AUTOCITS
AUTOCITS workshop

Lisbon, February, 28th

6th Workshop

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R&D Program Manager
Connecting Europe Facility (CEF)
key EU funding instrument to promote growth and competitiveness through targeted infrastructure investment at European level
**Atlantic Corridor:** The Atlantic Corridor stretches from Portugal to France.

**Main urban nodes:** Lisbon, Madrid and Paris
Context: ITS & C-ITS Projects

**ITS**
- Arc Atlantique 2
- Arc Atlantique 3
- Ursa Major 2
- Ursa Major neo
- Ursa Czech Republic
- Next ITS 2
- Next ITS 3
- MedTIS 2
- MedTIS 3
- Crocodile 2
- Crocodile 3 Hungary
- Crocodile 2 Hungary
- Crocodile 3 Croatia
- Crocodile 2 Croatia
- ITS deployment PL
- ITS deployment SI
- ITS deployment SI 2
- ITPs in DE and AT
- ITPs in RO
- ITPs in Flanders
- ITPs in ES

**C-ITS**
- C-Roads AT
- C-Roads FR
- InterCor
- C-Roads SI
- NordicWay
- C-Roads SI 2
- NordicWay 2
- C-Roads BE/Flanders
- C-Roads BE/Wallonia
- C-Roads DE
- C-Roads IT
- C-Roads HU
- C-Roads ES

**EU ITS Platform**
- I_HeERO
- eCall.at

**C-Roads Platform**
- CONCORDA
- Socrates
- CITRUS
- Timely
- AUTO C-ITS
- SOLRED
- MI2

**Total CEF funding for ITS:** 443,482,461 EUR
- Including 121,497,176 for C-ITS

**Total investments for ITS:** 1,172,984,236 EUR
- Including 235,632,797 for C-ITS

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**Indra**
Autonomous Vehicles/Driving, New concept?

1950s GM “Firebird II” (Concept)
“Bring together Cooperative ITS (C-ITS) and Autonomous driving”
“AUTOCITS aims to contribute to the deployment of C-ITS in Europe and to boost the role of C-ITS as catalyst for the implementation of autonomous driving”

C-ITS: Intelligent Transport Systems (ITS) where ITS stations (vehicles, roadside equipment, traffic control centers and personal devices) communicate and share information

CAD – Connected & Autonomous Driving take advantage of a variety of techniques to detect their surroundings and advanced control systems to interpret sensory information to identify appropriate navigation paths, as well as obstacles and relevant signage
AUTOCITS: Why C-ITS + Autonomous Driving?

Cooperation (C-ITS) Augments Sensing

- Cooperative vehicles can “talk” and “listen” as well as “seeing”
- Communicate vehicle performance and condition directly rather than sensing indirectly
- Enables closer separations between vehicles
- ....

AUTOCITS: Vehicle-Infrastructure Cooperation

- Speed reduction approaching road works for safety
- Speed harmonization to maximize bottleneck flow
- Automated changing lanes, starting beyond line of sight, to smooth traffic
**AUTOCITS - Objetives**

- **Study on the current National, European and International legal framework for autonomous driving**
- **Pilot C-ITS services** for autonomous vehicles (AVs) under the applicable traffic regulation
- **Cooperate with other current initiatives during the study: C-Roads, etc.**
- **Provide recommendations for regulations and large scale C-ITS deployments**
AUTOCITS Programme: Connected Europe Facility
Starting date: 01-11-2016
Ending Date: 31-03-2019
Duration: 29 months

Call: CEF- 2015
Budget: 2,606,550 €
Coordinator: INDRA
Funding: 50%

Stakeholders Group

Paris Pilot
Madrid Pilot
Lisbon Pilot
AUTOCITS 

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Regulation study in AUTOCITS (Study)

Study of the national and European regulatory frameworks for the deployment of the Autonomous Driving

United States of America, Japan, Singapore, South Korea, China, Australia, etc.

Making propositions and recommendations for regulation and legal framework

Some of the aspects under study are:

- Alignment with Vienna Convention
- Normative on driving
- Testing Legislation
- Vehicle certification (individual vehicles, mass production)
- Laws to be modified
- Changes on SAE 3-5 already initiated/foreseen
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3 Pilots in the Atlantic Corridor

**Location:**
A9 – CREL Circular Regional Externa de Lisboa / Terminal Cruises

**Day 1 C-ITS Services:**
- Slow or stationary vehicle & traffic ahead warning
- Weather conditions
- Other hazardous notifications

**Test vehicles**
- 2 autonomous vehicle
- 1 instrumented vehicle
- 2 autonomous shuttles

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**Location:**
The HOV Lane located between the M30 and M40

**Day 1 C-ITS Services:**
- Slow or stationary vehicle & traffic ahead warning
- Road works warning
- Weather conditions

**Test vehicles**
- 4 instrumented and connected vehicles
- 2 autonomous vehicles

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**Location:**
The A13 highway

**Day 1 C-ITS Service:**
- Slow or stationary vehicle & traffic ahead warning
- Weather conditions
- Other Hazardous notifications

**Test vehicles**
- 4 connected vehicles
- 1 autonomous vehicle
Pilot Overview - Spain

Road: A6 Autovía del Noroeste, stretch between M30 and M40, Reversible high occupancy lane
Length: 10 kms, 15 RSUs have been installed

Traffic conditions
- More than 20,000 vehicles/day
- Close to traffic: controlled tests
- Open to traffic: private vehicles and public collective transport (bus)

Vehicles involved
- Autonomous vehicles: 2 vehicles
- Connected vehicles: 4 vehicles

C-ITS Day 1 services
- Service 1: Road Works information service
- Service 2: Weather information service
- Service 3: Traffic ahead service

Communication Channel
- ITS G5
**Roads**

1) A9-CREL Between Radial Pontinha and Radial Odíveras / Cruises Terminal
   - Length: 7 kms, 5 RSUs have been installed / 850m
2) Road connecting A9 and Faculty of Human Kinetics
   - Length: 1 kms

**Traffic condition**

1) Open peri-urban traffic
2) Controlled traffic conditions

**Vehicles involved**

- Autonomous vehicles: 2 vehicles
- Autonomous shuttle: 2 vehicles
- Connected vehicles: 2 vehicles

**C-ITS Day 1 services**

- **Service 1**: Notification of slow or stationary vehicles
- **Service 2**: Weather information service
- **Service 3**: Other hazardous notifications

**Communication Channel**

- ITS G5
Road: Peri-Urban A13 Highway entrance to Paris
Number of RSUs: 2 RSUs has been installed

Traffic condition:
Urban and peri-urban traffic

Vehicles involved:
- Autonomous vehicles: C1 Evie
- Connected vehicles: 4 C3 vehicles

C-ITS Day 1 services:
- Service 1: hazardous location notification
- Service 2: contextual speed adapting
- Service 3: traffic scheduling assist

Communication Channel:
- ITS G5
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CONTRIBUTION TO THE PLATFORM

C-ITS SERVICE specifications for
- Harmonised C-ITS specifications (21/07/2017)
- Road Weather warning
- Roadworks warning
- Traffic ahead warning

IMPLEMENTED SERVICES:
- Implementation of services
- Provision of Communication model used
- Results of cross-border validation tests
- Results from pilots assessment and evaluation

EXPECTED CONTRIBUTION FROM THE PLATFORM

- C-ITS Services implemented following ETSI specifications and they have been customised/tailored to C-ROADS based on reference documents
  - C-ITS: Infrastructure Function Specification (v1.3) August 2018
  - C-ITS Service Description (v1.1) March 2018

- Strategy of evaluation including KPIs from WG3
  - Evaluation and assessment plan (Final Version) July 2017

- Security model
  - Security approach for TCC / C-ITS: IMHO, Only address RSUs / OBU in c-roads

- Infrastructure Communication model
  - Standardised communication between C-ITS-TCC: DATEX II (ECO-AT)
  - Standardised communication between C-ITS-C-ITS: DATEX II (ECO-AT)
  - Standardised communication between C-ITS-RSUs
Contribution to/from the C-ROADS Spain

C-ROADS Spain

AUTOCITS deployment

C-ROADS Spain deployment
AUTOCITS – C-ROADs Architecture

Architecture

Weather service provider

C-ITS module (HORUS)

Traffic Control Center

C-ITS Services

Roadside

4G / FO

RSU

RSU

RSU Header

RSU

RSU

OBU

OBU

OBU

OBU

OBU
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Interoperability and Cross-border tests

Initial interoperability lab tests

**Test Infrastructure:**
- INSIA Lab Equipment
- V2X Equipment from 5 manufacturers involved in all pilots

**Test Objective:** Validating compatibility on:
- Frequency channel
- Physical level compatibility
- Sending/Reception of CAM/DEMN messages

**Test Results:**
- Total compatibility at physical level.
- Frequency channel established in 5.900 GHz.
- Stable geo-networking version 0.1.
- Success in interoperability. Sending & reception of CAM/DEMN messages.

Initial cross-border tests:

**Test infrastructure:**
- Two connected vehicles
- V2X equipment from 3 manufacturers

**Test Objectives:**
- Ensure interoperability of one C-ITS Service (Traffic ahead warning)

**Test Results:**
- Timestamp origin of times is the same for all teams and are synchronized
- All fields of DEMN messages should be filled to be detected as DEMN
- MAC identification should be unique for each RSU
- Number of hops should be defined in order to forward of messages

Initial Conclusions:
- **Synchronization** of the time zone is needed
- The equipment must all work in the same frequency
- Same versions of geonetworking protocols must be implemented

Next Cross border tests: France–Spain: March, 2019
Workshops

1st AUTOCITS WORKSHOP
MADRID, Nov 23rd 2017

2nd AUTOCITS WORKSHOP
PARIS, May 10th 2017

3rd AUTOCITS WORKSHOP
Lisbon, October 10th 2017

1st INTERNATIONAL WORKSHOP
Cologne, 5th July 2017

4th AUTOCITS WORKSHOP
Madrid February 2018

2nd INTERNATIONAL WORKSHOP
Vienna, 17th April 2018

5th AUTOCITS WORKSHOP
PARIS, Dec 14th 2018

6th AUTOCITS WORKSHOP
Lisbon, February 2019

FINAL AUTOCITS WORKSHOP
Madrid, March 2018

Upcoming
AUTOCITS – Video: Objectives & Achievements
Thank you!

Regulation Study for Interoperability in the Adoption of Autonomous Driving in European Urban Nodes

www.autocits.eu

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