



## **DEVELOPMENT OF C-ITS SERVICES IN TUNNELS A23 GARDUNHA TUNNEL**


Paulo Pereira (Scutvias)


28/11/2017




# Development of C-ITS services in tunnels - A23 Gardunha Tunnel

## Summary:

 Beira Interior Concession

 A23 Gardunha Tunnel

 Gardunha Tunnel pilot

# Development of C-ITS services in tunnels - A23 Gardunha Tunnel

## C Beira Interior Concession

- 33 years Concession (1999 - 2032);
- 177,5 km extension;
- It is the fastest route from Lisbon to north Iberia and north Europe;
- 4 Tunnels (~5 km)
  - Alpedrinha (0,30 km)
  - Gardunha (1,62 km)
  - Ramela (0,29 km)
  - Barracão (0.33 km)



# Development of C-ITS services in tunnels - A23 Gardunha Tunnel

## A23 Gardunha Tunnel

### Characteristics

- Construction year (N/S - 1997) (S/N – 2003)
- 1620 meters long
- 2 tubes with 2-way unidirectional traffic
- 1,7% longitudinal slope
- 10 meters platform width
- 4,5 meters maximum height
- 80 km /hour maximum speed

# Development of C-ITS services in tunnels - A23 Gardunha Tunnel

## C A23 Gardunha Tunnel

### Systems

Air Quality Control



Fire Detection



Lighting



Electrical supply



Surveillance



Electronic signaling



SOS



Traffic control



Extinguishing fires



Telemetry



**All the systems are controlled from Lardosa Control Center**



# Development of C-ITS services in tunnels - A23 Gardunha Tunnel

## A23 Gardunha Tunnel

### Improvements

- Evacuation lighting installation
- Changing lighting control
- Lighting reinforcement
- Fire network expansion
- Evacuation signs reinforcement
- Traffic lights and megaphone system installation
- Emergency Communications Network implementation
- Smoke extraction system reinforcement

**~ 500k € Investment**

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## A23 Gardunha Tunnel

### Improvements

- Emergency plans implementation
- Operational structure coordination
  - Identification of mobilizable resources
  - Coordination with external resources
- Improvement of response times in emergency situations



# Development of C-ITS services in tunnels - A23 Gardunha Tunnel

## A23 Gardunha Tunnel

Emergency simulation

Túnel Seguro - LIVEX

Improvements



Training



# Development of C-ITS services in tunnels - A23 Gardunha Tunnel

## C A23 Gardunha Tunnel

### What are we going to do next?

- Being a part of Cooperative Intelligent Transport Systems (C-ITS) that allow effective data exchange through wireless communication technologies between components and actors of the transport system.
- Contribute for the deployment of harmonised and interoperable C-ITS services in Europe.

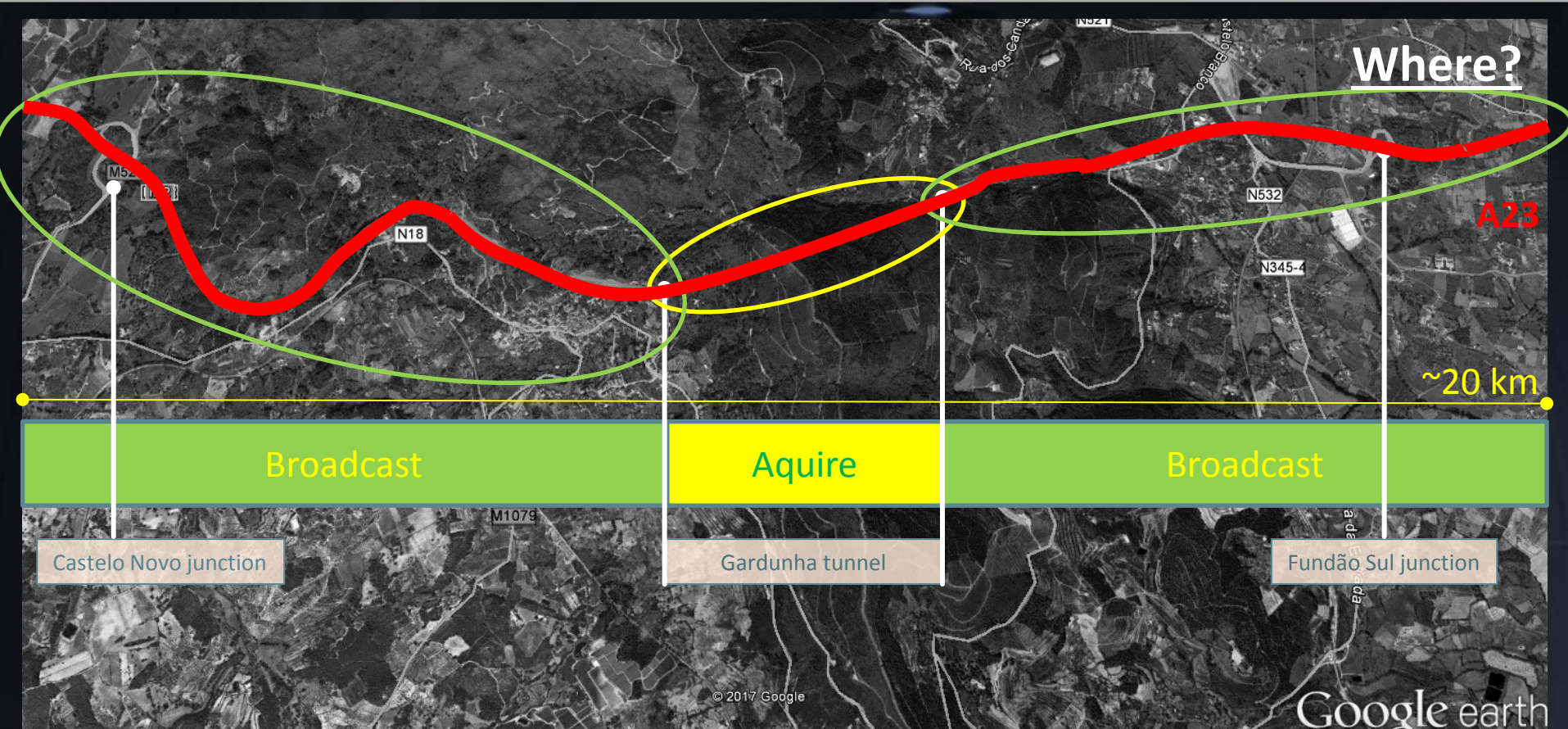
# Development of C-ITS services in tunnels - A23 Gardunha Tunnel

## Gardunha Tunnel pilot

- Development of C-ITS services in Gardunha Tunnel (A23)
- This sub-activity will pilot the provision of Day-1 C-ITS services inside and in the surroundings of the "Gardunha tunnel".
- The sub-activity will cover the following task:
  - Installation of RSUs ;
  - Use of vehicles with OBUs;
  - Tunnel automaton upgrade;
  - Testing and monitoring of the provision of the Day-1 C-ITS.

# Development of C-ITS services in tunnels - A23 Gardunha Tunnel

## Gardunha Tunnel pilot

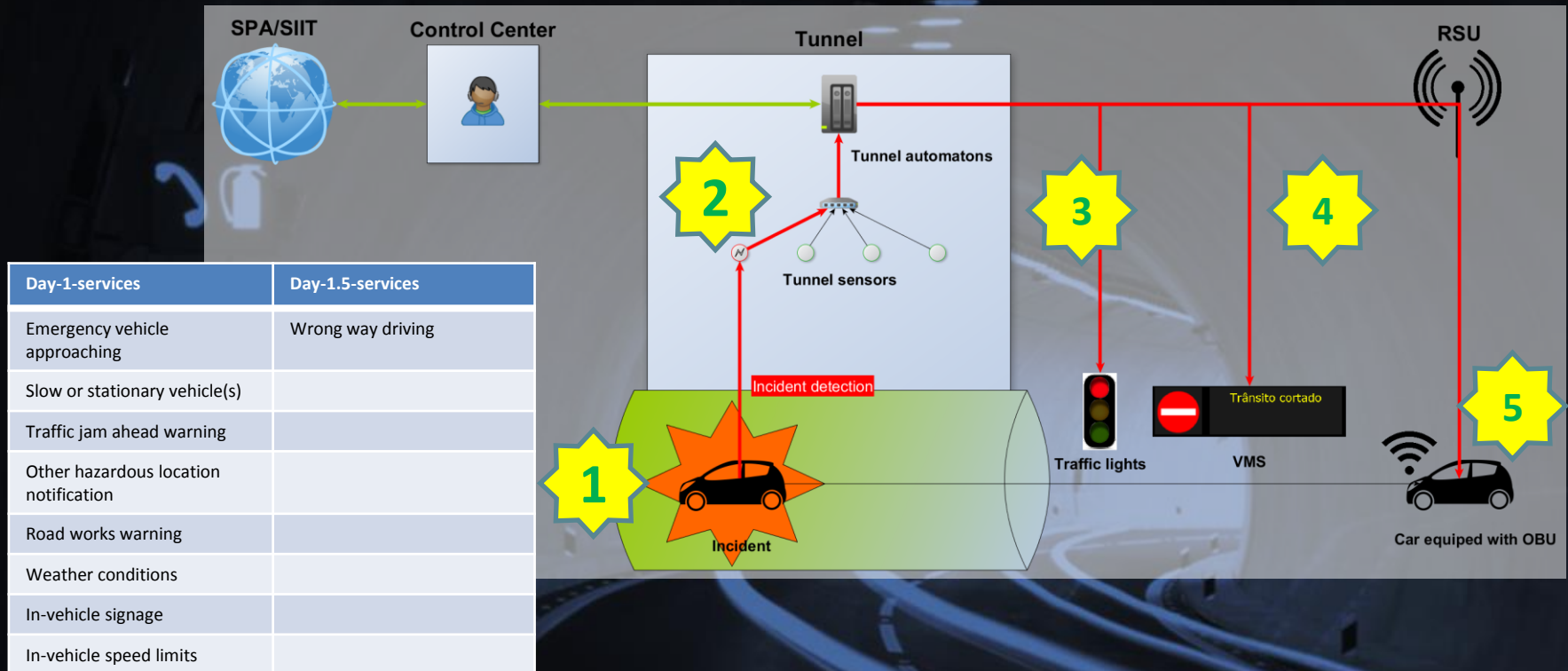




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## Gardunha Tunnel pilot

How?



# Development of C-ITS services in tunnels - A23 Gardunha Tunnel



Have a good trip





# THANK YOU!

Paulo Pereira

[p.pereira@scutvias.pt](mailto:p.pereira@scutvias.pt)

IT & ITS Manager

