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An Open Platform for the Development and Trials of Mobility Solutions (PASMO)

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Introduction and Motivation

Smart communities versus smart cities:

Enable new forms of territorial organization and interaction with citizens

New functionalities, services and results from data collection and analysis.

Mobility: one of the intervention fields

Due to the crowded urban environments, one the most critical.

strong impact in economy, energy, wellbeing, health, pollution, safety.

Technological mobility solutions are often proprietary:

Interoperation is normally a challenge.

Some strategic lines:

Open environment for field trials,

Enterprise cooperation

interoperable or at least connected solutions

Zone with characteristics adequate to illustrate the concepts of smart communities.

Opportunity and Restrictions

- P2020, the Portuguese EU funding program, opened a call in the central region to support collective actions towards immaterial competitive factors target to make available collective or public infrastructures or knowledge able to induce multiplication of economic factors.
- Also it was asked to promote the economic valorization of R&D results produced by entities from the Scientific Sector and to reinforce the transfer of knowledge or technology to the entrepreneurial sector.
- The projects should show clear collective nature, should avoid discrimination among stakeholders and should avoid to privilege a company or groups of companies.

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Background

A set of different R&D projects from the proposal team:

- **APOLLO** (2011-14, ADI/POFC 21580) - Machine to machine communications
- **MEDIEVAL** (2010-13, 258053-FP7-ICT-2009) – Efficient vídeo transport in mobile applications
- **OFELIA** (2010-13, 258365-FP7-ICT-2009-5) – Software defined networks
- **ICSI** (2012-15, 317671-FP7-ICT-2011-8) – Intelligent Cooperative Sensing for Improved Traffic Efficiency
- **Serv-CPS** (2012-15, PTDC/EEA-AUT/122362/2010) – Real-time Ethernet Architecture for Cyber-Physical Systems
- **Smart Parking** (2014-15, QREN/30161) – Integrated System to control parking and to facilitate payment in open urban environments
- **Smart Bikemotion** (2013-15, ADI/38937) – Integrated system for e-bike sharing

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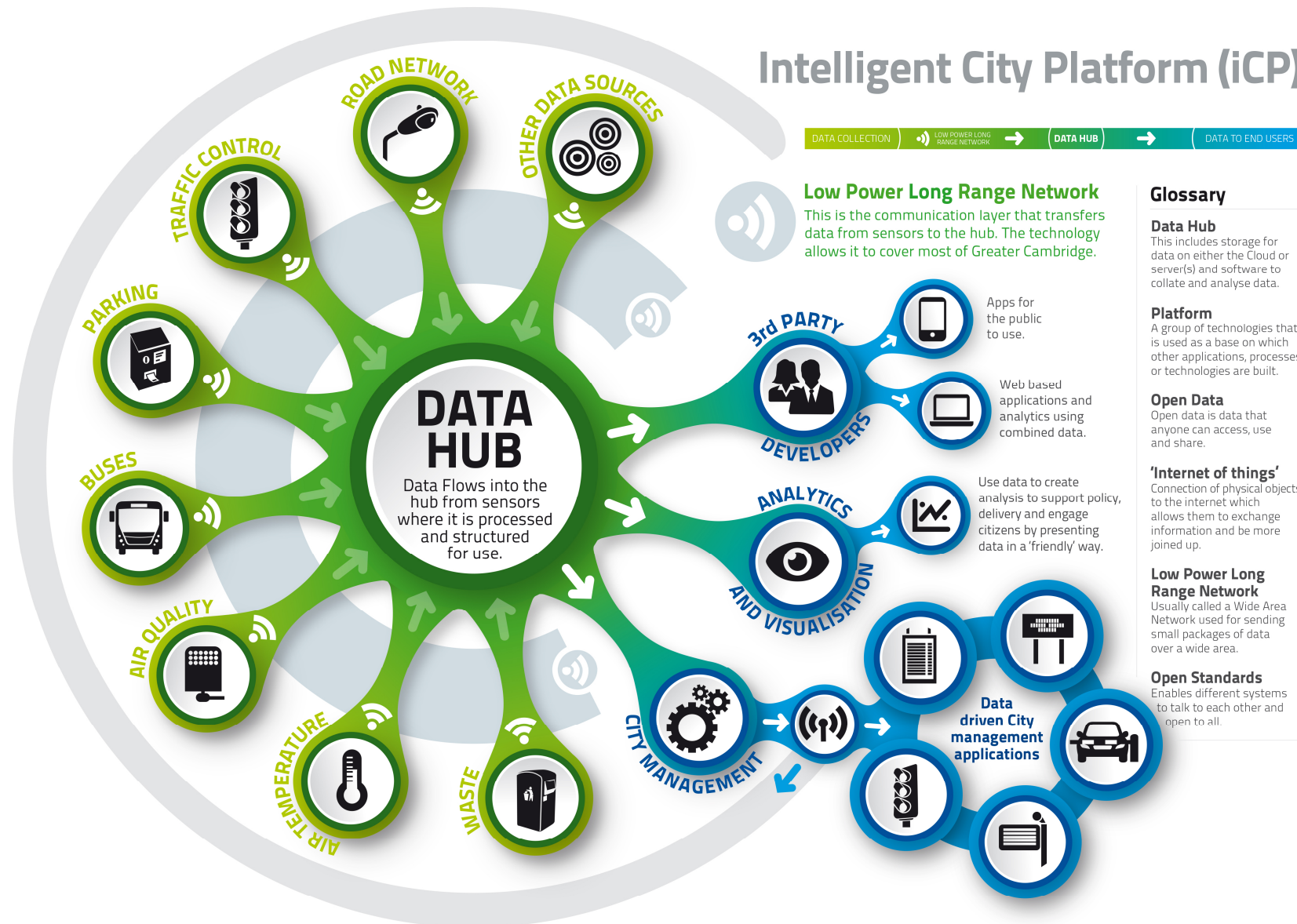
Objectives:

To create an open ecosystem promoting innovation in the fields of Intelligent Transportation Systems (**ITS**), in particular cooperative systems, and smart cities, including 3 subsystems:

- **Data collection:** from roads, vehicles, public spaces
- **Data transmission:** telecommunications and infrastructures.
- **Applications:** Smart parking, transport sharing, automatic incident detection, traffic management, road safety applications, tourism, etc.

Equipment, interfaces and open data, will be available to experiments and use cases for enterprises in may 2018.

Intelligent City Platform (iCP)



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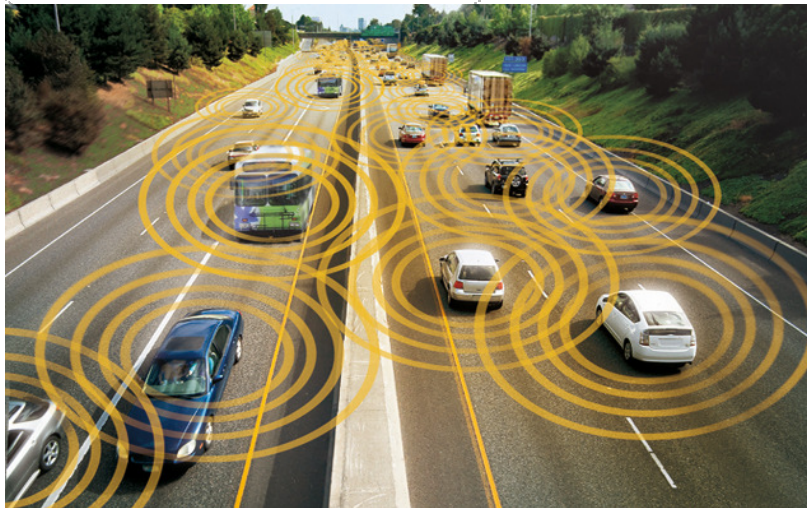
Source: Smart Cambridge

Cooperative Systems for Intelligent Transportation (C-ITS)

Safety – accident indication, sudden break, traffic light violation, ...

Traffic optimization– traffic management systems, platooning, traffic light control, dynamic signaling, etc.

Infotainment – Internet access, multimedia contents, gaming, ...

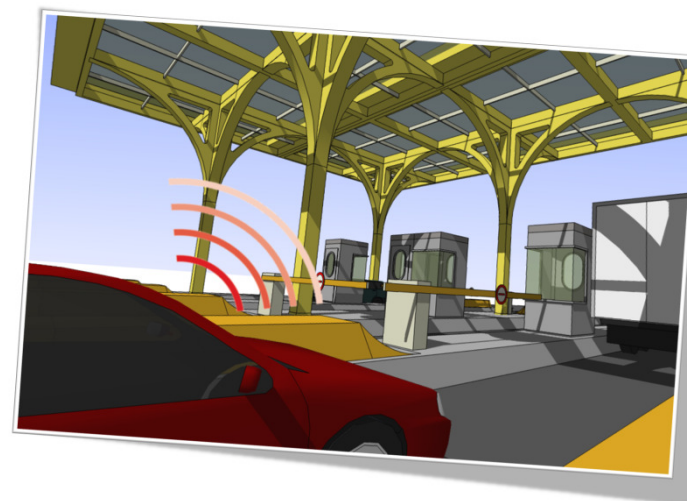
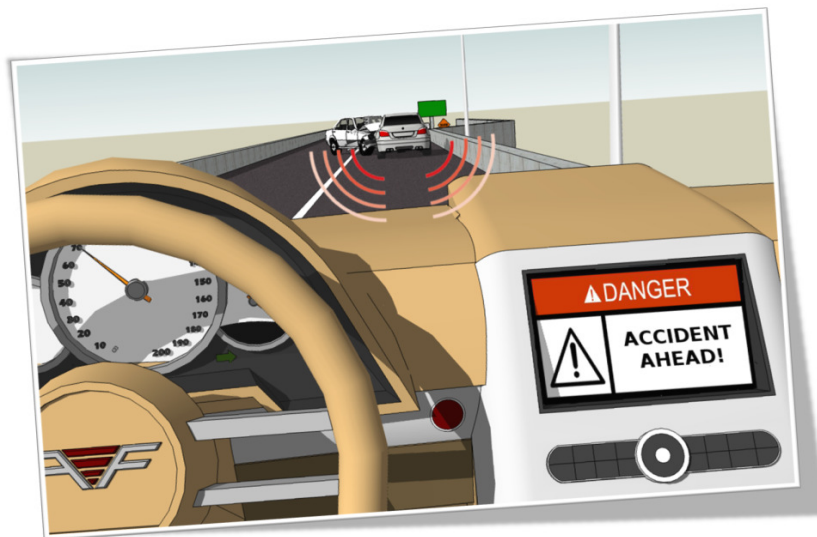


Source: US Department of Transportation



Source: www.car-to-car.org

Cooperative Systems for Intelligent Transportation (C-ITS)

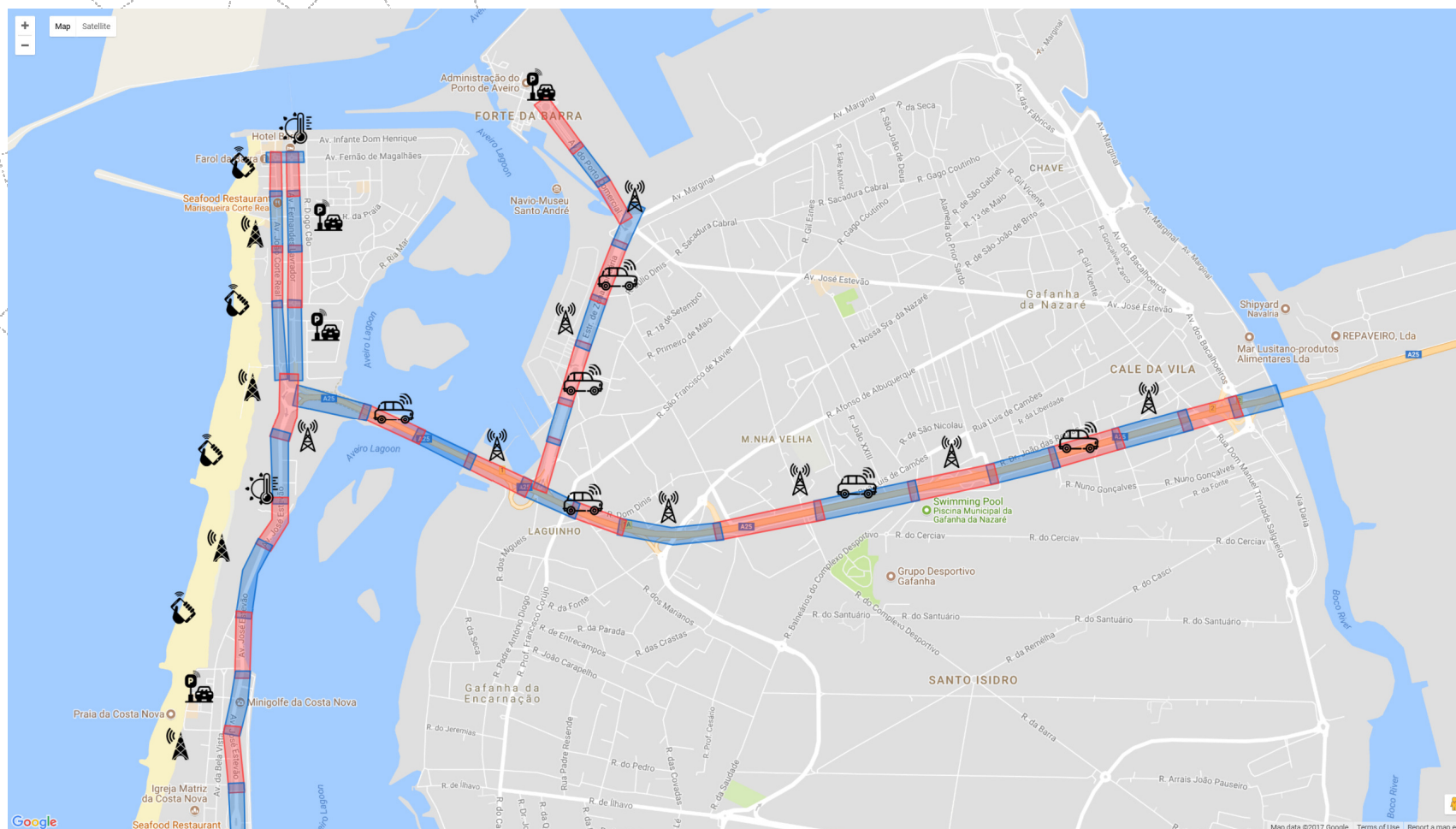


Road Infrastructures to install

- Road side units (RSUs) to be installed:
RSUs ESTI ITS-G5 (IEEE 802.11p)
Bluetooth Low Energy,
- RSUs will be connected with a private *backhauling* network
- Covered zones:
A25 motorway from Aveiro to Ilhavo's beaches
Urban zones in Barra and in Costa Nova do Prado (Stripe houses village)
- Radio coverage will also be provided in the future biking corridor from Aveiro to the beaches (not yet ready).

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Road Infrastructures to install

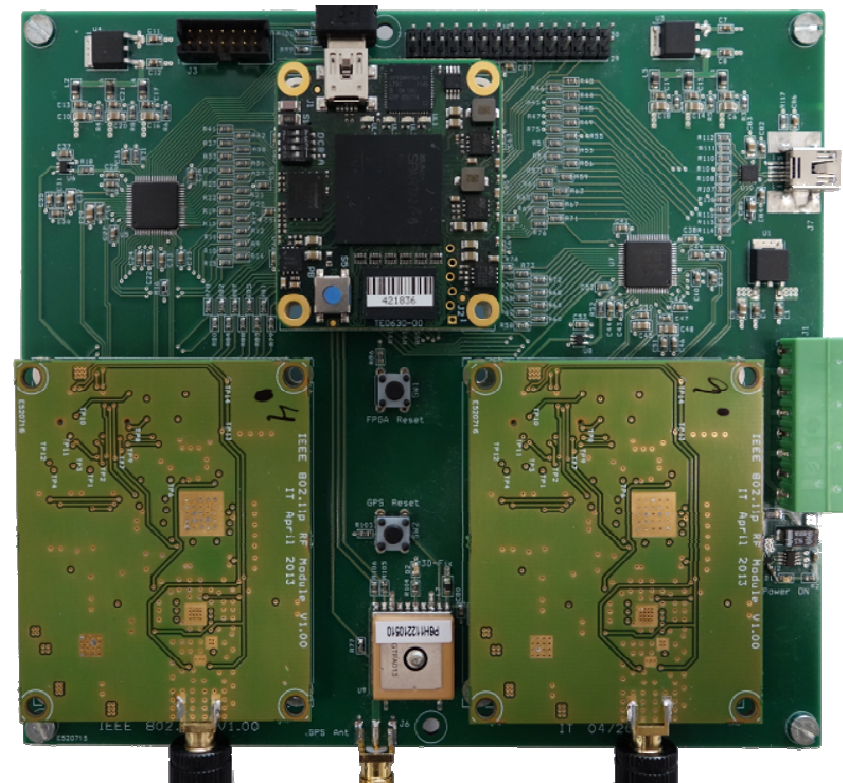


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Equipment to install in vehicles

Portable units (OBUs - On Board Units), including:

- Automotive PC
- ETSI ITS-G5
- LTE / LTE-V
- *Smartphone / Tablet*



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Equipment to install in vehicles



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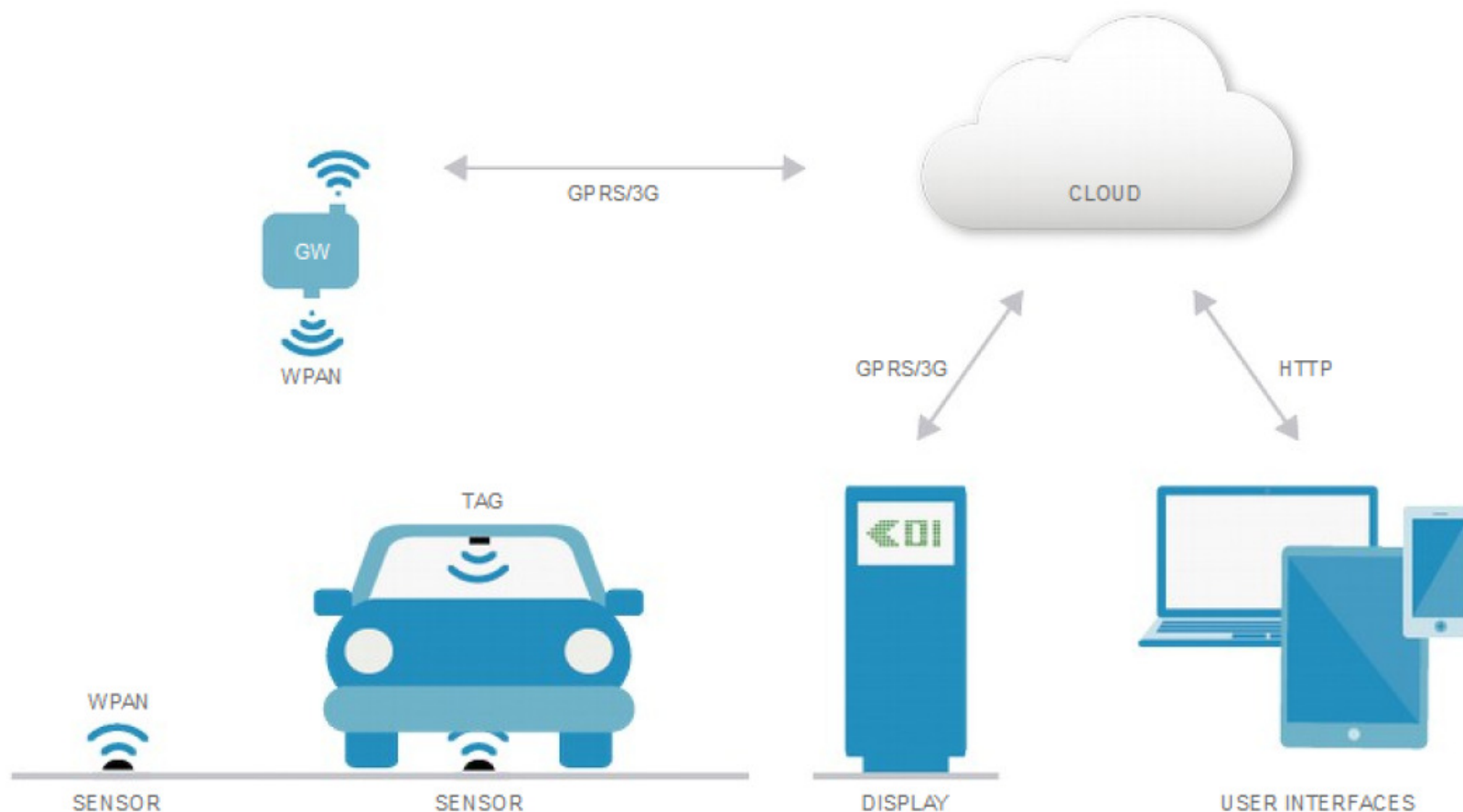
Infrastructures to install in urban areas

- WiFi coverage in the areas with more people movement, including beach areas (safety services welcome).
- Gateways multi-technology (BLE, ZigBee, LoRa, Sigfox, etc.)
- Parking sensors
- Environment monitoring stations



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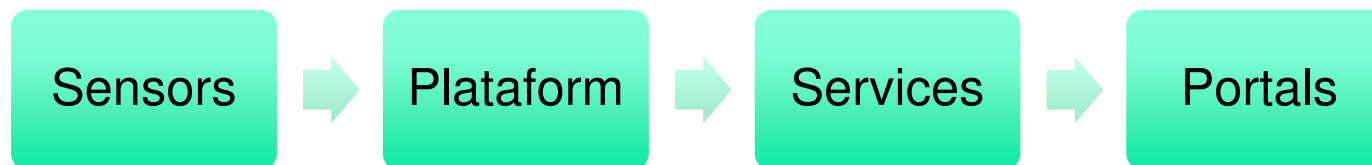
Infrastructures to install in urban areas



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Smart Cloud of Things

- Software platform able to communicate with heterogeneous devices using different protocols (HTTP, CoAP, MQTT, AMQP).
- Infrastructure with processing and storage allocation for the data collected by the platform (Big Data)
- Availability of multimodal interfaces including a portal to visualize the data collected and APIs to enable the development of applications and services that take profit of the platform capabilities and functionalities.



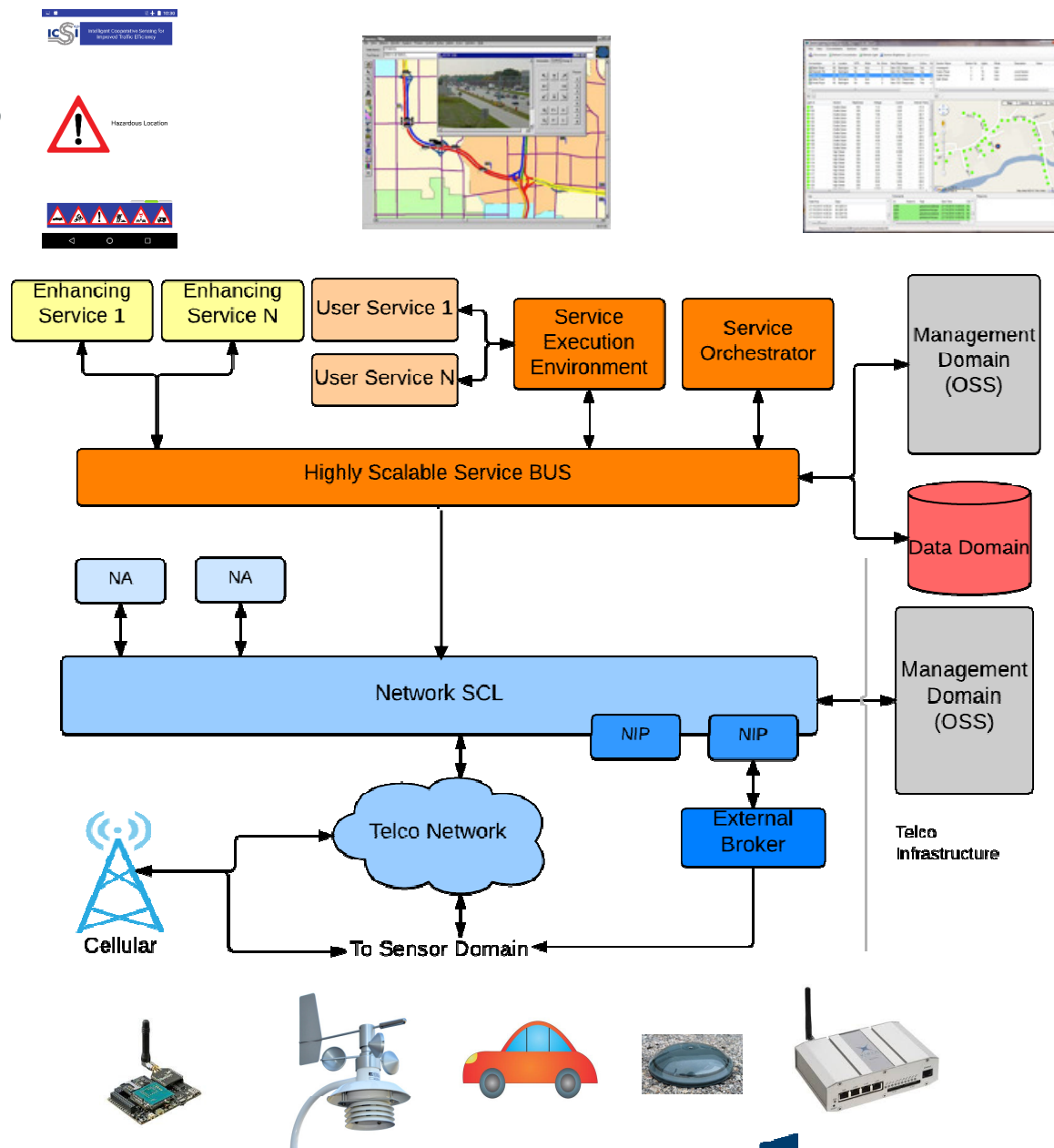
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Smart Cloud of Things

Data Aggregation (Big Data)
Multiple source relationship inferences

Acceleration of the creation and launching of new services

Composed services
Intelligent Actuation



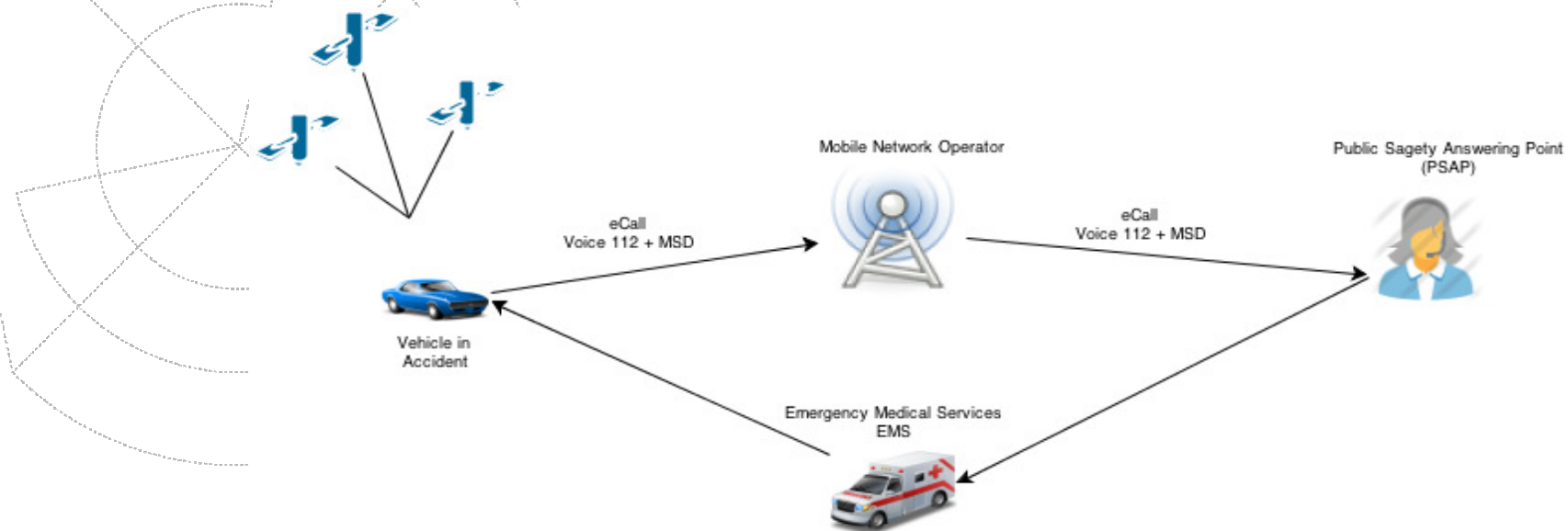
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Demonstration Mobile App eCall++

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eCall: Automatic Accident Detection



- Automatic emergency call (eCall)
- Voice call
- MSD – Minimum Set of Data, in the voice band:
 - GPS coordinates, speed of collision, etc.

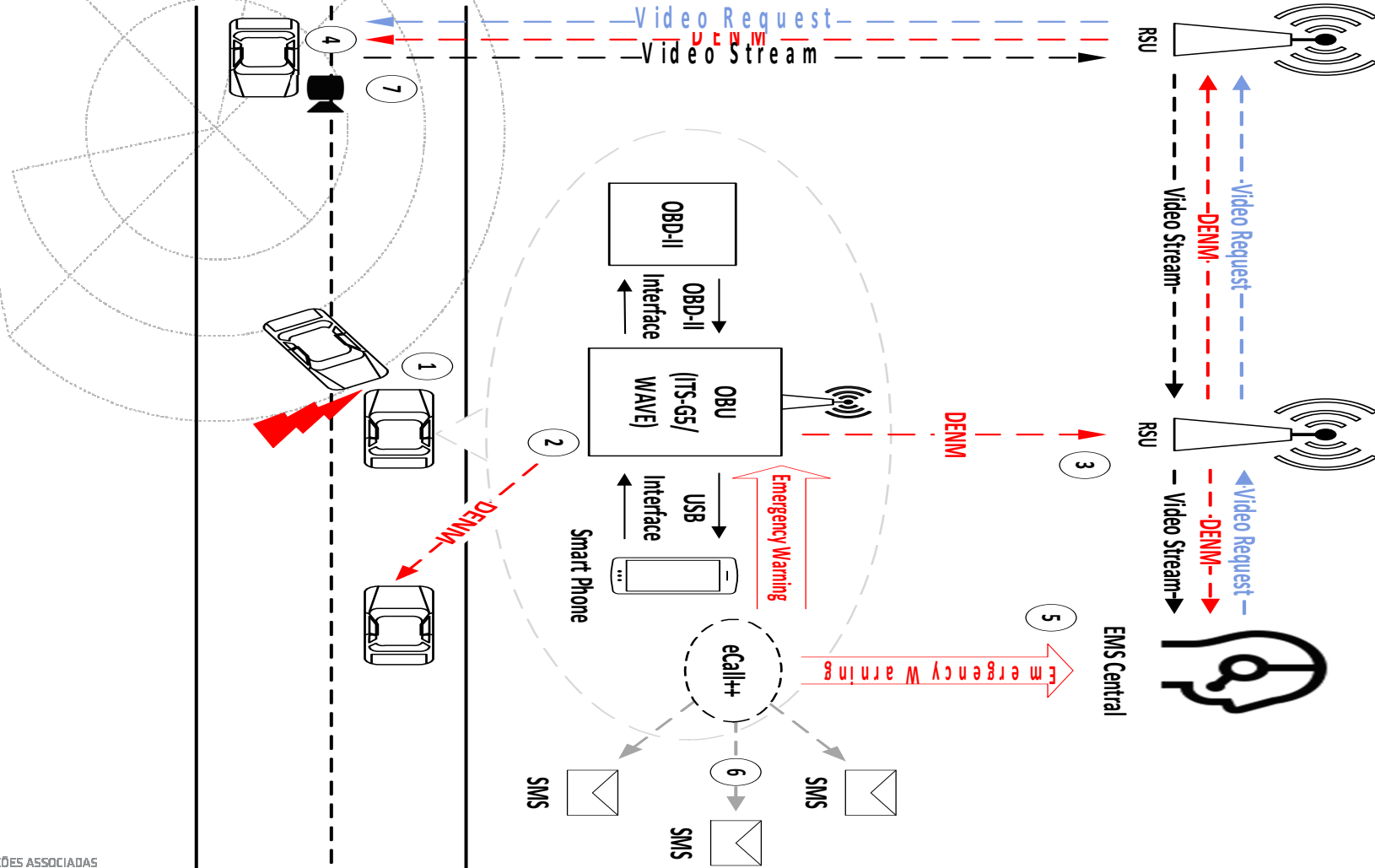
But eCall doesn't include the passengers number and their health situation

eCall++: additional functionalities

- Integration with vehicular networks
- Manual warnings issued by users
- Unified graphical Interface to the safety system through vehicular communications
- Cooperative ITS applications to help the management of road incidents:
 - The road operator can access mobile phone cameras in the neighborhood to get and share images to help in the rescue or actuation
- Indication of the number of passengers to the eCall info
 - Using info from seat sensors or, in case of just a mobile phone, the front camera of the device to count the number of passengers.

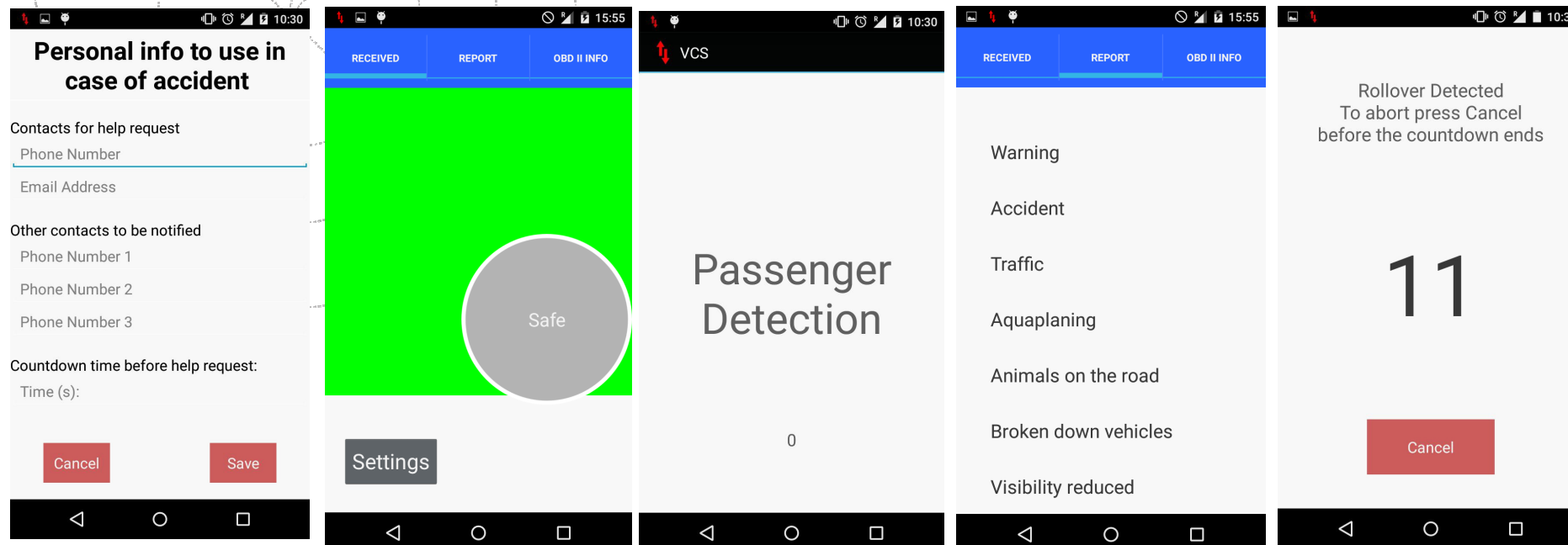
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eCall++



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eCall ++



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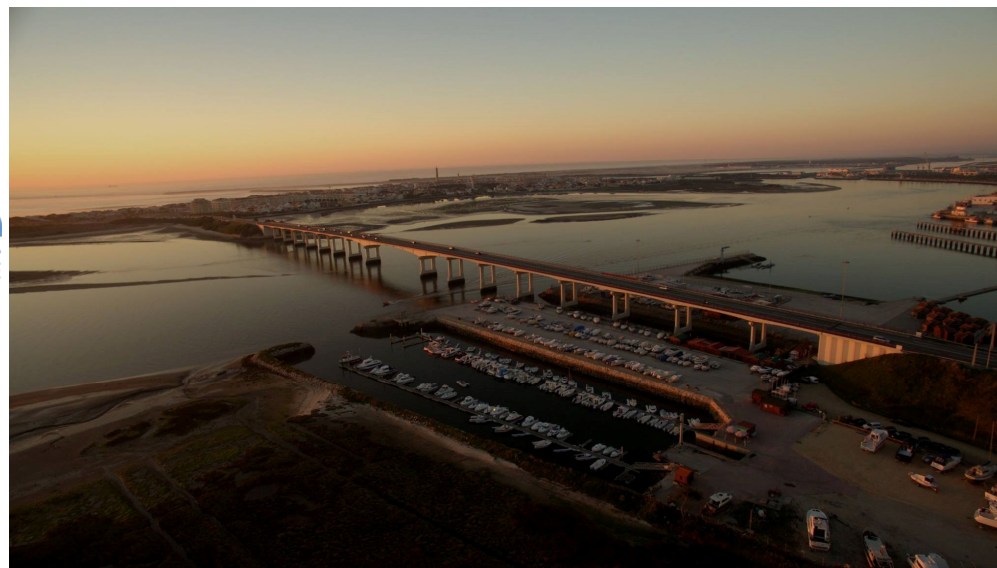
Strategic Partnerships



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Conclusions

- Smart communities are an important concept supported on smart cities technology.
- Mobility is one of the key issues to address due to its impact on quality of life.
- Intelligent Transportation Systems (ITS) and cooperative systems can support solutions to address mobility issues.
- An initiative is required to increase collaboration among stakeholders, joining enterprises among themselves and those with research institutions.
- We believe that the PASMO platform project can help to potentiate collaboration and field testing in a rich environment representative of the smart communities concept..



Thank you

Please contact jaf@ua.pt for further info.

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CENTRO 2020

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