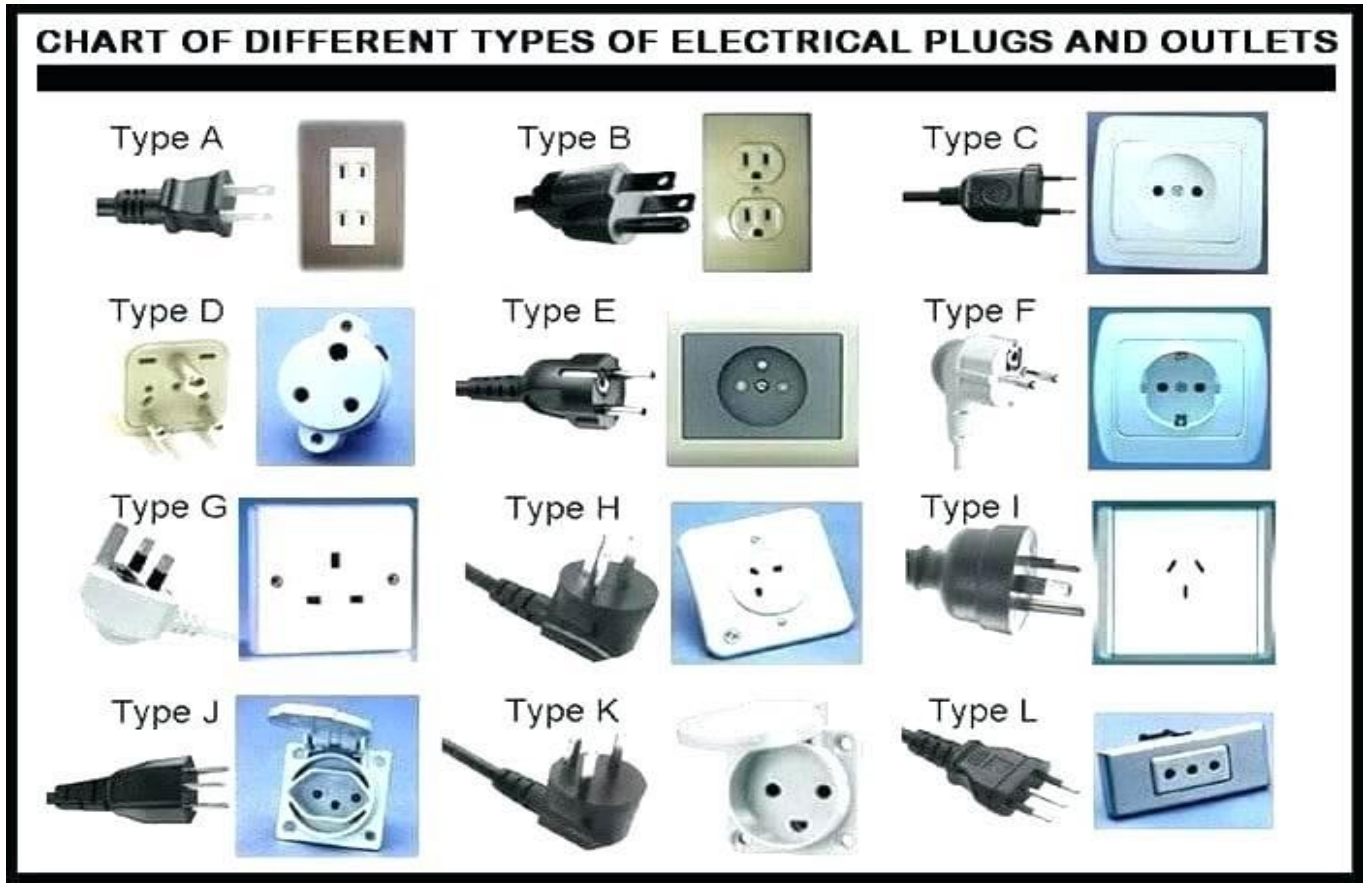


Digital fingerprint



Singapore road network drawn by GPS trace of ~16k taxis, from midnight to 9am

Standards?



Standardization

is the will

to cooperate

Wich ones?

European **ITS directive (2010/40/EU)** has created an international legal fundament for the technical specifications of road side ITS and telematics systems. In terms of **exchanging traffic information, and traffic management**, many of the priority areas and services mentioned in the directive are covered by **DATEX II**.

MULTIMODAL TRAVEL INFORMATION

PRIORITY ACTION (A)

Dynamic travel and traffic data, static travel and traffic data and historic traffic data for the road transport – same as Action b).
The relevant static travel and traffic data listed in point 1 and point 2 of Annex I that are applicable to NeTEx and DATEX II shall be represented through minimum national profiles.

REAL-TIME TRAFFIC INFORMATION

PRIORITY ACTION (B)

Standardised formats, if available, or any other machine readable format for static road data (incl. dynamic Location referencing).
DATEX II (CEN/TS 16157 and subsequently upgraded versions) format or any machine-readable format fully compatible and interoperable with DATEX II for dynamic status road data and traffic data.

SAFETY RELATED TRAFFIC INFORMATION

PRIORITY ACTION (C)

DATEX II (CEN/TS 16157) format or any fully compatible and interoperable with DATEX II machine readable format.

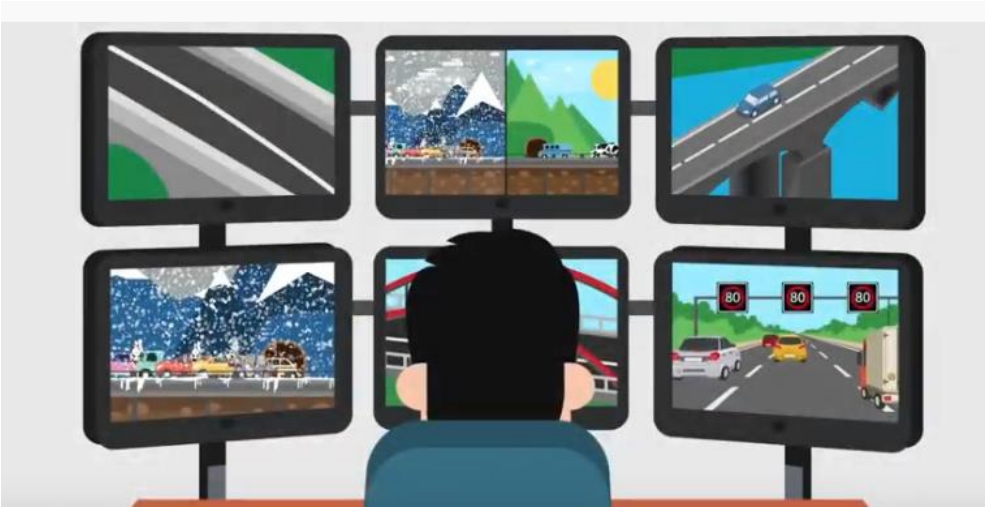
SAFE AND SECURE TRUCK PARKING INFORMATION

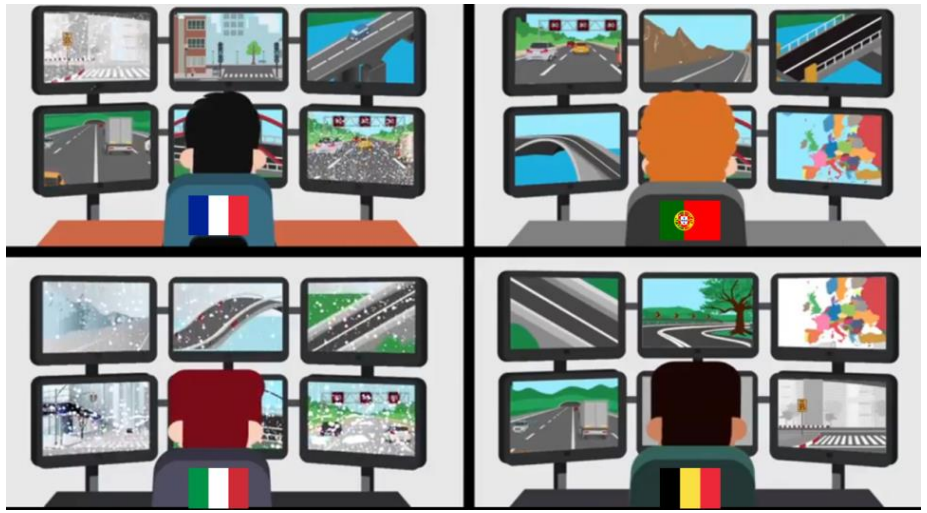
PRIORITY ACTION (E)

DATEX II (CEN/TS 16157) format or any internationally compatible and interoperable with DATEX II machine readable format.

https://datex2.eu/datex2/about

DatexII – what for?





https://www.youtube.com/watch?v=RhvuBI6Q0HI

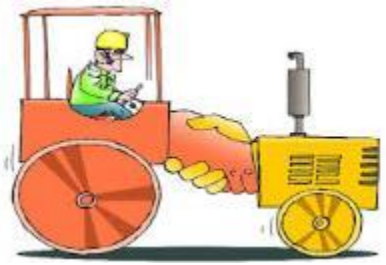
DatexII Implementation in Portugal

Challenges

- Several Stakeholders
- Several Concessions Contracts
- Huge amounts of information
- Several Quality KPI's

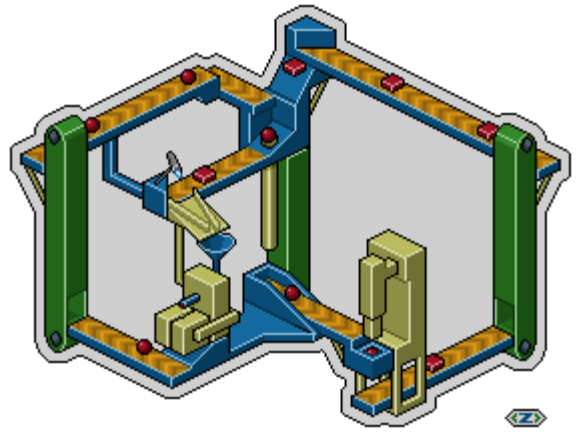
Needs

- Use Standards
- Use Common Language
- Use Common Metodology
- Work togheter



A Functional Architecture

- **Setting up a common language will ensure:**
  - **Interoperability** and continuity of services**;**
  - **Harmonization of performance** Indicators;
  - Using **Standards**;
  - **Safeguarding the road user** perspective.



OpenRoads

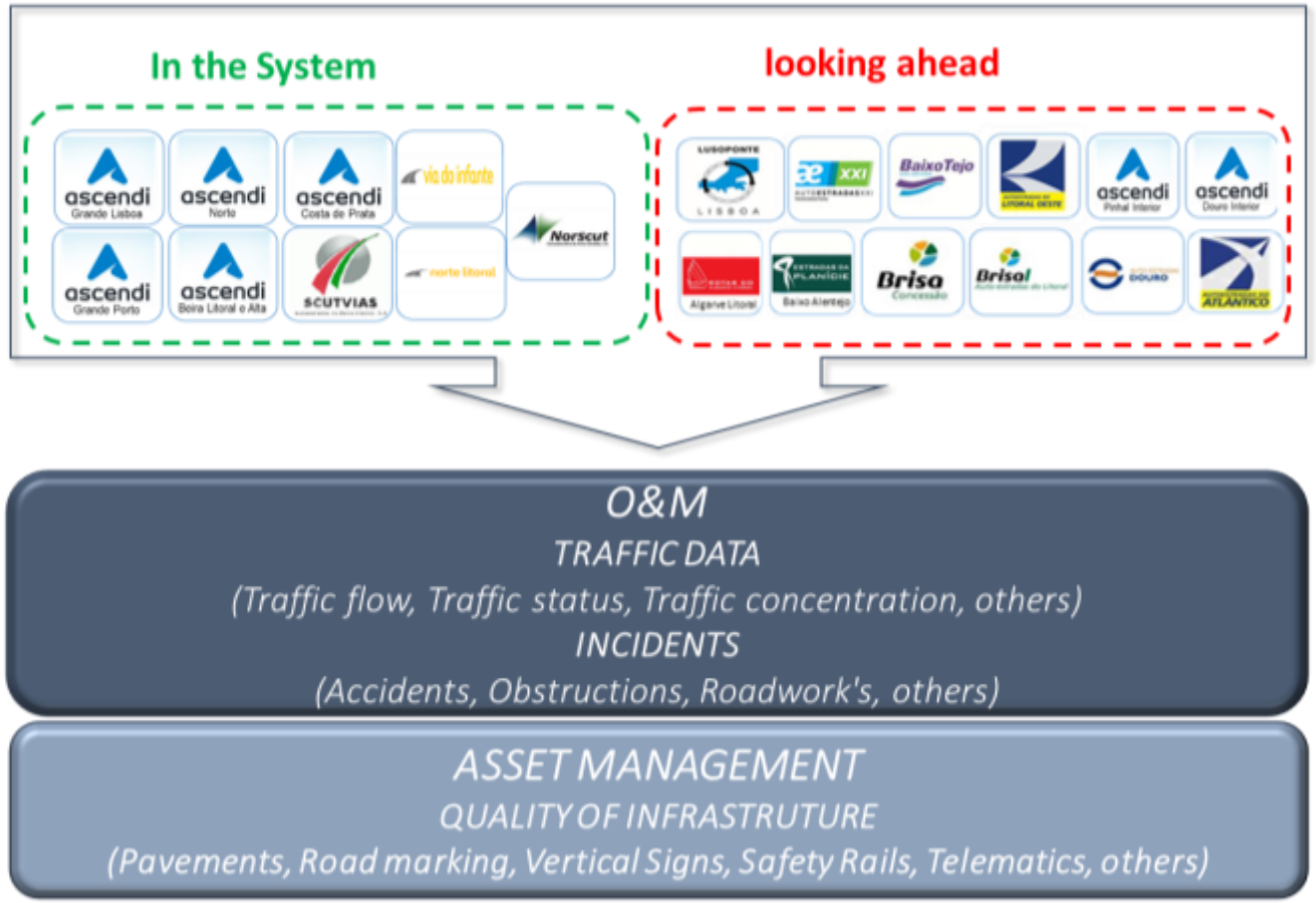
Process and produce multiple analysis and indicators…
Build a national DataWarehouse

OpenRoads

Check OpenRoads video

https://www.youtube.com/watch?v=ZZwJs6sB5-8

OpenRoads Implementation

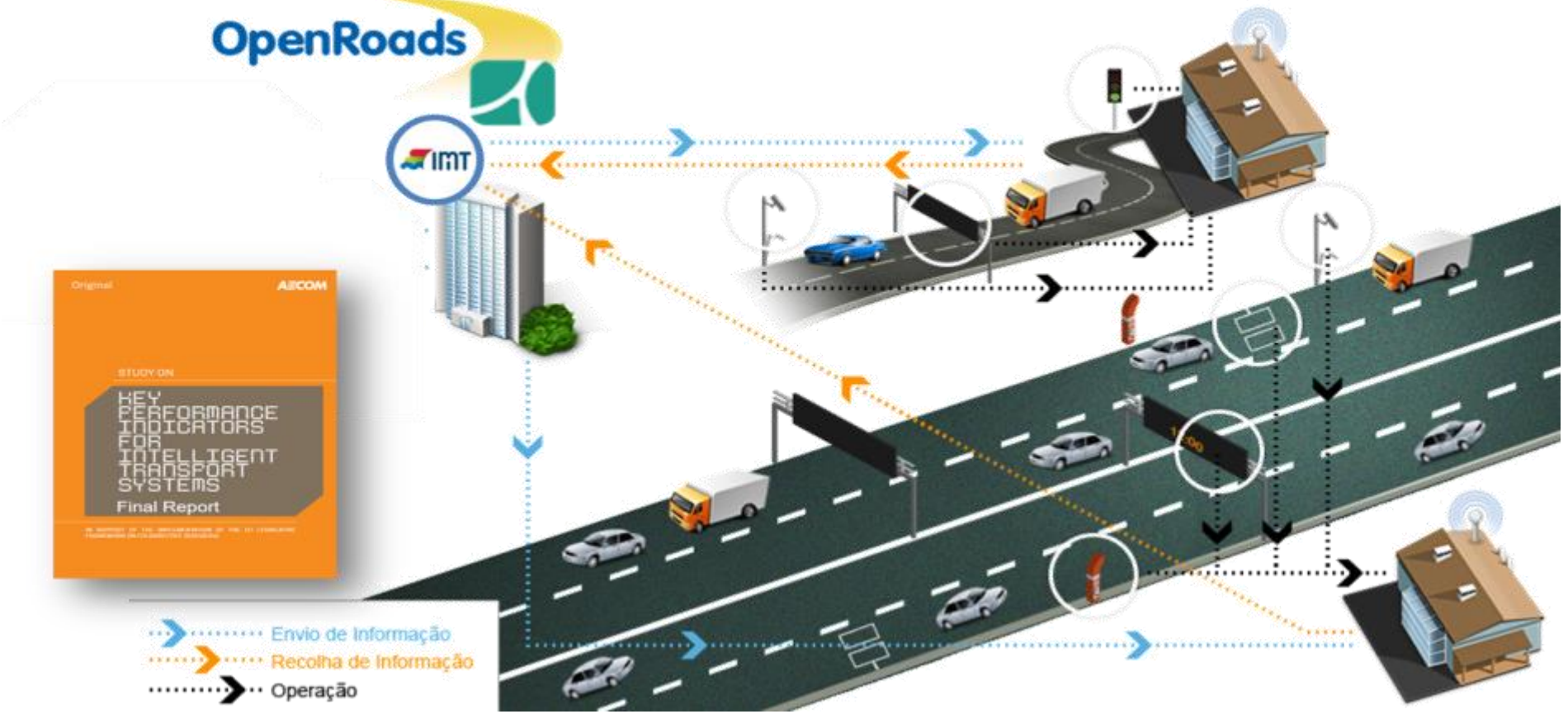


OpenRoads Implementation

We systemized the way **information** is gathered according to the **type of road and contract information**. IMT produced a common **Glossary** describing the methodology, concepts and the information to be collected (Datex II Profiles – Situations and Measures and Datex II Extensions - Infrastructure quality assessment).

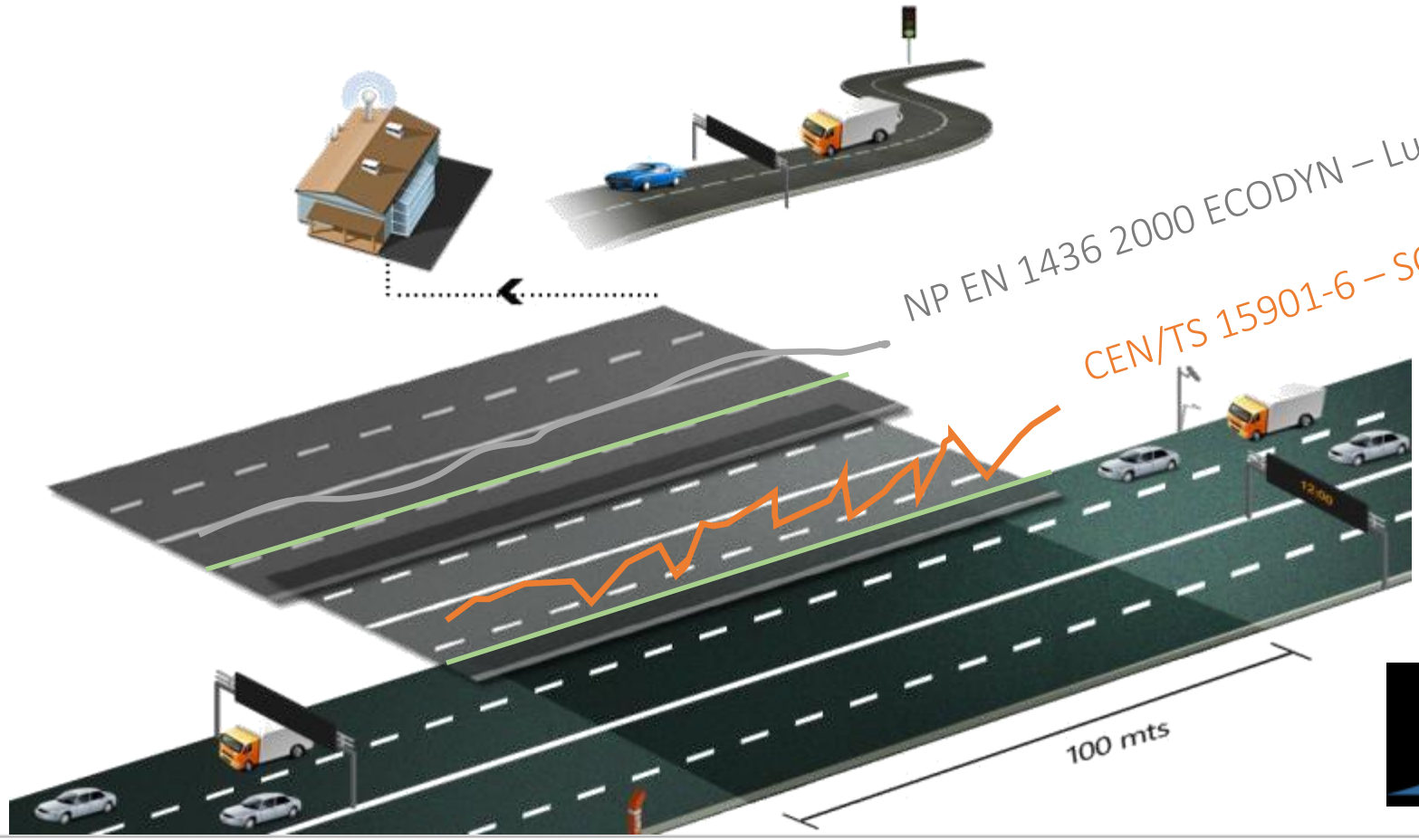
OpenRoads

- Traffic Level of Service and Incident Response performance



OpenRoads

- Infrastructure Quality Assessemen



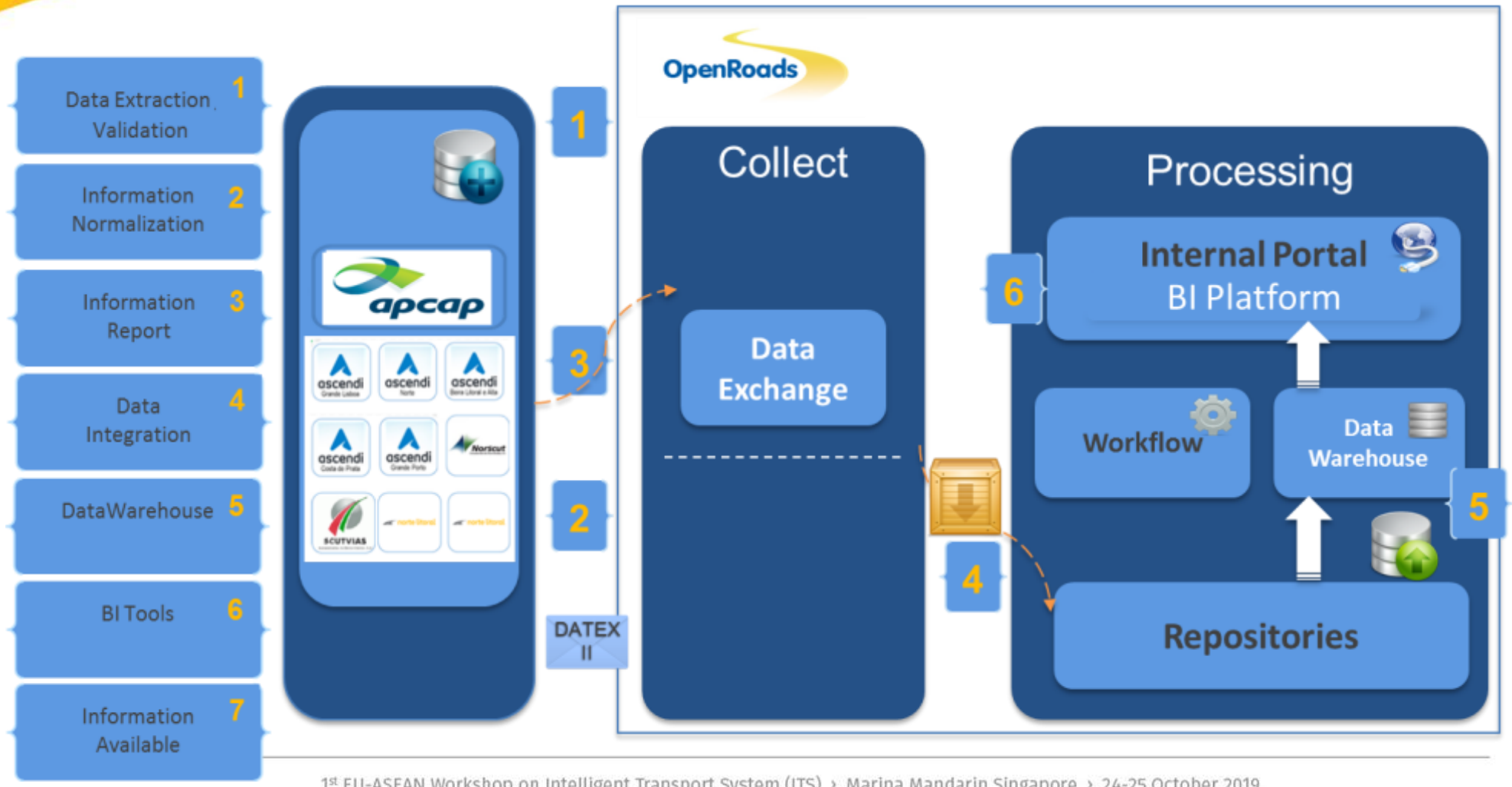
ITS standardization

OpenRoads

- DATEX II Profiles for Infrastructure Quality Assessement

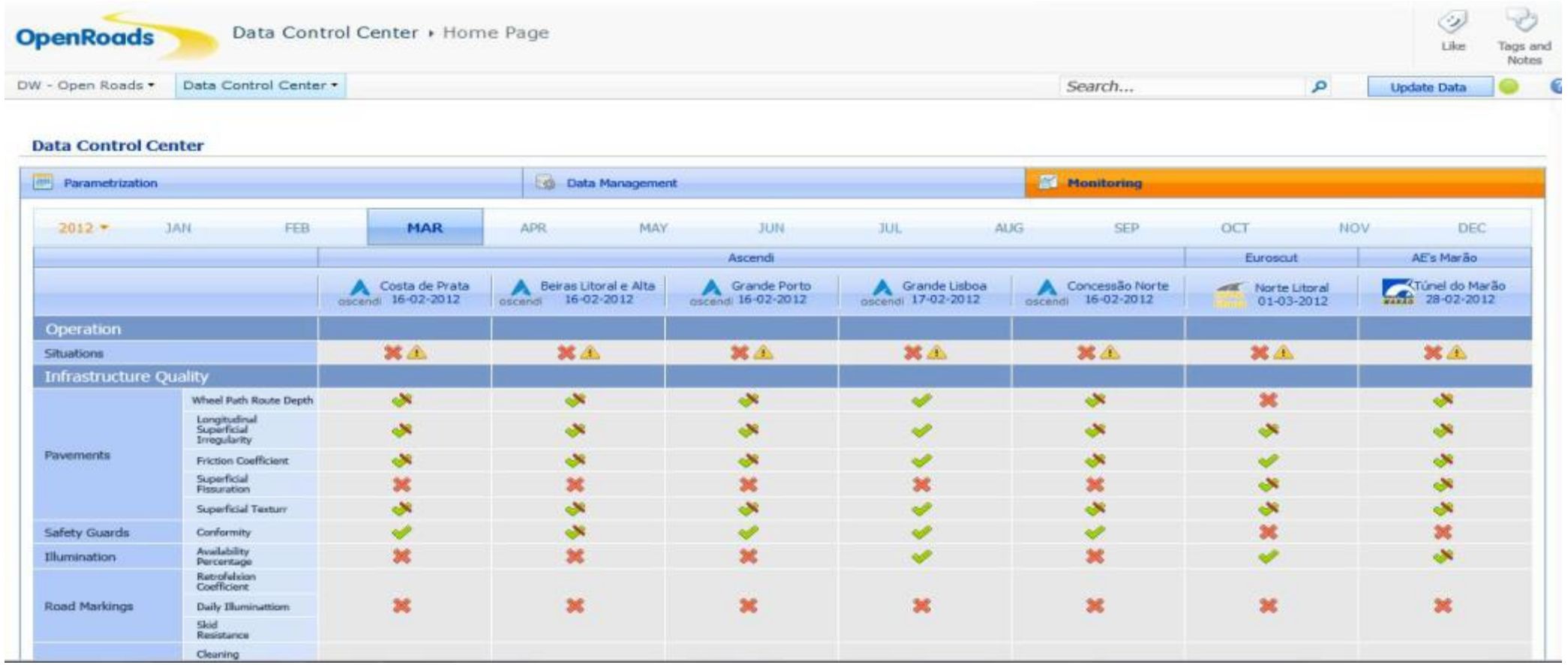
- Use Datex II Profiles – Situations and Measures
- Creating a new Publication for Infrastructure quality assessment, "Road Infrastructure QOS Publication", for different KPI's :
  - Road marks
  - Safety rails systems
  - Vertical signs
  - Telematics
  - Illumination
  - Pavement Quality
    - Friction Coefficient
    - Superficial Crusting
    - ....

OpenRoads DatexII Implementation



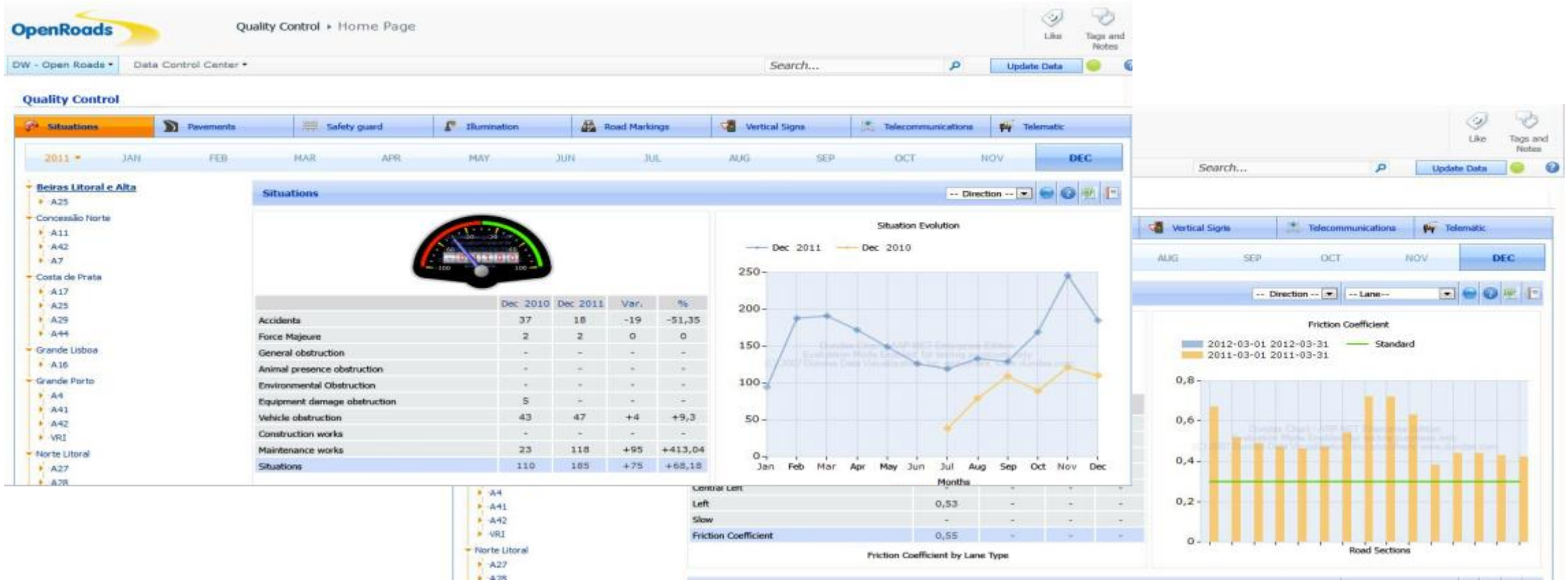
OpenRoads

- Monitoring information



OpenRoads

- Easy uptodate dashboards and reporting



OpenRoads

- Exploring information

OpenRoads

- Financial assessement

OpenRoads Availability › Home Page

Like | Tags and Notes

DW - Open Roads | Data Control Center | Search... | Update Data

Availability Evaluation

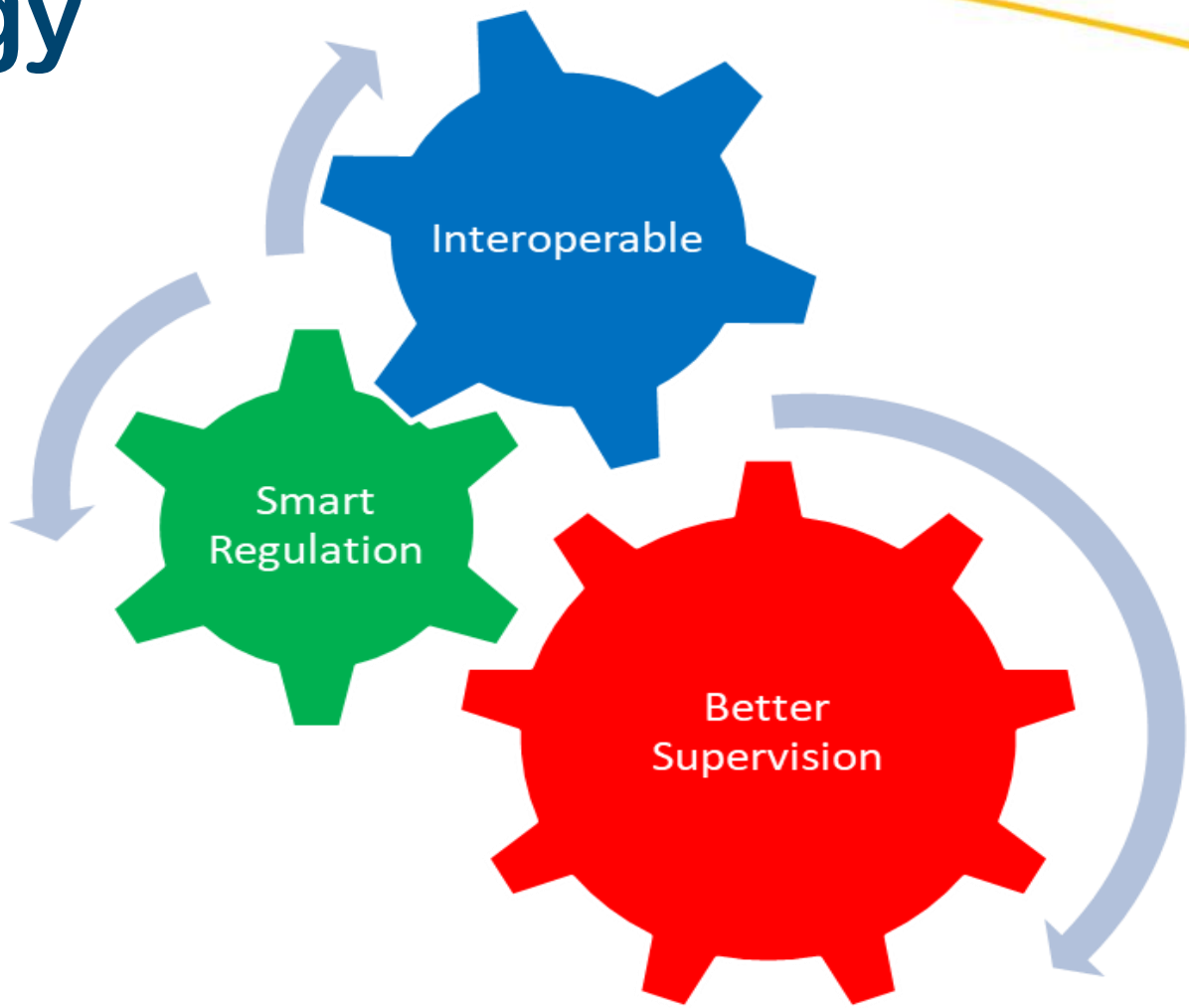
2011 | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC

	Ascendi								Euroscut		AE's Marão	
Availability Report	Costa de Prata ascendi 16-02-2012		Beiras Litoral e Alta ascendi 22-02-2012		Grande Porto ascendi 16-02-2012		Grande Lisboa ascendi 17-02-2012		Concessão Norte ascendi 22-02-2012		Norte Litoral 01-03-2012		Túnel do Marão 01-03-2012	
Deductions														
Acessibility	€ 0,00		€ 0,00		€ 0,00		€ 0,00		€ 0,00		€ 0,00		€ 0,00	
Safety	€ 999.999,00		€ 999.999,00		€ 999.999,00		€ 999.999,00		€ 999.999,00		€ 999.999,00		€ 999.999,00	
Circulation	€ 999.999,00		€ 999.999,00		€ 999.999,00		€ 999.999,00		€ 999.999,00		€ 999.999,00		€ 999.999,00	
Total	€ 999.999,00		€ 999.999,00		€ 999.999,00		€ 999.999,00		€ 999.999,00		€ 999.999,00		€ 999.999,00	
Penalties	☀	☾	☀	☾	☀	☾	☀	☾	☀	☾	☀	☾	☀	☾
Plafond	99.000,00	99.000,00	99.000,00	99.000,00	99.000,00	99.000,00	99.000,00	99.000,00	99.000,00	99.000,00	99.000,00	99.000,00	99.000,00	99.000,00
Balance	99.000,00	99.000,00	99.000,00	99.000,00	99.000,00	99.000,00	99.000,00	99.000,00	99.000,00	99.000,00	99.000,00	99.000,00	99.000,00	99.000,00
Total	-	-	-	-	-	-	-	-	€ 0,00	€ 0,00	-	-	€ 0,00	-
Total														
Annual Payment	€ 99.999.999,00		€ 99.999.999,00		€ 99.999.999,00		€ 99.999.999,00		€ 99.999.999,00		€ 99.999.999,00		€ 99.999.999,00	
Amount Receivable	€ 99.999.999,00		€ 99.999.999,00		€ 99.999.999,00		€ 99.999.999,00		€ 99.999.999,00		€ 99.999.999,00		€ 99.999.999,00	
Annual Forecast	€ 99.999.999,00		€ 99.999.999,00		€ 99.999.999,00		€ 99.999.999,00		€ 99.999.999,00		€ 99.999.999,00		€ 99.999.999,00	

OpenRoads Metodology

- **OpenRoads allows us to know:**
  - 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 road operator / road manager and reported to IMT on a "**Datex II wrapping**";
  - **Openroads** is a powerfull tool for **assessing Concessions performance** in a standardized and interoperable way.

OpenRoads Metodology



OpenRoads Datex II Implementation

Datex II Forum 2018 Award

Openroads

Best Valued Contribution

for Datex II Implementation

C-ROADS
PORTUGAL

Road infrastructure preparation → Connecting urban nodes → Backbone data sharing

5 macro pilots / 15 pilot activities
31 implementing bodies

Activity 7 Pilot 2
"Portuguese network for C-ITS"

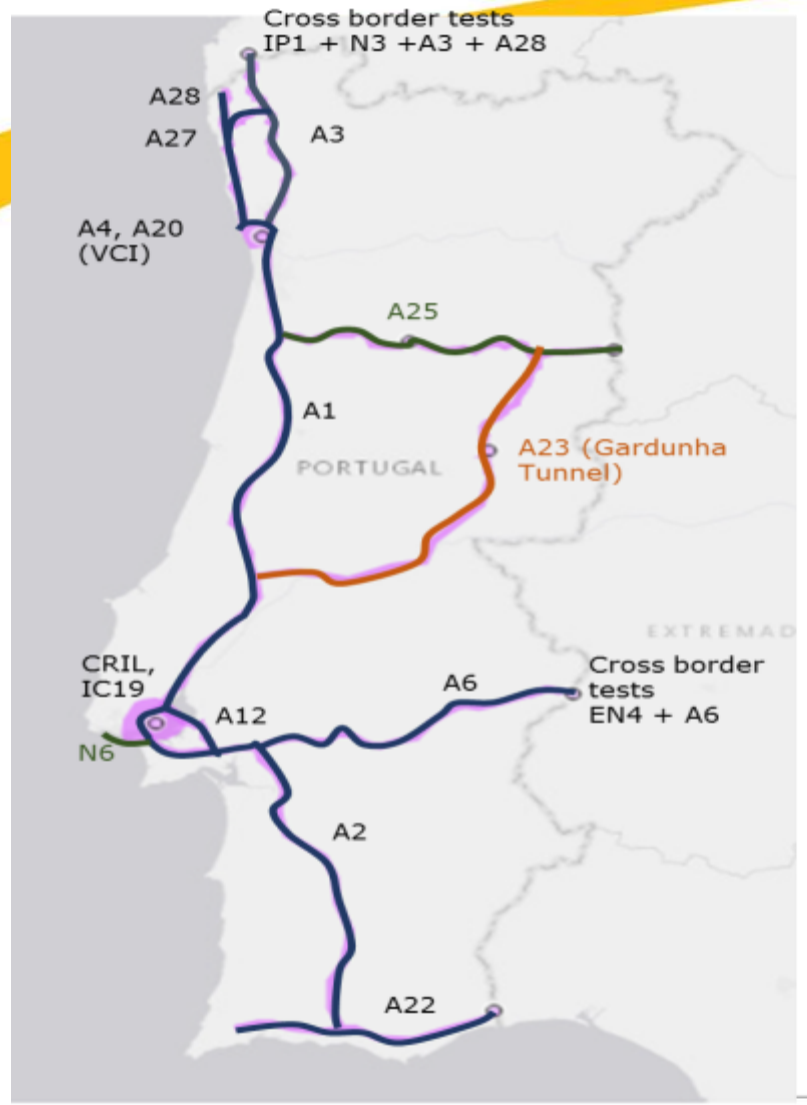
Activity 9 Pilot 4
"Lisbon urban node"

Activity 6 Pilot 1
"Single Access Point -SPA" and SPApp usage app for SPA Services"

Activity 8 Pilot 3
"Network preparation for CAD vehicles"

Activity 10 Pilot 5
"Porto Urban node"

- **Timeline and Investment**
  Project Start: 07/02/2017
  Project End: 31/12/2020
  Max Investment: 8.4 M€



Pilot case: Portuguese network for C-ITS

Demonstration of C-ITS services in core and comprehensive network (including entrances in urban nodes)

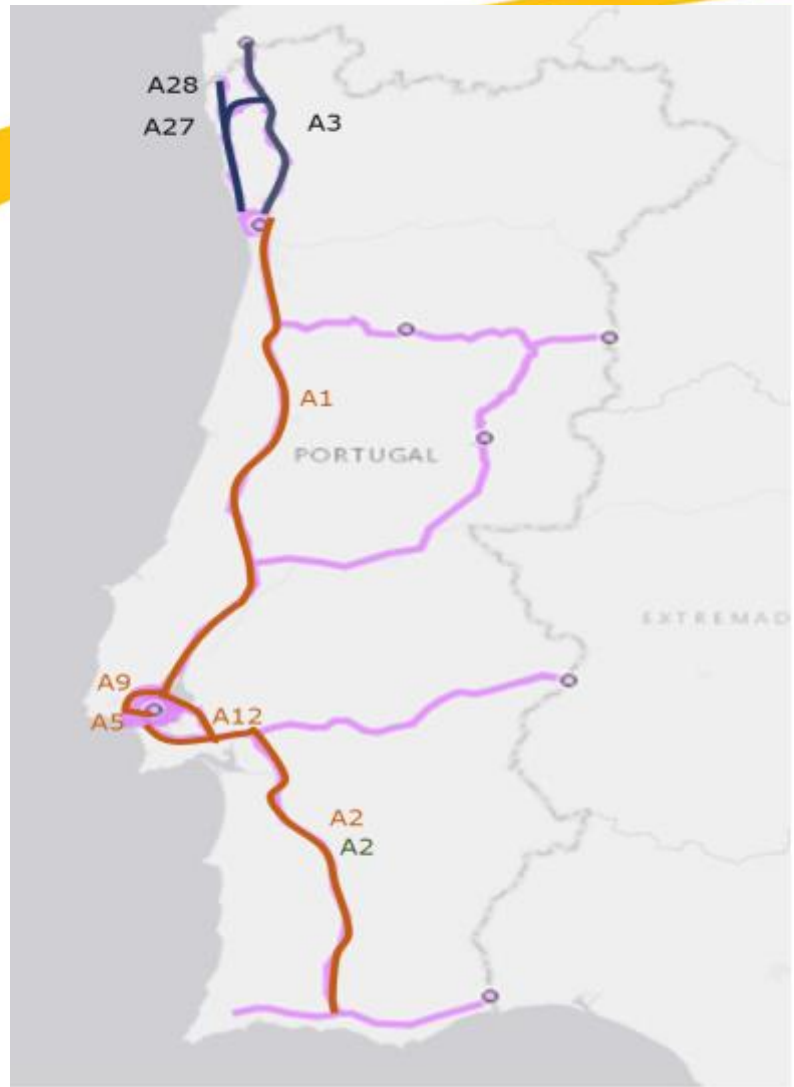
- A1 – 30 km
- A2 – 30 km
- A3 – 40 km
- A4 – 30 km
- A20 - VCI (Porto node circular) – 11 km
- CRIL (Lisboa node circular) – 19 km
- IC19 (Lisboa node circular) – 17 km
- A6 – 20 km
- A12 – 20 km
- A22 – 90 km
- A27 –24,7 km
- A28 – 88,6 km

In-vehicle app to connect C-ITS server in TEN-T network and urban nodes connections

- A25 – 8 km (Viseu)
- N6 (Lisboa entrance) – 20 km

Development of C-ITS services in tunnels

- A23 – 20 km Gardunha Tunnel



Pilot case: Network Preparation for Connected and Autonomous Vehicles

Connected and autonomous vehicles in open roads

- A3 – 40 km
- A27 –24,7 km
- A28 – 88,6 km

A2 the Holiday motorway

- A2 – 240 km

Connected vehicles for advanced services

- A1 – 66 km
- A2 – 54 km
- A5 (urban access) – 25 km
- A9 (urban access) – 35 km
- A12 – 24 km

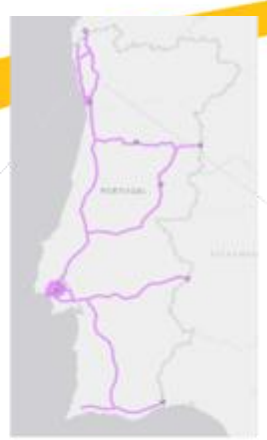
Fig. 4– Cenário de teste "*highway chauffeur*" – *entrada na AE*

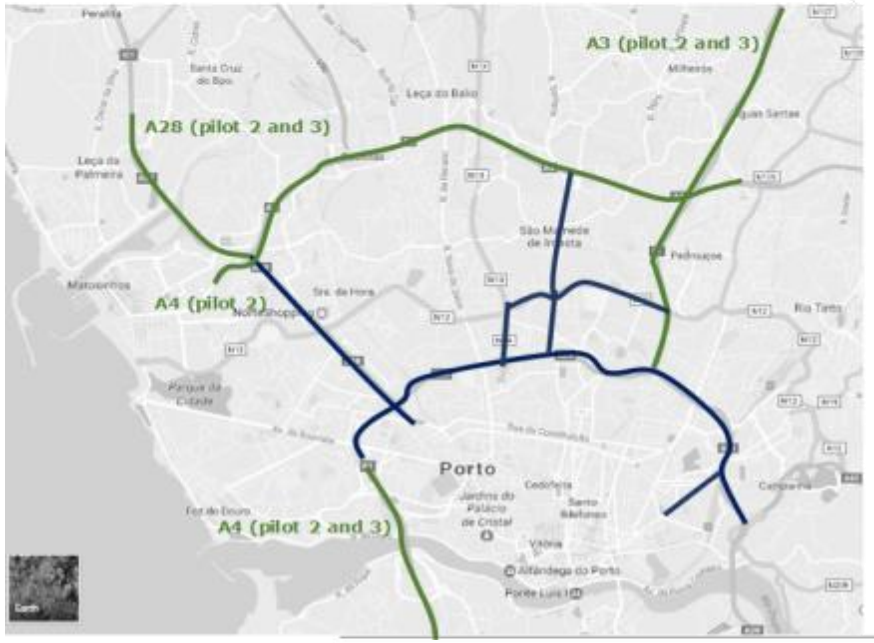
Fig. 5 – Cenário de teste "*highway chauffeur*" – *saída da AE*

Trials
in 2018 and 2019

Pilot case: C-ITS Pilot in the Lisbon Urban Node

Traffic service level monitoring and travel time prediction in Lisboa node	• A36 (2ª circular) – 10,5 km
Parking availability system in Lisboa node	• Lisboa central axis (Entrecampos – Marquês) – 2,7 km
In-vehicle app to connect C-ITS server in Lisboa node	• A36 (2ª circular) – 9,8 km
Signal corridors and bus corridors prioritization in Lisboa node	• Lisboa central axis (Campo Grande – Marquês) – 4,1 km
Mobility Hub in Lisboa node	• A2 (urban access) - 40 km • A5 (urban access) – 15 km • A9 (urban access) – 35 km





C-ITS Pilot in the Porto Urban Node

Traffic service level monitoring in real time and 2-hour travel time prediction in the Porto node

- 5,9 km (central area)
- A28 – 6 km
- A20 – 17 km
- N14 – 5,2 km

V2I and I2V integration of the CaetanoBUS vehicle with the infrastructure in Porto node

- 1,4 km (central area)

Demonstration of C-ITS services in Porto node (see pilot 2)

- A4 – 30 km
- A20 – VCI – 11 km

(Pilot activity A.3.2)

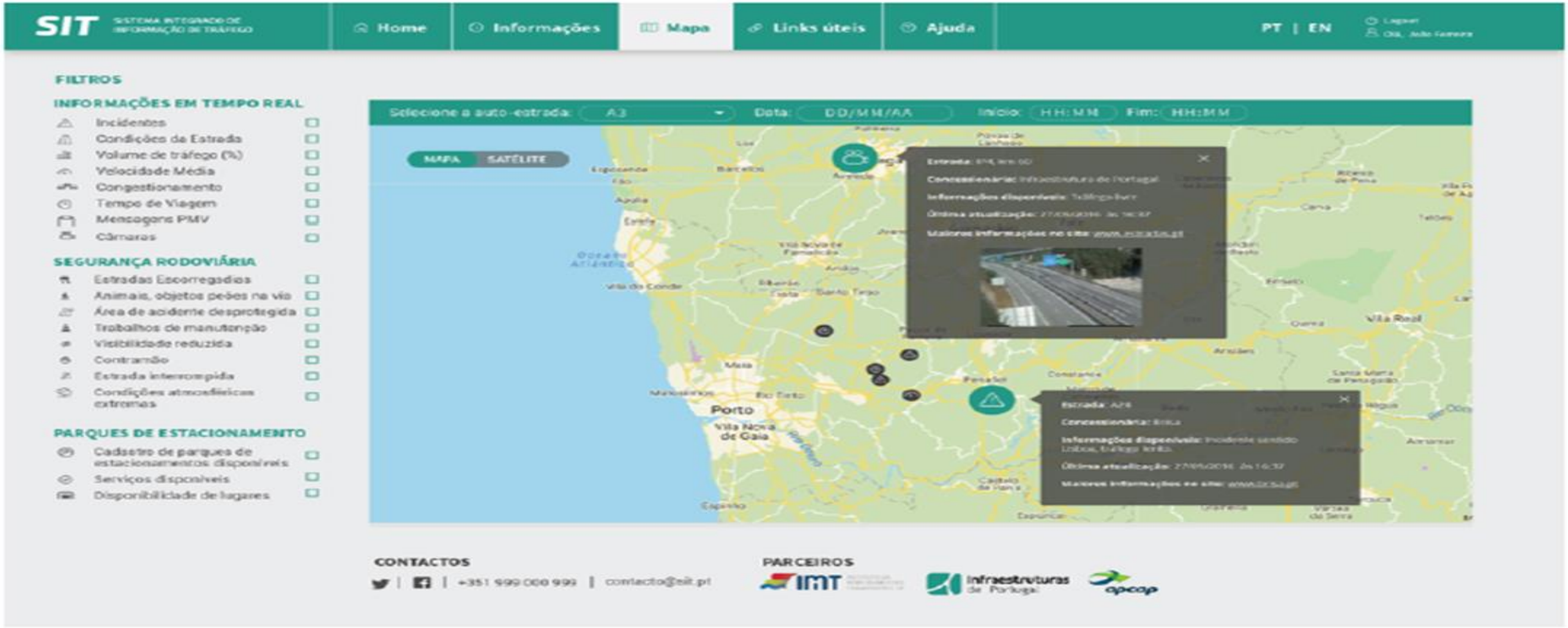
Pilot case : SPA and SPApp usage app for SPA Services

Backbone data sharing prototype

To identify the technical and effort requirements to establish the NAP, both in terms of hardware and software, specifically requirements identification and analysis, the system modelling including the data interfaces according to the DATEXII model, the normalization of the data frames sent by each road operator and the "discovery/search and browse" functionality. We also aim at developing a prototype to validate the approach and analyse the different required functionalities

SPApp usage app

Test the potentialities of a mapping system that aims to demonstrate de use case scenarios based in Google's Maps, helping uses to connect then self's to the connected roads understand their surroundings and path. The system will compile transportation data from the nodes provided by the SPA prototype to be used by a consumer-facing app, serving as a travel companion beyond the driver and the infrastructure. The app will offer real-time traffic updates, display upcoming road hazards, provide the locations of events.



The vision is to implement an **Integrated Traffic Information System (SIIT)**, and create the Portuguese Data Sharing Backbone, paving the way for the implementation of the **Portuguese National Access Point.**

Day 1 services

Day 1,5 services

Core network / Comprehensive network / cross-border sections / access to urban nodes

204 RSU's
141 OBU's
140 Vehicles

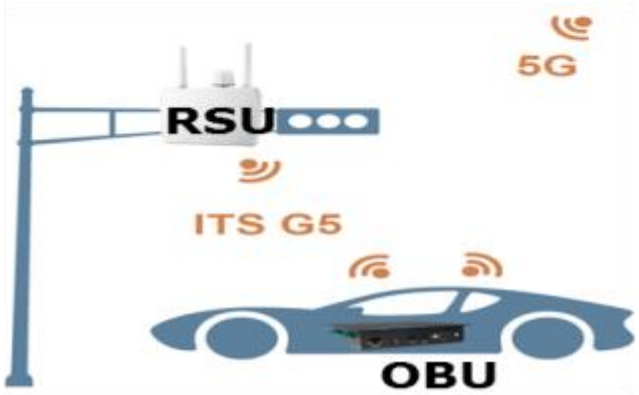
~ 957 km

Hybrid communication (ITS G5 + Cellular)

Urban nodes
Suburban commuting áreas

O/D matrix
In vehicle app
GLOSA
Mobility hub
Traffic prediction 2 hours
Smart Parking
Intelligent bus

~116 km

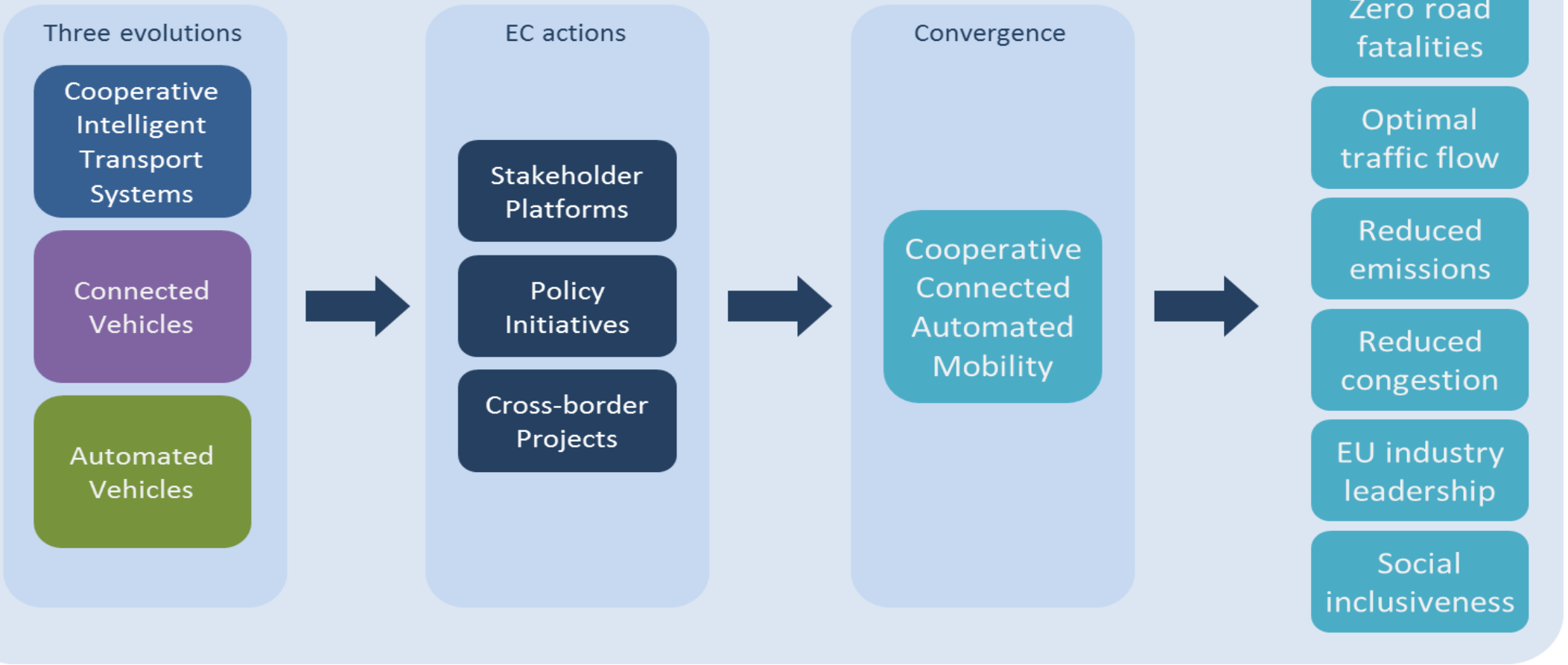


C-ROADS PORTUGAL

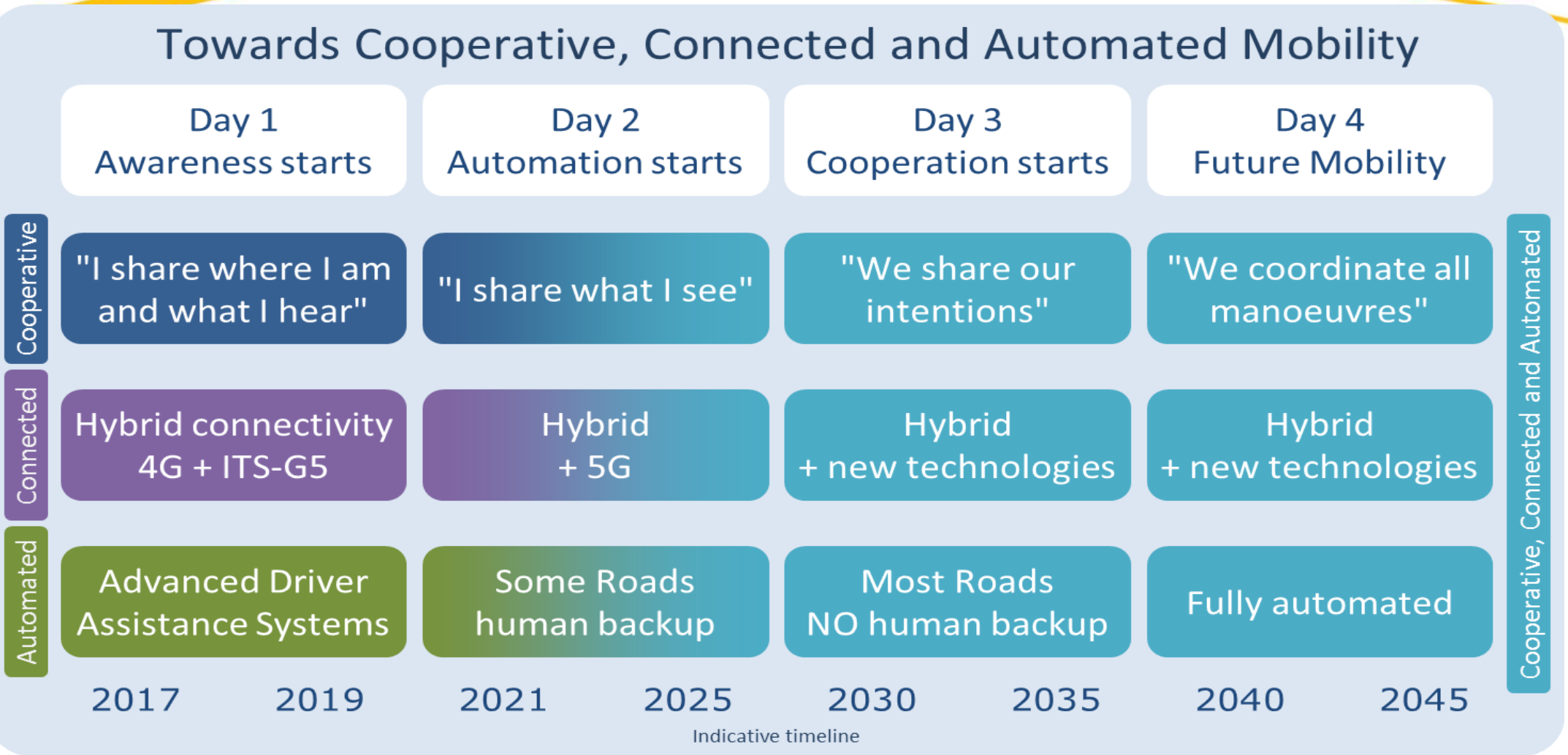
Agenda

- Overview of Portuguese Road Sector Portuguese
- ITS & C-ITS Projects in Portugal
  - European and Portuguese roadmaps
    - Openroads
    - C-Roads Portugal
- **New Roles in Future Traffic Management**
  - **CCAM**

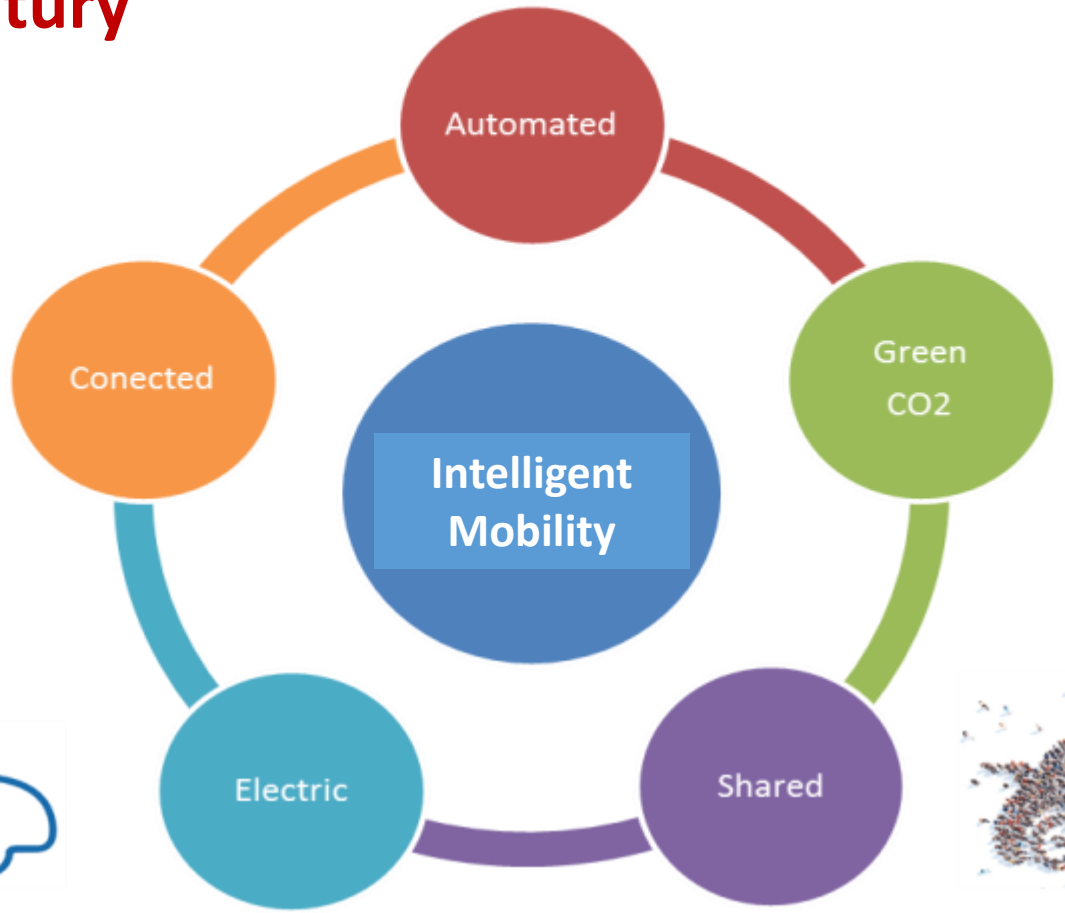
From Technology to Sustainable Mobility



Towards Cooperative, Connected and Automated Mobility



Mobility in the 21st Century – Key drivers



SOCIAL LAYER

URBAN LAYER

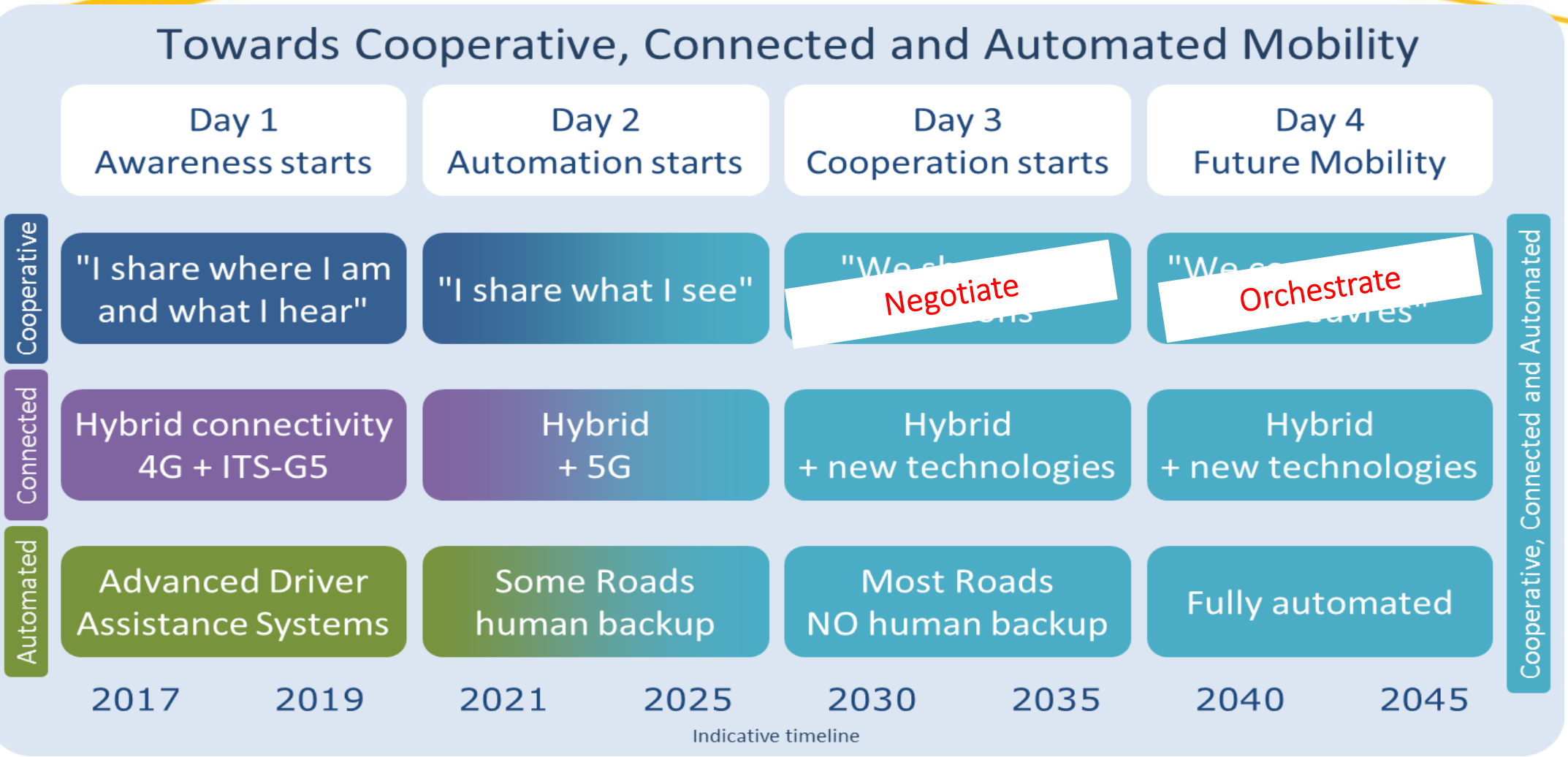
TECHNOLOGY LAYER

CONSUMERS

CITIES COMMUNITIES

TRANSIT AGENCIES

Towards Cooperative, Connected and Automated Mobility














Upcoming Events in Portugal

https://itseuropeancongress.com/

https://www.youtube.com/watch?v=oJlFRDb3ZPQ

https://www.youtube.com/watch?v=aolvxJXEfnk
https://www.youtube.com/watch?v=Jhs6kuis6DY

Thank you

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