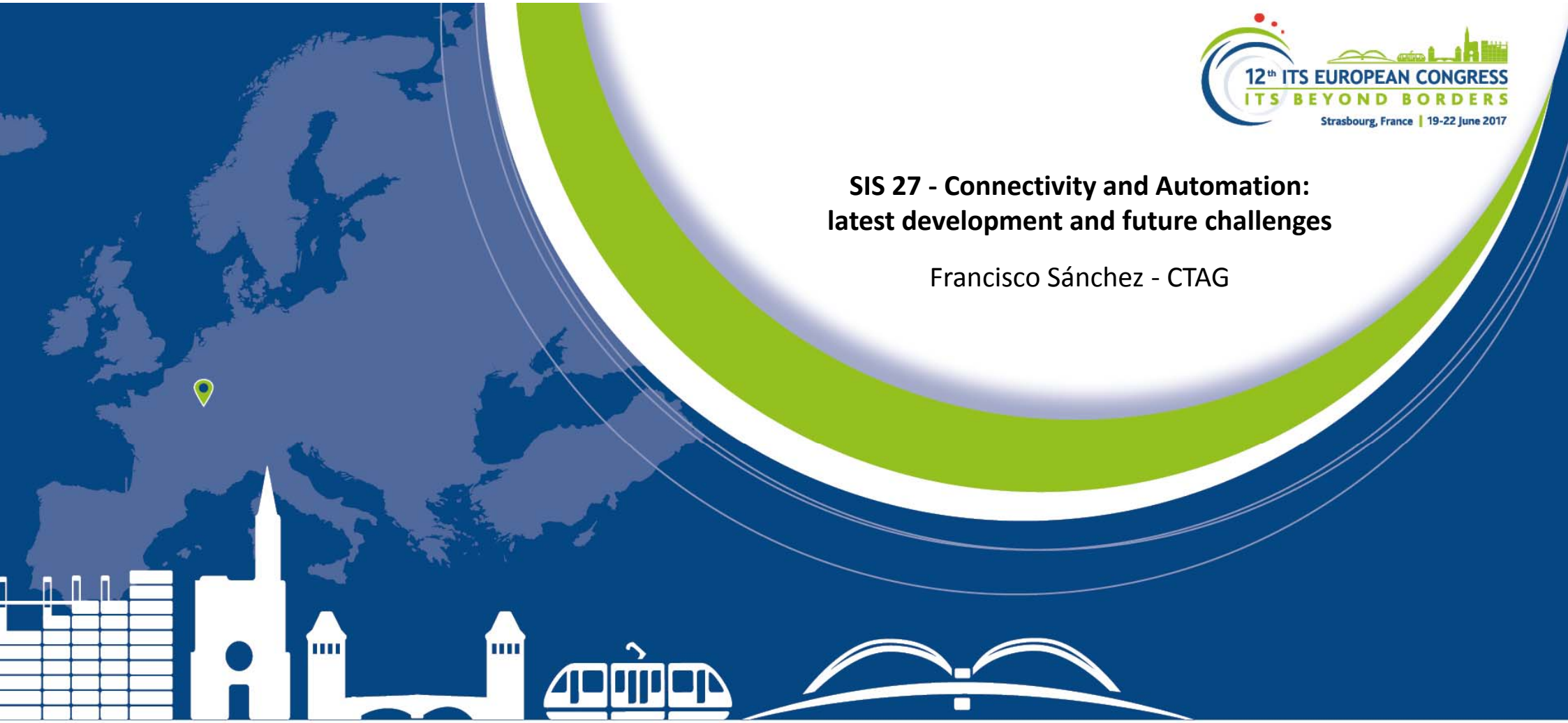

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SIS 27 - Connectivity and Automation: latest development and future challenges

Francisco Sánchez - CTAG

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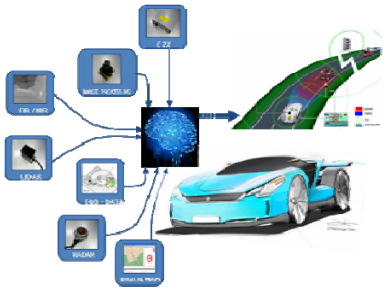
Challenges for CAD

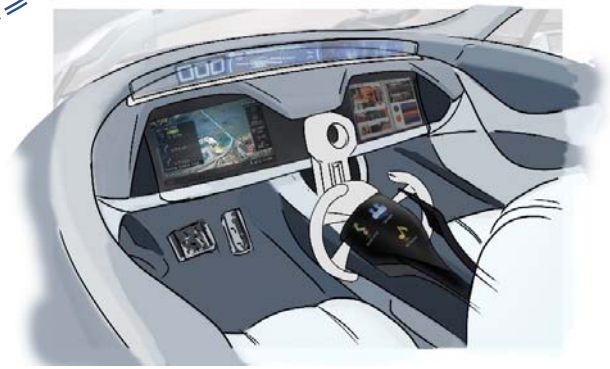
Testing and Validation



Sensors and perception

Functions and control

Connectivity

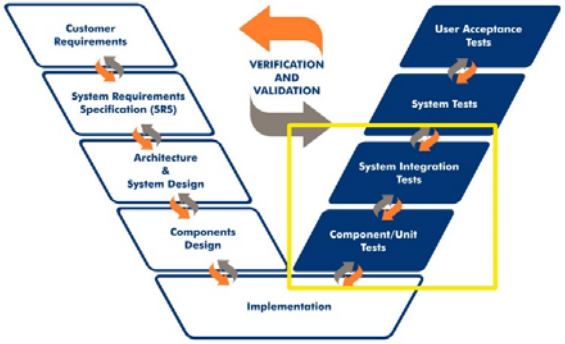


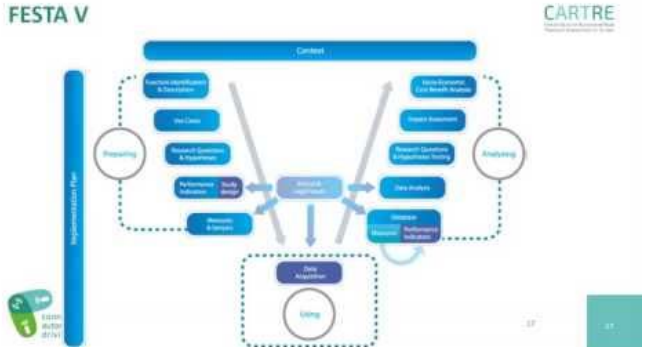
Road and infrastructure adaptation

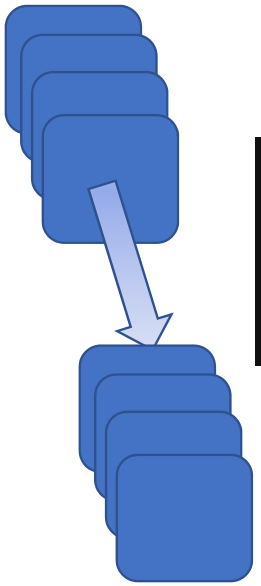
Legislation

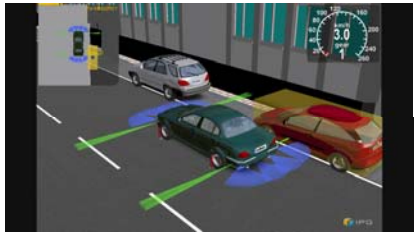
HMI and Human Factors

CAD Testing approach









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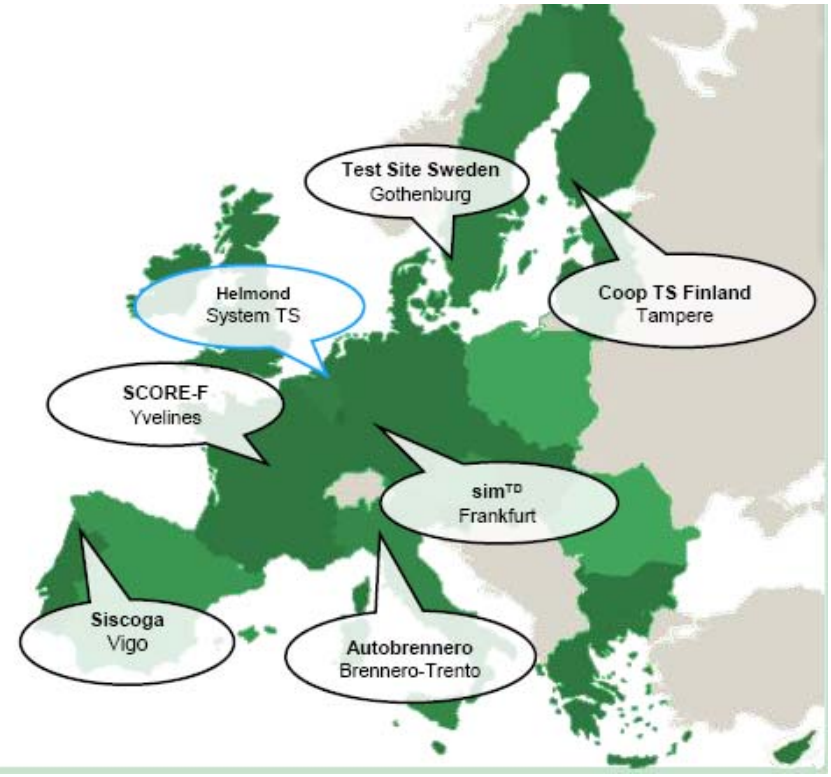
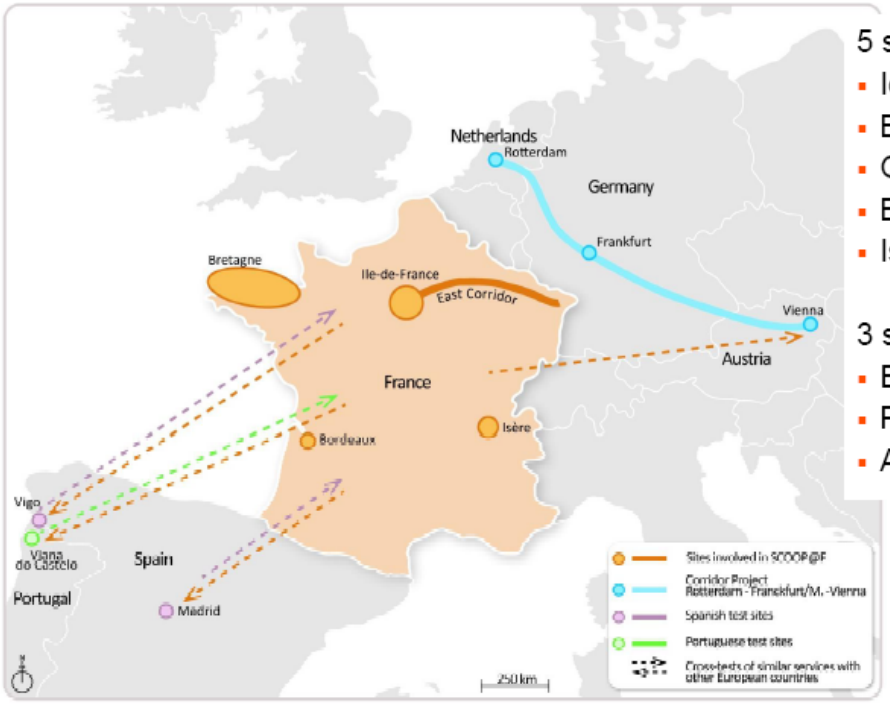
Testbeds in Europe – Cooperative systems



Testbeds in Europe – Cooperative systems

Projet SCOOP
véhicules et routes connectés
connected vehicles and roads



5 sites en France:
- IdF
- Bretagne
- Grand Est
- Bordeaux
- Isère

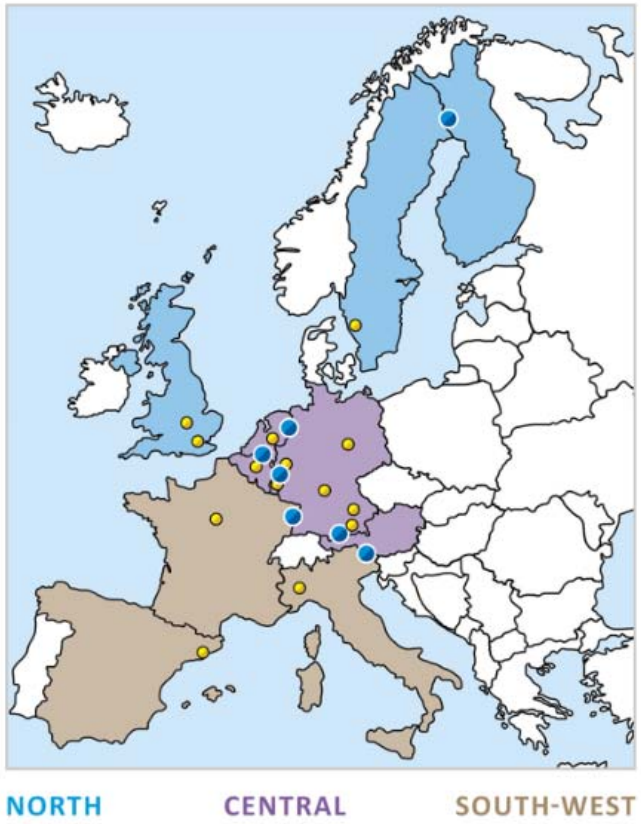
3 sites en Europe:
- Espagne
- Portugal
- Autriche

C-ROADS

Testbeds in Europe – Towards CAD. L3PILOT

Crossborder

Austria	Germany
Austria	Italy
Belgium	Germany
Belgium	Netherlands
Finland	Sweden
France	Germany
Germany	Netherlands



Country, region - OEM

BE, Brussels; NL;
ES, Barcelona - Toyota

DE, Aachen - Ford

DE, Ingolstadt - Audi

DE, Munich - BMW

DE, Offenbach - Honda

DE, Wolfsburg - VW

FR, Paris and other regions - REN, PSA

IT, Turin - CRF

LU; NL - Delphi

SE, Gothenburg;
UK, London - Volvo

UK, Coventry - JLR

L3Pilot

01.09.2017 - 31.08.2020

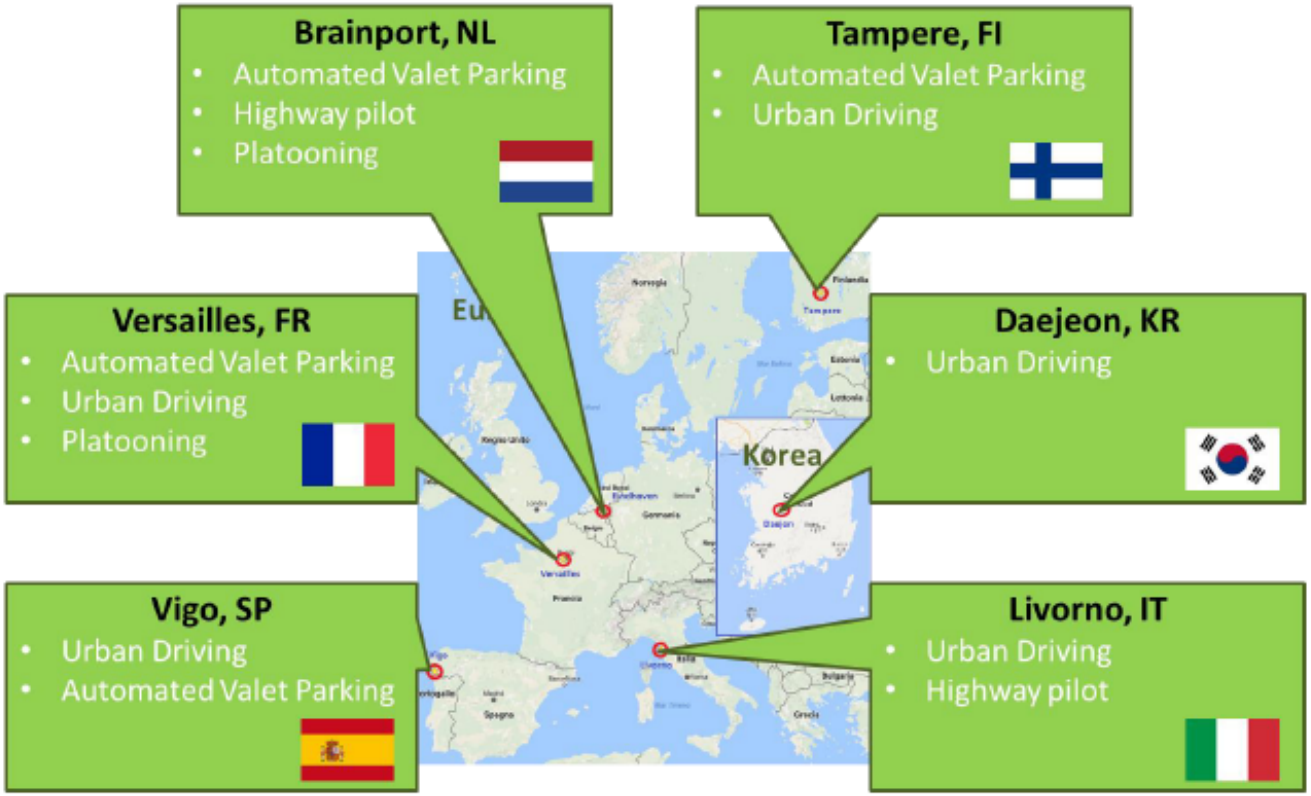
WWW.L3PILOT.EU/

AUSTRIA, BELGIUM, FINLAND, FRANCE, GERMANY, GREECE, ITALY, NETHERLANDS, NORWAY, SWEDEN, SWITZERLAND, UNITED KINGDOM

1,000 test drivers and 100 vehicles in 11 European countries tests the viability of automated driving as a safe and efficient means of transportation. L3Pilot focuses on large-scale piloting of SAE Level 3 functions, with additional assessment of some Level 4 functions. It is co-funded by the European Union under the Horizon 2020 programme, Grant Number 723051, and is supported by the European Council for Automotive R&D.

Testbeds in Europe – Towards CAD. AUTOPILOT

AUTOPILOT



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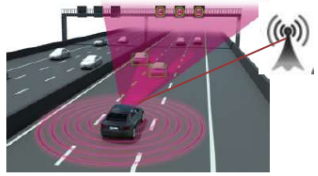
Testbeds in Europe – Towards CAD. Drive Me (Sweden)

- The project was kicked off in 2013, and the pilot begins in 2017
- Similar pilots will later be run also in London and China

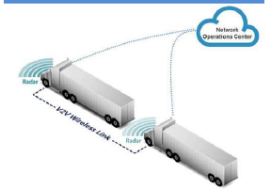
Testbeds in Europe – Towards CAD. CONCORDA EATA Project

	Use case	Technologies	Sites
STEP1	Enabling services for - Highway chauffeur (L2/3) - High density truck platooning	Pre Deployment: - hybrid communication : LTE, ITS G5 + LTE V, Mobile Edge Computing applications - Network slicing - LTE Broad casting: GNSS offset, hazards and HD-map updates Studies : business models responsibilities, safety concepts, Quality of service, Security and data protection Regulation and standardization	20..40 km tracks DE, FR,NL, ES, BE
STEP2	As step 1 + Valet parking	Application above technologies and studies	Cross border motorways networks
STEP3	As step 2 Automated driving	Industrialization	Commercialisation on AD authorized motorways

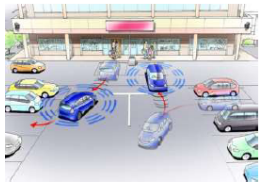
High way chauffeur L3 & L4

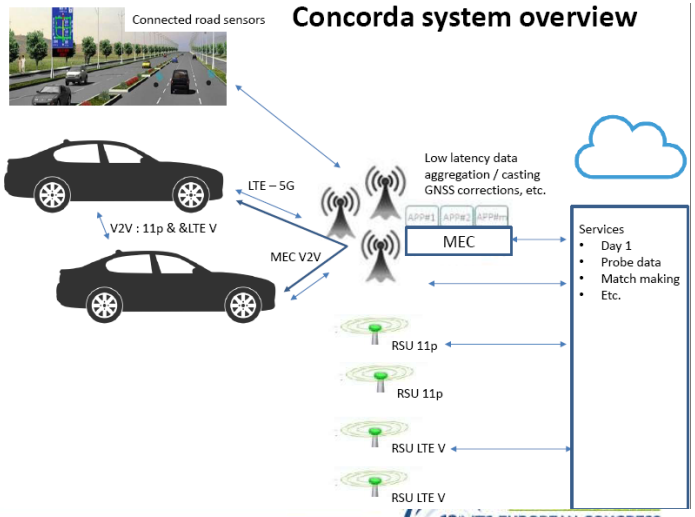


High Density truck platooning



Automated Valet parking





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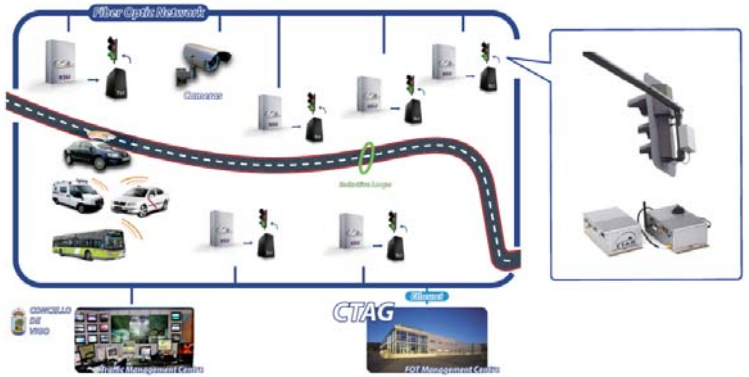
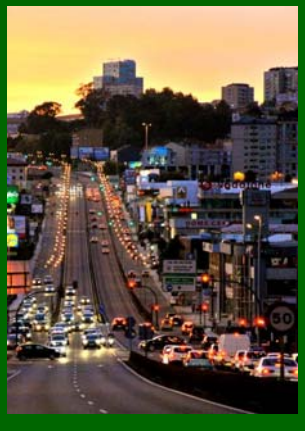
Testbeds in Europe – SISCOGA^{4CAD} Testbed

SISCOGA 4CAD

SISCOGA TEST-BED FOR CONNECTED & AUTOMATED DRIVING



SISCOGA^{4CAD} Testbed. TMCs (DGT and Vigo Council)



SISCOGA^{4CAD} Testbed. TMCs (DGT and Vigo Council)

SISCOGA^{4CAD} Testbed. Proving Grounds

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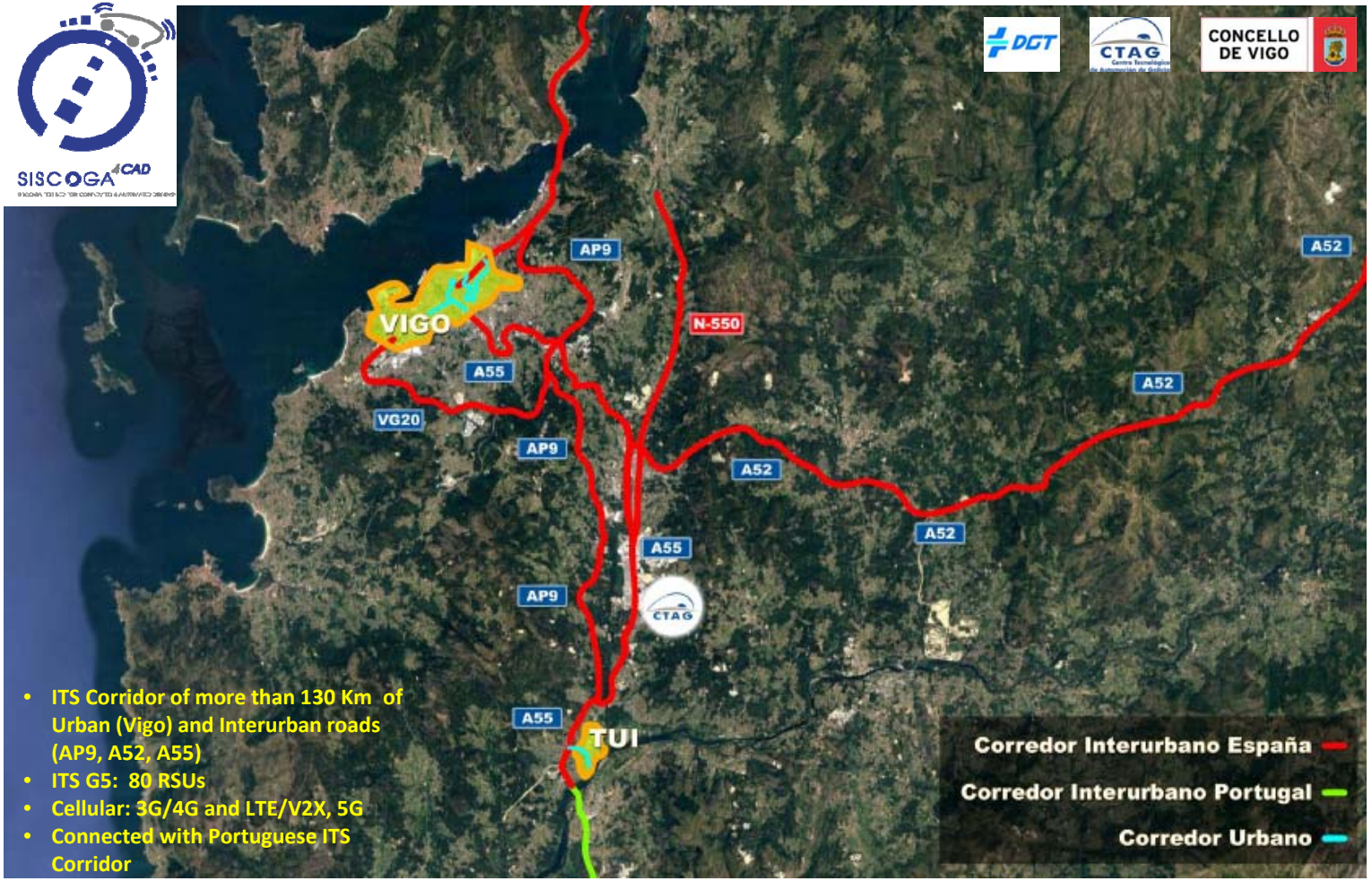
SISCOGA^{4CAD} Testbed. Real Corridor



- ITS Corridor of more than 130 Km of Urban (Vigo) and Interurban roads (AP9, A52, A55)
- ITS G5: 80 RSUs
- Cellular: 3G/4G and LTE/V2X, 5G
- Connected with Portuguese ITS Corridor

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SISCOGA^{4CAD} Testbed. Stakeholders and Partners

SISCOGA^{4CAD} Testbed. Cooperative FOTs and Pilots

R&D | FOT | PILOT | DEPLOYMENT

2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017

C2ECOM

SISCOGA NATIONAL FOT

SISCOGA DRIVE-C2X FOT

COMPASS4D PILOT

CO-GISTICS

SCOOP

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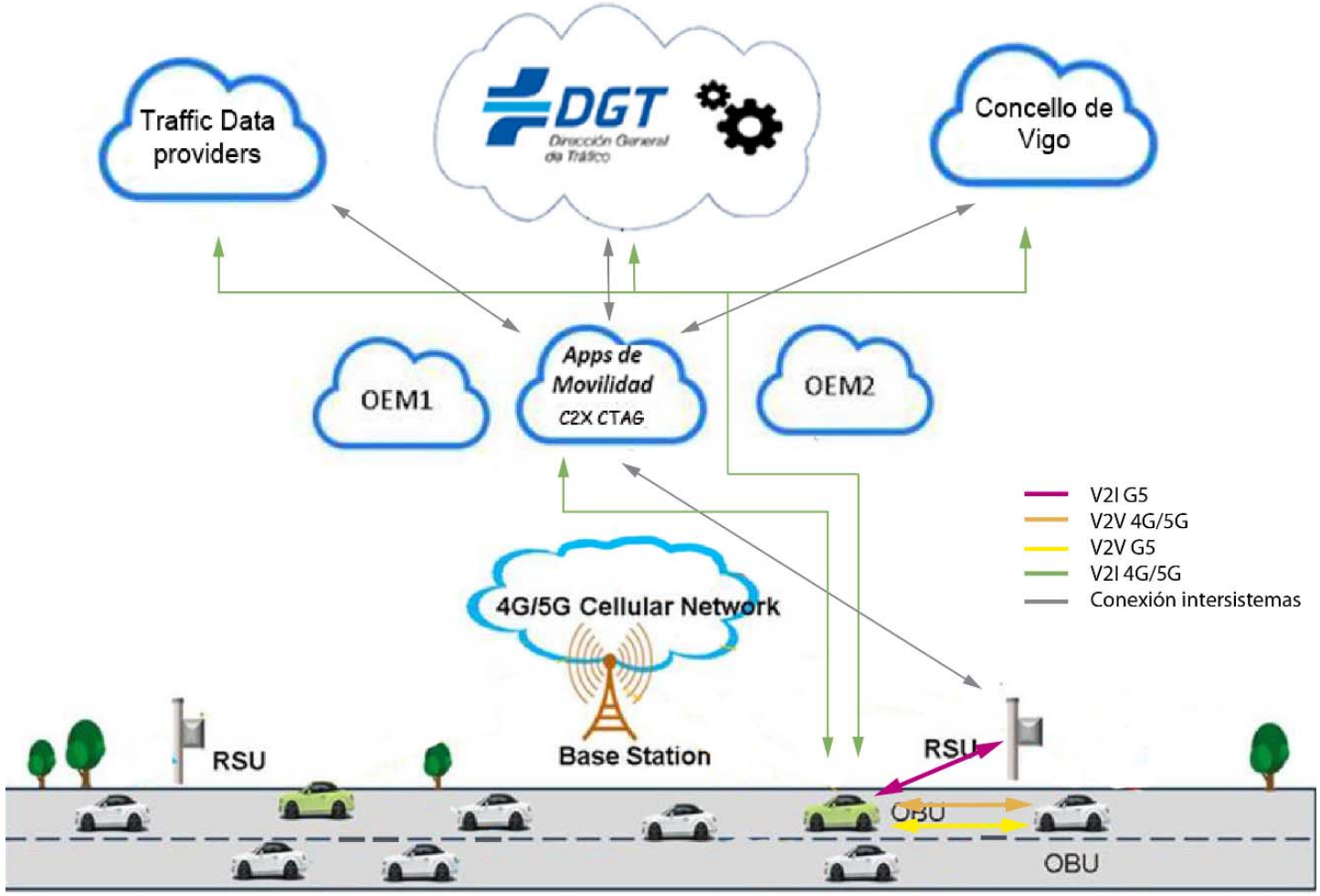
SISCOGA^{4CAD} Testbed. Example of results (COMPASS4D)

Emergency vehicle priority service

SISCOGA^{4CAD} Testbed. Hybrid Architecture



SISCOGA[4CAD] Testbed. DGT instruction for testing CAD prototypes

LEGAL ISSUES

INSTRUCTION 15/V-113: ***Authorization to conduct tests or research trials of automated vehicles on roads open to general Traffic.***

- Applicant must provide a **system certification**, complying with the Annex I requirements.
- The autorization procedure is really **swift and flexible**.
- **Mutual recognition** with other Member States

Autonomous vehicles **are being** tested

Future: Type approval → Software certification

SISCOGA^{4CAD} Testbed. Next activities and pilots

Projet SCOOP
véhicules et routes connectés
connected vehicles and roads

January 2016 – December 2018

Functions:
- Selected Day 1 Cooperative Services

Fleet: 10 Connected Vehicles

Location: SISCOGA^{4CAD} Interurban and Portuguese Corridor

AUTOPILOT

July 2017 – June 2020

Functions:
- AUTOMATED VALET PARKING
- URBAN AUTOPILOT

Fleet: 4 CAD Vehicles

Location: SISCOGA^{4CAD} Urban (Vigo)

CONCORDA PROPOSAL

July 2017 – December 2020

Functions:
- HIGHWAY CHAUFFEUR

Fleet: 5 CAD Vehicles

Location: SISCOGA^{4CAD} Interurban

C-MOBILE

June 2017 – November 2020

Functions:
- Traffic Efficiency (Green priority, GLOSA, Dynamic Speed Limits, Probe Vehicle Data)
- Infrastructure To Vehicle Safety (RWW, RHW, EVW, Signal Violation Warning, Warning System for Pedestrian)
- Vehicle to Vehicle Safety (Urban ACC, Emergency Brake Light, SVW, VRUs Warning)

Fleet: 20 Trucks, 10 Buses, 30 Cars, 10 Emergency Vehicles, 10 motorcycles

Location: SISCOGA^{4CAD} Urban (Vigo) and Interurban

C-ROADS SPAIN

July 2017 – June 2020

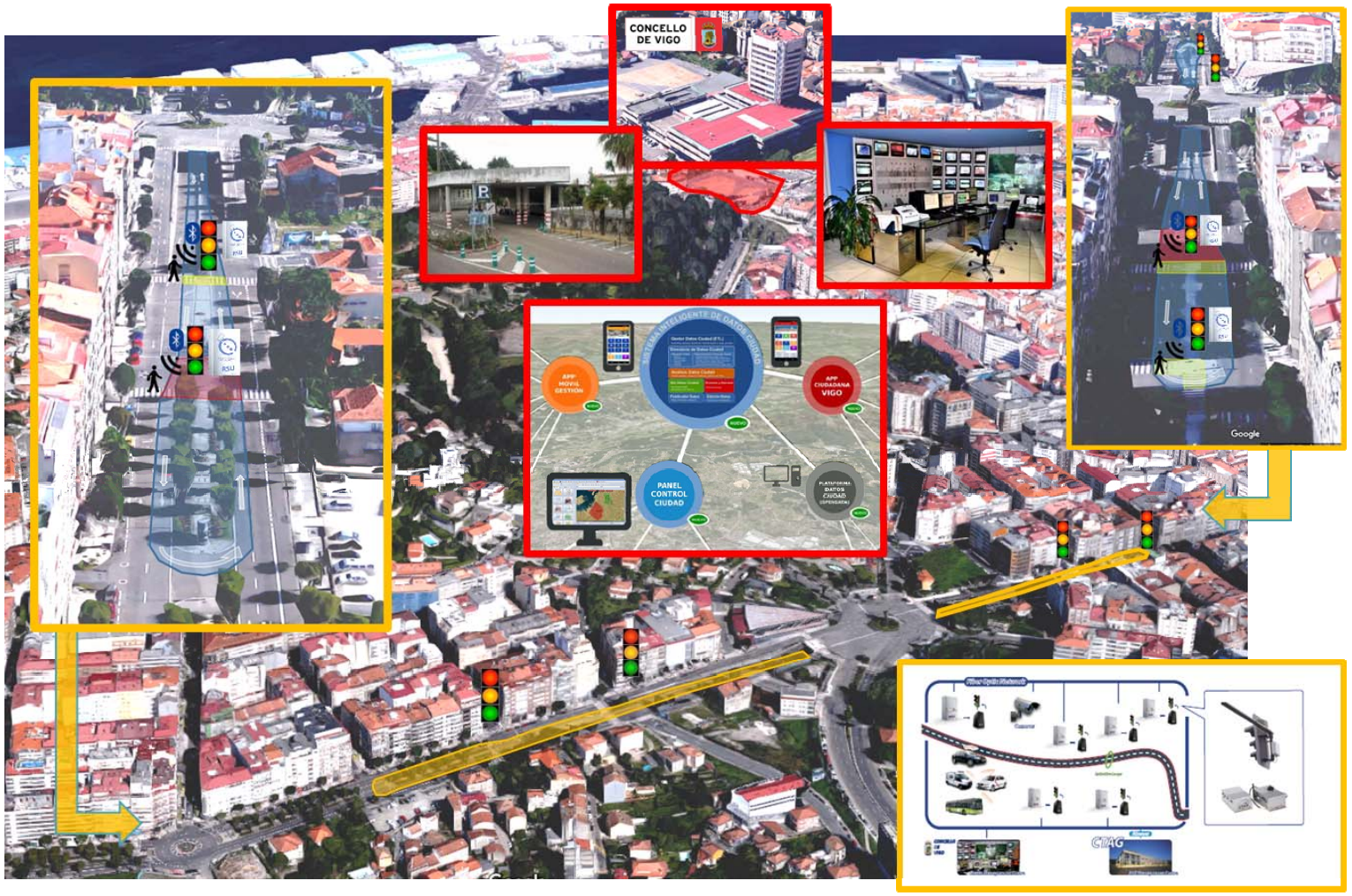
Functions:
- Day 1, Day 1,5 cooperative services
- Urban Autopilot
- Automated Valet Parking
- Hightway Chauffeur
- Last Mile Autonomous Shuttle Services

Fleet: 30 Private Vehicles, 15 Taxis, 30 Buses, 5 Emergency Vehicles, 5 CAD Vehicles

Location: SISCOGA4CAD Urban and Interurban and Portuguese Corridor (cross-tests)

More to come …

SISCOGA^{4CAD} Testbed. Example AUTOPILOT



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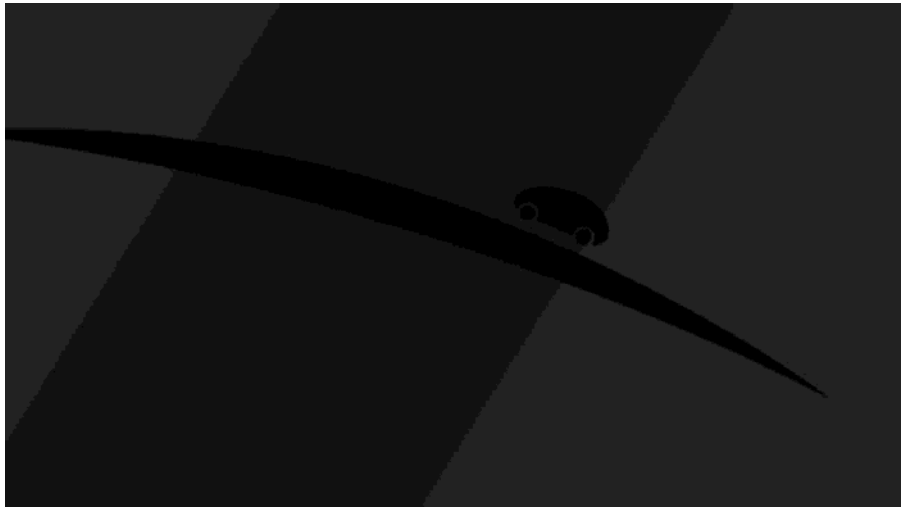
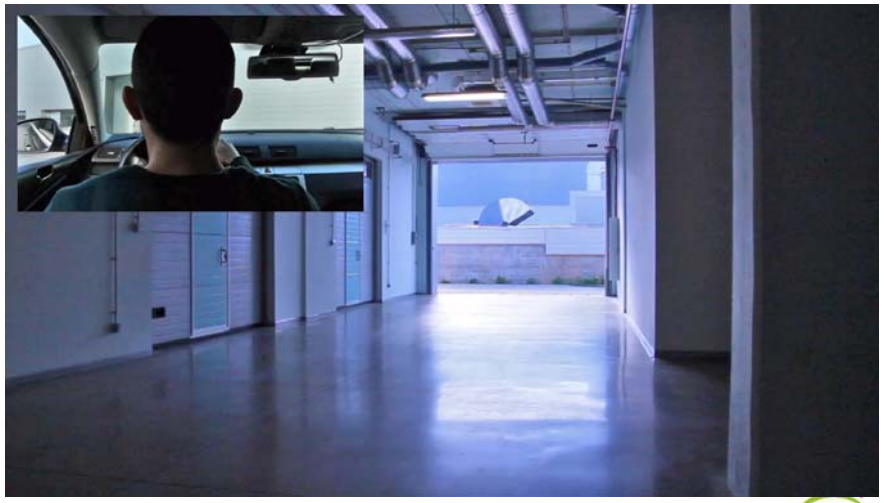
SISCOGA^{4CAD} Testbed. Connected Highway Chauffeur

SISCOGA^{4CAD} Testbed. CAD Functions for urban scenarios





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Muchas Gracias