C-ROADS AUSTRIA

Martin Böhm, AustriaTech

February, 14th, 2017
C-ROADS Austria

- The Austrian pilot contributes to interoperable European C-ITS solutions starting from the EU C-ITS Corridor.
- The implementation is linked to the
  - C-ITS Strategy AUSTRIA, which defines the C-ITS deployment steps 2020 in an organisational framework

- The Austrian C-Roads-Pilot
  - has its start the core elements of the EU C-ITS Corridor project in Austria (ECo-AT)
  - extends them to a motorway based network of C-ITS stations in 2020, as defined in the Austrian C-ITS Strategy.
Implementing Bodies

- Pilot activities at single test and validation locations are prepared by the Austrian motorway operator ASFINAG
- Those are usually gantries, where C-ITS units are installed and which can be accessed without restrictions to passing by traffic flows of vehicles.
- Mobile road side units are also planned, e.g. on road works warning trailers.
Schedule

• Starts in 2016 with an agreed EU C-ITS security solution ready for implementation and validation.
• From 2017 on, at least 10 ITS-G5 Road Side Units are installed and connected to the central C-ITS-station with live traffic data feeds from the Traffic Management Centre (TMC).
• Also in 2017, Austria C-Roads pilot site becomes operational with 30km of the Austrian test location equipped.
• Later in 2017, equipping of in total 300km of Austrian motorway starts.
• In 2018, cross-site tests will be carried out with the first two C-Roads pilot locations.
• From Q3 2018 on, 300km of the Austrian pilot sites are fully operational with connections between TMC and the central C-ITS-stations and the service distribution to all C-ITS stations.
Key Performance Indicators

- Four project phases, which start with the core elements of the EU C-ITS Corridor project in Austria (Eco-AT) and lead to a motorway based network of C-ITS stations in 2020.
  - Specification Phase: Partners in the national pilots work on specifications of three common C-ITS services and harmonise them with other C-Roads national pilots in Europe.
  - In 2017, piloting and cross-site testing, including a common C-ITS security solution, will be implemented in the C-ITS stations.
  - 2018 will see the start of regular pilot operation and live data feed from the TMC in single areas.
  - By 2020 network segments-wide C-ITS operation including access to vehicle data and enhanced message distribution to all travellers on the road will take place.
ECo-AT Project

- **C-ROADS Austria** is based on the experience of the C-ITS corridor and the ECo-AT project

- **Basis:**
  - ECo-AT Specifications, Use Cases, Architecture and Interfaces
  - ECo-AT and C-ITS Corridor Harmonization efforts
  - ECo-AT Living Lab and ECo-AT Test Cycle experience
Eco-AT Experience and Results

- **ECo-AT Use Cases**
  - Roadworks Warning
  - Event Warning
  - In-Vehicle Signage
  - Probe Vehicle Data
  - Light Signal Systems

- **ECo-AT Specifications**
  - Use Case, System Architecture and Interface specification Requirements and Test Cases
  - 7 Releases so far
  - 1 Release left until 03/2017

- **ECo-AT Living Lab**
  - 24 Roadside Installations in live traffic
  - 3 different vendors
  - Open for anyone

- **ECo-AT Test Cycles**
  - Four Test Cycles until now
  - Strong OEM participation
  - ~80% of Test Cases tested successfully
  - 2 more Test Cycles planned

- **ECo-AT / C-ITS Corridor Harmonization**
  - C-ITS Corridor Harmonization Task Force
  - C-ITS Corridor Profile
  - SCOOP@F Harmonization
Planned Releases and Test Cycles

- Test cycles are organized together with OEMs / third parties
- Results of test cycles are incorporated in new releases
29 specification documents in Release 3.6

- black: previously released document, not updated for Release 3.6
- blue: previously released document, updated for Release 3.6
- green: new document in Release 3.6

- ECo-AT SWP2.1 Overview on Use Cases
- ECo-AT SWP2.1 CAM Aggregation
- ECo-AT SWP2.1 DENM Applications
- ECo-AT SWP2.1 Intersection Safety
- ECo-AT SWP2.1 In Vehicle Information
- ECo-AT SWP2.1 Road Works Warning
- ECo-AT SWP2.3 Explanatory Release Note
- ECo-AT SWP2.3 Master Table of References
- ECo-AT SWP2.3 C-ITS Monitoring
- ECo-AT SWP2.3 System Overview
- ECo-AT SWP2.7 Upwards Compatibility
- ECo-AT SWP3.1 DATEX II Mapping Tables
- ECo-AT SWP3.1 C-ITS-S Functional Description
- ECo-AT SWP3.1 IF1 Data Specification
- ECo-AT SWP3.1 IF3 Communication
- ECo-AT SWP3.1 IF3 Management
- ECo-AT SWP3.1 IF3 XML Schema Definition
- ECo-AT SWP3.2 R-ITS-S Functional Description
- ECo-AT SWP3.3 V-ITS-S Functional Description
- ECo-AT SWP3.4 Security
- ECo-AT SWP3.5 Co-Existence
- ECo-AT SWP3.6 Convergence Strategy
- ECo-AT SWP3.7 Living Lab
- ECo-AT SWP4.1 C-ITS-S Test Specification
- ECo-AT SWP4.2 R-ITS-S Test Specification
- ECo-AT SWP4.5 Co-Existence Test Specification
- ECo-AT SWP4.6 Use Case Test Specification
- ECo-AT SWP4.7 Reference Messages
- ECo-AT SWP4.8 Guideline For Living Lab
Lessons learned from ECo-AT

- Open specification process with frequent, public releases
- Test each release and let the test results feed the next release
- Start harmonization efforts early on during specification
- Choose the right level of Harmonization
  - Harmonization on Message Delivery / Interface to the Vehicle / Air Interface
  - Harmonization on Standards
  - Harmonization on Data Elements (for the chosen target formats)
  - No Harmonization on Backend (Architecture, Interfaces, Data Formats) needed
- Open Interfaces (e.g. DATEX II) are essential, but no need for forced harmonization
- Interoperability on message content and interpretation, but not on message creation
- Testing activities (national and cross-site testing) should be reasonable and effective
  - State a testing goal and achieve it with appropriate and reasonable resources
  - (Cross-site) Tests can be mostly virtual (using capture files)
  - Physical tests are only needed for a minority of test cases
  - Cross Test HW installations are complicated and not needed most of the time
  - Cross Border Pilot Drives are more of a political statement and a showcase than a technical necessity
The Path to C-ROADS

- We expect to continue an open process of developing C-ITS specifications and extend and invitation to all others to participate and be as open in their own development.
- We expect to further interconnect with C-ITS activities beyond the C-ITS Corridor and SCOOP@F.
- We expect to pursue the harmonization process of C-ITS throughout Europe until a certain level of interoperability is achieved.
- We expect a joint push of all C-ROADS participants to bring the best possible C-ITS services towards a common customer: car manufacturers and OEMs and the people driving their vehicles.
- We expect that our common work in C-ROADS will involve other countries interested in C-ITS to become a part of C-ROADS.
C-ROADS Austria

![Map of C-Roads Pilot Sites in Austria](image-url)
THANK YOU!

Martin Böhm
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Outline

• Project scope
• Partners
• Timeline

• Parallel C-ITS projects in Flanders
  – InterCor
  – CITRUS
C Road Belgium/ Flanders - Scope

• first steps in C-ITS

• Act. 1: participation/ contribution to C Road ‘platform’

• Act 2: ‘National’ pilot
  • Cloud based ‘virtual digital infrastructure’
  • using Cellular Communication networks

• Act 3: Evaluation

• Act 4: Governance & project management
C Road Flanders – Outcome (expected)

• Learn from more advanced pilots
• Assess added value & options of the followed approach
• Contribute to planned ‘platform’ analysis & convergence on a European scale

• Pan-European interoperability & harmonization
• Learn & adopt best practices for C-ITS deployment

  impacts, user acceptance, safe deployment (HMI)

> Establish a national vision on C-ITS
> Foster a ‘national’ implementation plan
C Road Flanders – Partners

• Flemish Dept. Mobility & Public Works (lead)

• Tractebel Engineering

• ITS Belgium

• HERE (= focus on Activity 2)
Approx. 1000 vehicles, equipped with smartphone
**C Road Belgium/ Flanders – Pilot (2)**

- Communication: existing 3G / 4G cellular networks
- Services: queue warning, shockwave damping, road works, meteo
- Evaluation: User impact + **multi service/ multi provider** environment
C Road Flanders – Services

• Traffic jam warning (end of queue)

• Slow moving / stationary vehicles (÷ Hazardous locations)

• Road Works

• Shock wave damping

• Meteo (Incl. black ice/ slippery road) (tentative)
C Road Belgium/ Flanders - Timeline

• Act. 1 – Contribution to C Road ‘platform
  17/02/2016 --- >  31/12/2020

• Act 2: ‘National’ pilot
  • requirements & use cases < 30/06/2018
  • upgrade Cloud + Apps + TMC < 31/03/2019
  • end-to-end tests, fleet < 31/03/2019
  • pilot operations 31/03 – 31/12/2019

• Act 3 - Evaluation
  • evaluation plan < 30/09/2017
  • data collection & assessment < 30/09/2020
C-ITS Corridor
NL – GE - AT

SCOOP @ France
C-ROADS France

French projects: C-Roads France InterCor

Link with SCOOP@F
C-ROADS France

- 5 years (2016-2020) | 14 beneficiaries | 14.5 M€
- Extension of the SCOOP@F services to additional areas to increase service coverage
- New end-user services of 2 types:
  - Services in the urban environment and at the urban/interurban interface, with the objective to reach seamless continuity
  - Traffic information services increasing comfort on transit stretches
- Pragmatic and user-centric approach: to increase penetration rates, it will develop a C-ITS smartphone application supporting early I2V services roll up and further scale up.
- Supported by a hybrid technology enabling a seamless switch between ITS G5 and cellular for not safety-critical applications.
## C-ROADS France

- **Project consortium**

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<th>ROAD OPERATORS</th>
<th>Ministry: public road operators (DIRs Est, Centre-Est, Atlantique, Ouest)</th>
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C-ROADS France

- 4 local pilot sites
C-ROADS France

A1- C-ROADS Platform
- 1.1- Pilot Tracking
- 1.2- Organisational aspects of C-ITS
- 1.3- Technical aspects of C-ITS
- 1.4- Evaluation and Assessment

A2- Studies
- 2.1- Studies coordination
- 2.2- Use case definition
- 2.3- Specifications
- 2.4- Developments
- 2.6- Systems validation
- 2.7- Impact studies

A3- Pilot sites
- 3.1- North-East
- 3.2- Centre-East
- 3.3- South-West
- 3.4- West
- 3.5- Car Manufacturers

A4- Project Management & communication
- 4.1- Project management
- 4.2- Communication
InterCor

- 3 years (Sept 2016-Sept 2019) | 16 beneficiaries | 30 M€
- France: 10 beneficiaries | 8,2 M€
- Extension of the SCOOP@F services towards the North of France to increase service coverage
- New services, in particular in the field of freight and logistics
- Demonstrating a large-scale interoperable deployment of C-ITS through the Netherlands, Belgium/Flanders, UK and France to achieve safer, more efficient and more convenient mobility of people and goods
- Fostering a hybrid communication approach based on the experience from France and the Netherlands
- A specific focus on security across borders
## InterCor

### Project consortium – French partners

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### Project consortium – Foreign partners

- UK department for Transport, Rijkswaterstaat, Provincie Noord-Brabant, Provincie Utrecht, Flemish Department of Mobility and Public Works, Ertico
Reminder on SCOOP@F Part 2

- 3 years (2016-2018) | 15 beneficiaries | 20 M€
- Intends to connect 3,000 vehicles with 2,000 km of road network (various typologies)
- 2 deployment waves:
  - 2nd wave (2016-2018) : hybrid cellular/ITS-G5, additional services
- Priority services focus on improving road user and road operators safety (data collection, road works warning, hazardous location notification)
- Specifications are open: www.scoop.developpement-durable.gouv.fr/en
- 1st wave prototypes currently tested incl. open-road testing
## Reminder on SCOOP@F Part 2

### Project consortium – French partners

| ROAD OPERATORS | – Ministry: public road operators (DIRs Ile-de-France, Atlantique, Ouest)  
|                | – SANEF  
|                | – LD38 |
| CAR MANUFACTURERS | – Renault  
|                  | – PSA |
| RESEARCH INSTITUTES | – CEREMA  
|                    | – IFSTTAR  
|                    | – LAB  
|                    | – ITS Bretagne |
| UNIVERSITIES AND HIGHER EDUCATION AND RESEARCH INSTITUTIONS | – Université de Reims Champagne-Ardennes  
|                                                                 | – Institut Mines Télécom (Telecom ParisTech) |
| SECURITY EXPERTS | – IDnomic |
| TELECOM EXPERTS | – Orange |

### Project consortium – Foreign partners

- Spain: DGT, CTAG
- Portugal: IMT, AENL
- Austria: ASFINAG
5 sites en France:
- IdF
- Bretagne
- Grand Est
- Bordeaux
- Isère

3 sites en Europe:
- Espagne
- Portugal
- Autriche
## Link between C-Roads France, InterCor and SCOOP@F

### Overview of French partners

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| Major urban nodes | | |
|-------------------|---|
| - Strasbourg Eurométropole | |
| - Bordeaux Métropole | |

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Link between C-Roads France, InterCor and SCOOP@F

Inputs from SCOOP@F to C-Roads France and InterCor

- Definition of services
- Specifications
- Some prototypes (incl. the SCOOP@F platform = central ITSS)
- Methodology for impact studies
- Test specifications
Link between C-Roads France, InterCor and SCOOP@F
French coordination committee

- Discussion of cooperation agreements between the 3 projects incl. Intellectual property issues
- Designation of French representatives for international discussions (C-Roads Platform, C-ITS Platform, Amsterdam Group...)
- Definition of French positions on specific topics: security, privacy, hybrid communications, business models, etc.
- Management of resources
- Coordination of the productions on services definition, specifications, validation methods, evaluation methods
C-Roads Slovenia

2015-SI-TM-0286-S

beneficiary: Republic of Slovenia, Ministry of Infrastructure (MZI)

implementing body: DARS d.d.

Motorway Company in the Republic of Slovenia

C-Roads Slovenia project coordination: Božidar Volk, DARS d.d.
bozidar.volk@dars.si
C-Roads Slovenia

Event at the time of proposal preparing that lead us to the pilot area selection

- Multiple-vehicle collision (chain crash) 30.01.2016 at 14:00
  - the worst ever
  - sudden heavy fog
  - unadjusted speed
  - involves 56 vehicles
  - 4 died
  - 7 seriously injured and
  - 18 injured
  - 10 hours road closure
C-Roads Slovenia

Pilot area A1 highway (section Ljubljana – Koper), A3 (section Divača - Sežana) and H4 (section Razdrto – Vipava)
C-Roads Slovenia

A2 The C-Roads Slovenia Pilot
C-Roads Slovenia

The C-Roads Slovenia Pilot

- A1 The C-Roads-Platform

- A2 The C-Roads Slovenia Pilot
  - 2.1: Upgrade of the ITS Infrastructure
  - 2.2: ITS Infrastructure Integration for Real Time Services
  - 2.3: Availability of Traffic Information Service in Real Time
  - 2.4: C-ITS Cellular Connected Car and Cloud Information Services
  - 2.5: C-ITS-G5 Roadside Infrastructure
  - 2.6: Location-aware Mobile Application for End Users
  - 2.7: The C-Roads Pilot Slovenia Assessment and Evaluation
C-Roads Slovenia

A2 The C-Roads Slovenia Pilot
2.1: Upgrade of the ITS Infrastructure

- The upgrade will consist of at least the following deployments connected to regional Traffic Control and Management Centre:
  - Upgrade of road signalisation with Variable Message Signs (VMS) with dynamic signalisation
  - Installation of 6 weather stations that can detect wind, fog, snow and slippery conditions
  - Installation of 10 video detection stations with thermic capabilities

- Location: A1 highway (section Ljubljana – Koper), A3 & H4 (to. Italy)

- Activity already started
Objective is to integrate deployed and connected ITS systems (Activity A.2.1 VMS, weather stations and video detection, ETSI-ITS-G5) into regional traffic centre RNC in Kozina and to harmonize new data inputs with the existing systems and services.

Output of activity will be work performed by upgrading systems for traffic control and management in regional traffic centre RNC Kozina (HW and SW upgrades). Second phase will be integration of C-ITS collected information into TMC Real Time Services.
Activity is a preparation and deployment of dedicated service that will cover pilot area and selected events and formats in real time with hybrid solution for roadside ETSI-ITS-G5 and C-ITS cellular network delivery Traffic Information Service in Real Time.
C-Roads Slovenia

A2 The C-Roads Slovenia Pilot
2.4: C-ITS Cellular Connected Car and Cloud Infor. Services

- Pilot a cooperative ITS solution enabling safety-related Traffic Information Services in real time for cellular network 3G/4G/LTE connected road users while at the same time get the traffic related information from the vehicle/s.
C-Roads Slovenia

A2 The C-Roads Slovenia Pilot
2.5: C-ITS-G5 Roadside Infrastructure

- Deployment of ETSI-ITS-G5 nodes strategically distributed over the pilot section that allows Infrastructure to Vehicle (I2V), Vehicle to Infrastructure (V2I) communication on the critical A1 motorway sections Postojna - Divača (length 30 km).
C-Roads Slovenia

A2 The C-Roads Slovenia Pilot
2.5: C-ITS-G5 Roadside Infrastructure
C-Roads Slovenia

A2 The C-Roads Slovenia Pilot

2.6: Location-aware Mobile Application for End Users

- Pilot extension of already popular (over 30,000 active users) local Traffic Information application which is mainly used as before trip Traffic Information service. Tested would be new functionalities of on trip Traffic Information application service
  - location-awareness of application service (location, driving direction, selection of relevant events) on server side and on client side
  - inclusion of safety related messages introduced in and related to C-ITS pilot action
  - voice messaging as advanced interface that don’t need user intervention
  - exchange of information based on intelligent timing related to section in use for later full scale deployment on motorway road network
  - re-use of GPS positioning and other usable traffic related relevant sensors data as FCD data provision for Traffic Management real time services
C-Roads Slovenia

A2 The C-Roads Slovenia Pilot

2.7: The C-Roads Pilot Slovenia Assessment and Evaluation

- Assessment of C-ITS technology and deployment perspectives in general and for national C-ITS pilot through its deployment in relation to C-Roads-Platform cooperation that will end as national assessment C-ITS papers and final evaluation of the pilot.
C-Roads Slovenia

THANKS FOR YOUR ATTENTION

C-Roads Slovenia project coordination:

Božidar Volk, DARS d.d.

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