



SEMINARIO OPEN D'AUTUNNO "VEICOLI E MOBILITÀ 4.0" "MOBILITÀ INTEGRATA E SMART ROAD"

DEFINIZIONE TECNICA DI SMART ROAD, LA PIATTAFORMA EUROPEA C-ROADS ED I FINANZIAMENTI COMUNITARI

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Esperto ITS

RAM S.p.A. - Società In house, **Ministero delle Infrastrutture e dei Trasporti**

Verona, 17 novembre 2018

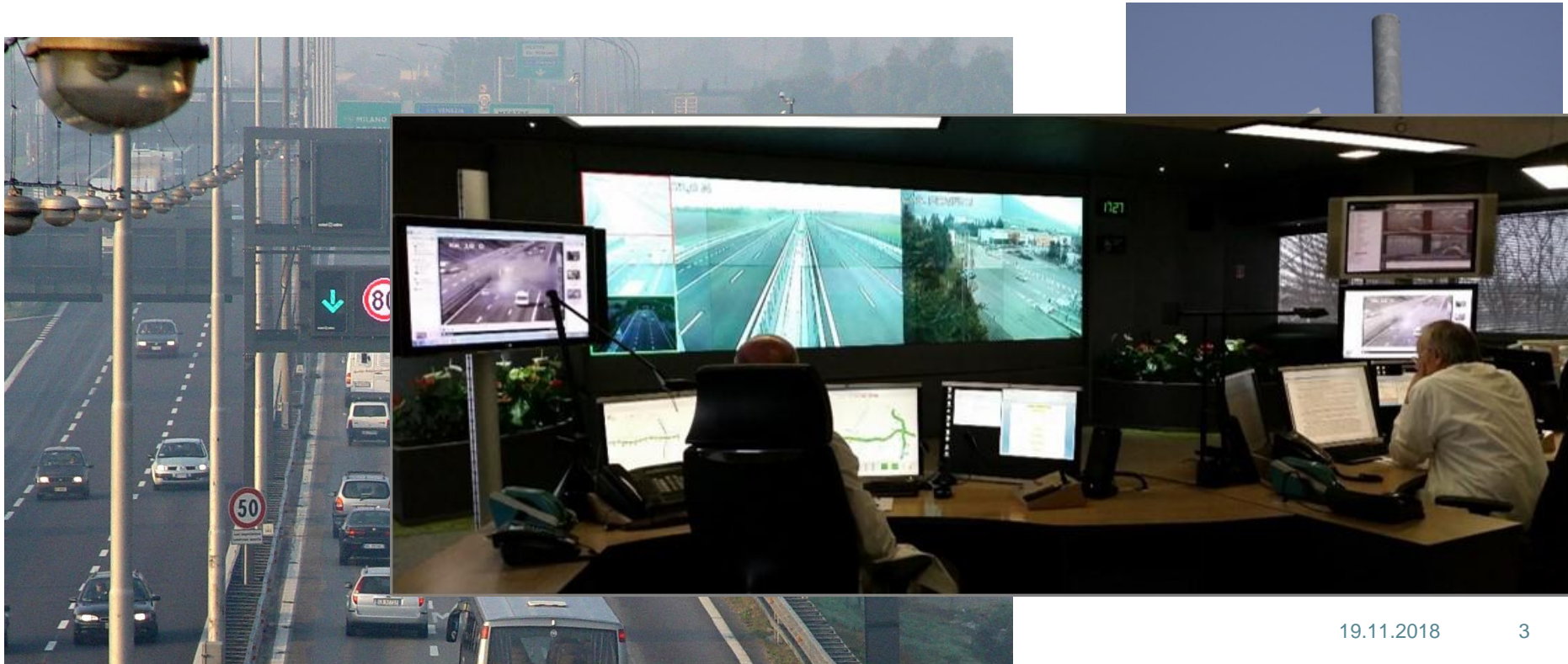


Summary

- ITS/C-ITS and Smart road
- European Commission co-funding
- C-Roads Platform
- C-Roads Italy
- Conclusion

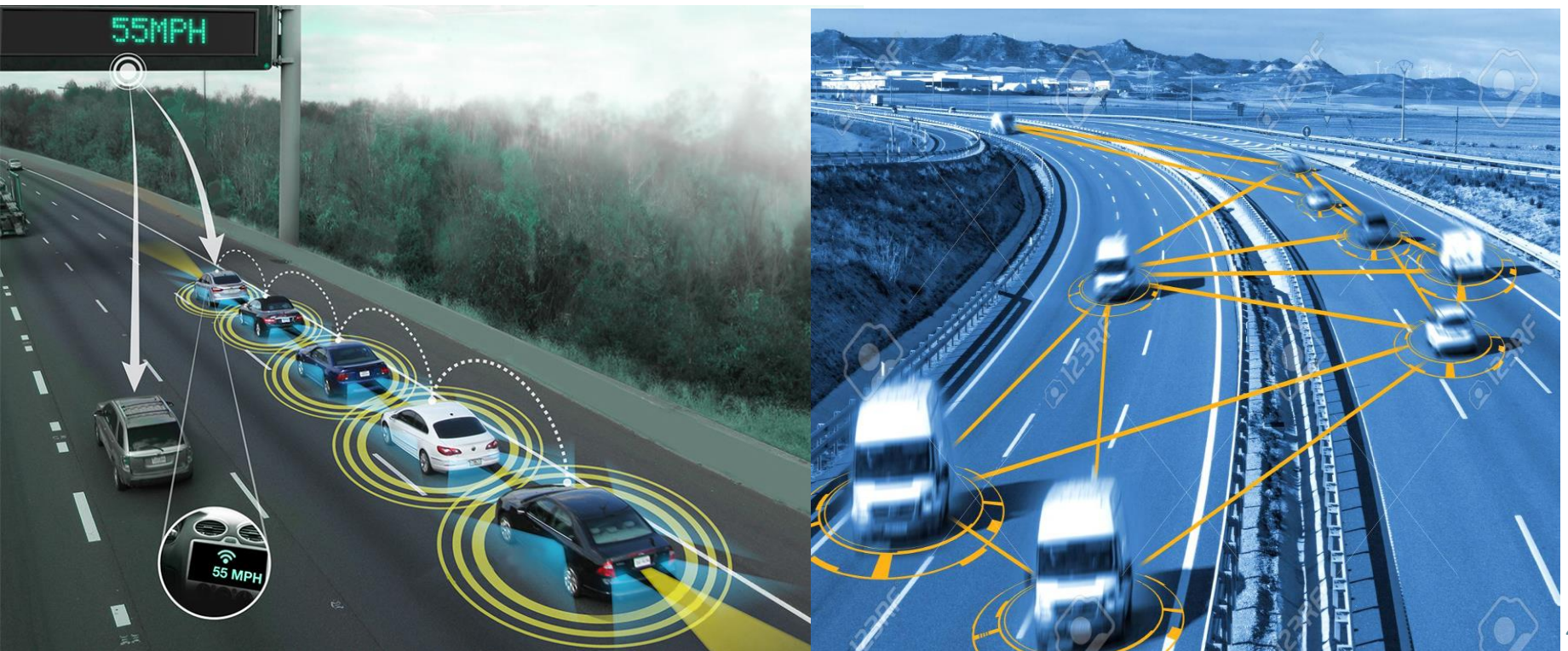
ITS

The *Intelligent Transport Systems*, are based on the interaction between **information technology**, **telecommunications** and **multimedia**. They can make transport *safer, more efficient and more sustainable* by applying various information and communication technologies to all modes of passenger and freight transport.



C-ITS

Cooperative-ITS (C-ITS), are systems that allow effective **data exchange** through wireless technologies so that **vehicles can connect** with each other, with the road infrastructure and with other road users. The actual deployment of *(C-ITS)*, is paving the way for automation in the transport sector. This can notably improve road safety and reduce congestion.



Smart Road

To allow such interaction and information exchange **road infrastructure must be equipped with innovative technologies.**

This involves upgrading the infrastructure and simultaneously integrating V2I C-ITS services and V2V information with vehicle control strategies.

Therefore, the fundamental prerequisite is to make the infrastructure adequate and "intelligent" or **"Smart road"**.

Smart Road

Over the last few years, the use of the term “**smart**” has become a widespread practice at all levels:

- technology tends to become “**smart**” in numerous areas
- now we use “**smart**” phones....etc

Roads must transform themselves in order to play a relevant role in this “revolution”: there cannot be a “**smart city**” without a “**smart road**” and together provide citizens with “**smart mobility**”.

This cooperative element – enabled by digital connectivity between vehicles and between vehicles and transport infrastructure – is expected to significantly improve road safety, traffic efficiency and comfort of driving, by helping the driver to take the right decisions and adapt to the traffic situation.

Smart Road





**Co-financed by the Connecting Europe
Facility of the European Union**

European Commission co-funding

To modernise Europe's transport system, the European Commission is focussed to improve the TEN-T network with the necessary technological components to support the deployment of **interoperable systems and services and thereby ensure continuity between Member States and operators**, with the aim of contributing to a sustainable transport system, in terms of economic, environmental and social impacts and, at the same time, improving road safety, **increasing the efficiency of the use of infrastructure** and traffic management, improving the interoperability of transport services both for passengers and for goods.

To ensure a coordinated and effective deployment of ITS within the Union as a whole actions must comply with applicable rules and EU legislation.

European Commission co-funding

To ensure a coordinated and effective deployment of ITS within the Union as a whole, actions must comply with applicable rules and EU legislation, in particular the:

ITS Directive 2010/40/EU and its
Delegated Regulations.

6.8.2010

IT

Gazzetta ufficiale dell'Unione europea

L. 207/1

I

(Atti legislativi)

DIRETTIVE

DIRETTIVA 2010/40/UE DEL PARLAMENTO EUROPEO E DEL CONSIGLIO

del 7 luglio 2010

sul quadro generale per la diffusione dei sistemi di trasporto intelligenti nel settore del trasporto stradale e nelle interfacce con altri modi di trasporto

(Testo rilevante ai fini del SEE)

IL PARLAMENTO EUROPEO E IL CONSIGLIO DELL'UNIONE EUROPEA,

visto il trattato sul funzionamento dell'Unione europea, in particolare l'articolo 91,

vista la proposta della Commissione europea,

visto il parere del Comitato economico e sociale europeo ⁽¹⁾,

previa consultazione del Comitato delle regioni,

deliberando secondo la procedura legislativa ordinaria ⁽²⁾,

considerando quanto segue:

(1) L'aumento del volume del trasporto stradale nell'Unione, associato alla crescita dell'economia europea e delle esigenze di mobilità dei cittadini, costituisce la causa principale dell'incremento della congestione dell'infrastruttura stradale e del crescente consumo energetico, nonché una fonte di problemi ambientali e sociali.

(2) La risposta a queste grandi sfide non può limitarsi alle misure tradizionali, tra cui l'ampliamento dell'infrastruttura esistente per il trasporto stradale. L'innovazione avrà un ruolo di primo piano nella ricerca di soluzioni adeguate per l'Unione.

(3) I sistemi di trasporto intelligenti (ITS) sono applicazioni avanzate che, senza essere dotate di intelligenza in senso proprio, mirano a fornire servizi innovativi relativamente ai diversi modi di trasporto e alla gestione del traffico e consentono a vari utenti di essere meglio informati e di fare un uso più sicuro, maggiormente coordinato e più «intelligente» delle reti di trasporto.

(4) Gli ITS integrano le telecomunicazioni, l'elettronica e le tecnologie dell'informazione con l'ingegneria dei trasporti al fine di pianificare, progettare, rendere operativi, sottoporre a manutenzione e gestire i sistemi di trasporto. L'applicazione delle tecnologie dell'informazione e della comunicazione al settore del trasporto stradale e alle interfacce con altri modi di trasporto darà un contributo significativo al miglioramento delle prestazioni ambientali, dell'efficienza, compresa l'efficienza energetica, della sicurezza del trasporto stradale, compreso il trasporto di merci pericolose, della sicurezza pubblica e della mobilità dei passeggeri e delle merci, assicurando al tempo stesso il funzionamento del mercato interno nonché accresciuti livelli di competitività e di occupazione. Tuttavia, le applicazioni ITS dovrebbero lasciare impregiudicate le questioni relative alla sicurezza nazionale o che sono necessarie nell'interesse della difesa.

(5) I progressi realizzati nel campo dell'applicazione delle tecnologie dell'informazione e della comunicazione ad altri modi di trasporto dovrebbero ora tradursi in sviluppi nel settore del trasporto stradale, in particolare al fine di accrescere l'integrazione tra il trasporto stradale e altri modi di trasporto.

(6) In alcuni Stati membri sono già utilizzate applicazioni nazionali di tali tecnologie nel settore del trasporto stradale. Tuttavia, la loro diffusione frammentaria e non coordinata rende impossibile la continuità geografica dei servizi ITS in tutta l'Unione e alle sue frontiere esterne.

⁽¹⁾ GU C 277 del 17.11.2009, pag. 85.

⁽²⁾ Posizione del Parlamento europeo del 23 aprile 2009 (non ancora pubblicata nella Gazzetta ufficiale), posizione del Consiglio del 10 maggio 2010 (non ancora pubblicata nella Gazzetta ufficiale), posizione del Parlamento europeo del 6 luglio 2010 (non ancora pubblicata nella Gazzetta ufficiale).

European Commission co-funding

ITS Directive

Supporting Framework and Enabling Conditions

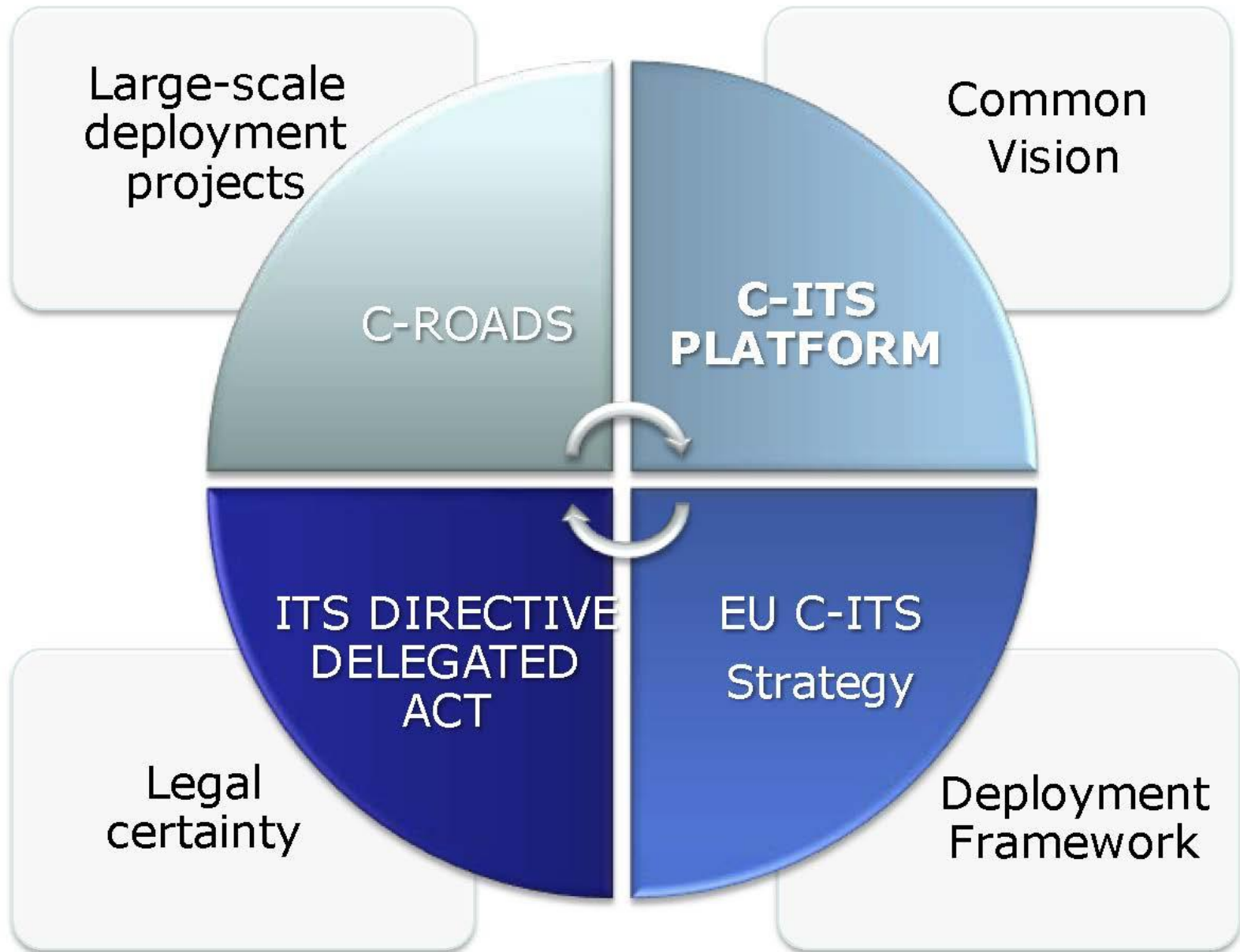


European Commission co-funding

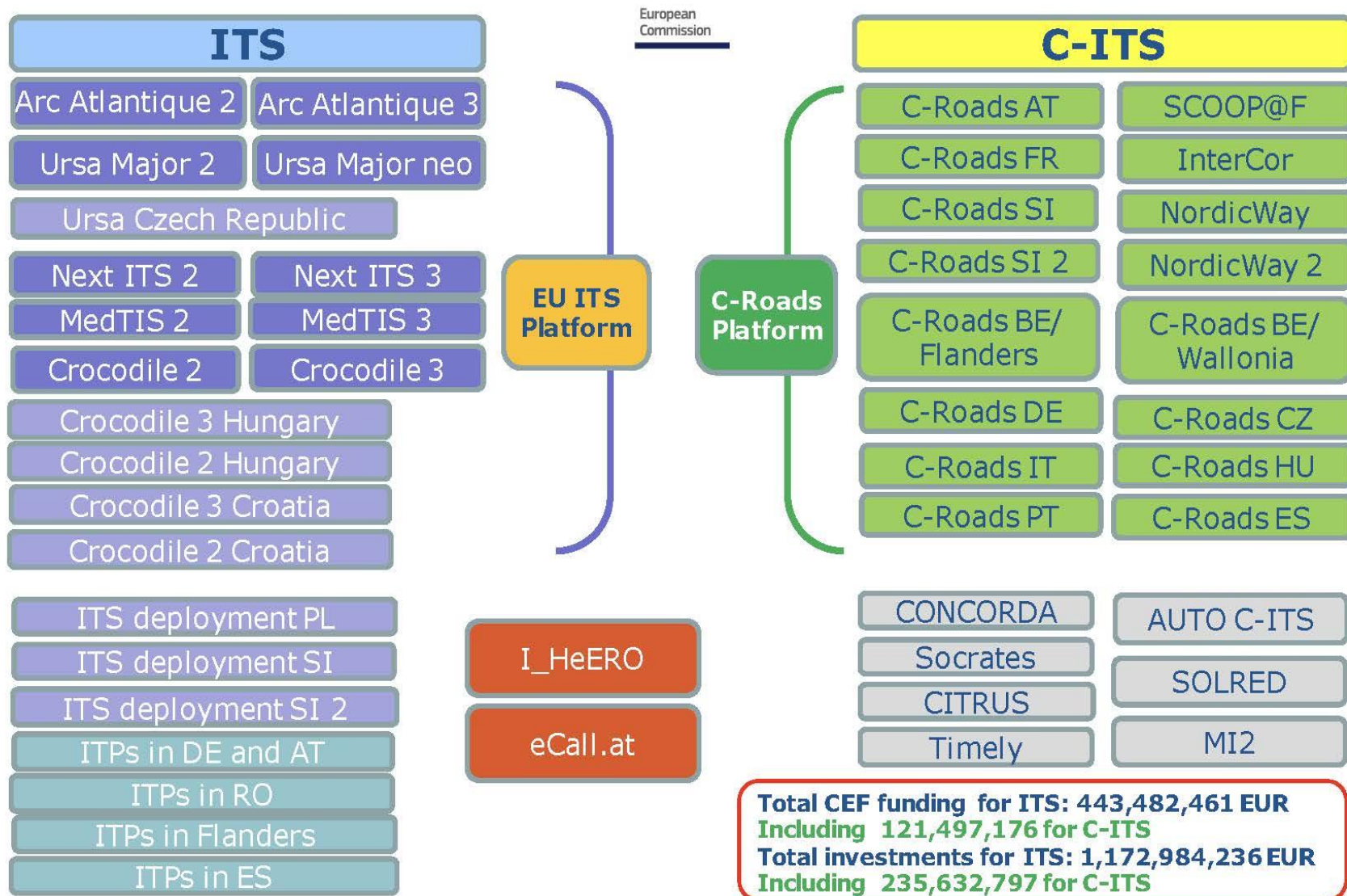
At the end of 2016, was finalized the “EU strategy for the coordinated deployment of C-ITS” in order to avoid a fragmented internal market in the field of C-ITS and create synergies between different initiatives.

The EU has already made over 130 Million EUR alone since 2014 through **CEF** and **H2020** on the topic of **cooperative, connected and automated vehicles**

European Commission co-funding

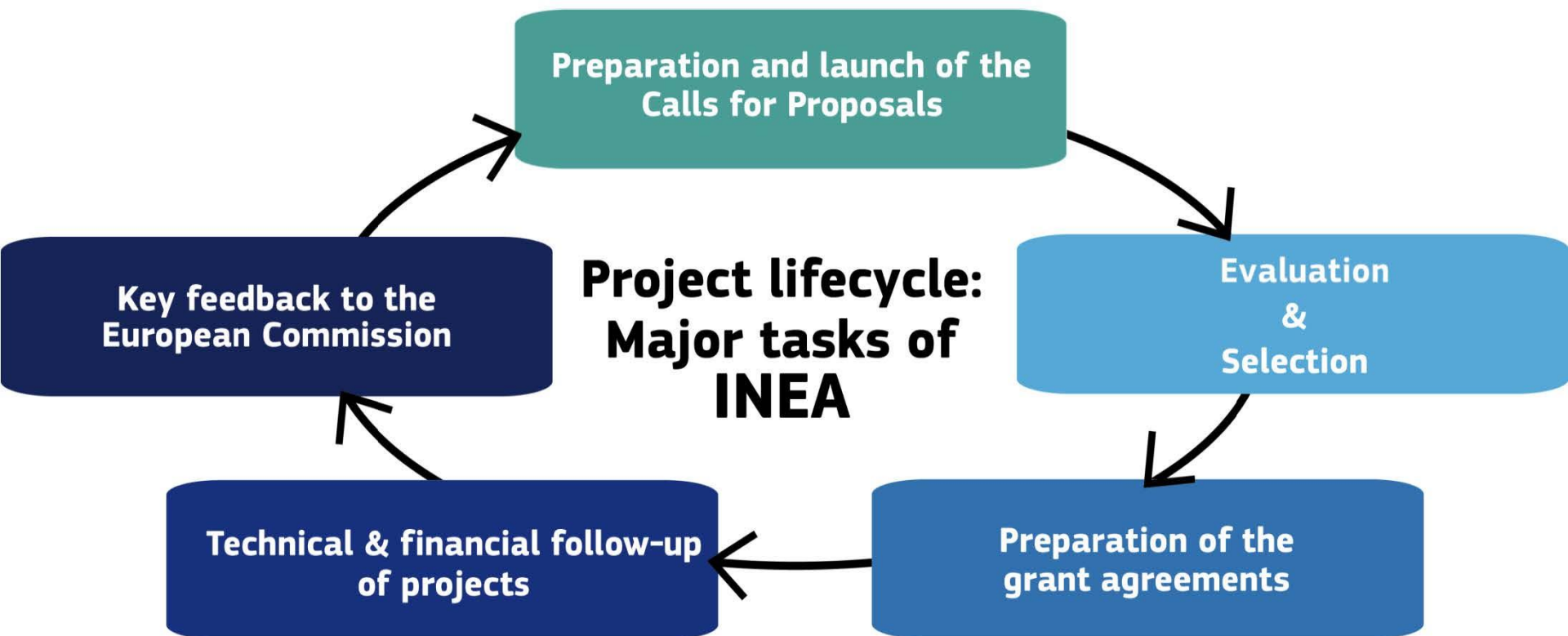


European Commission co-funding



European Commission co-funding

Making implementation happen



European Commission co-funding

Last 2018 CEF Transport call

Reference documents

- 2018 MAP Work Programme
- CEF Regulation & TEN-T Guidelines
- Call text
- Application forms (Parts A, B, C and D)
- Guide for Applicants
- Application checklist & CBA checklist
- FAQs published on the call page
- Model grant agreement
- Cohesion Policy CBA methodology & CBA cash flow template

European Commission co-funding

The 2018 CEF Transport call

Content of the call text

- Priority Description
- Budget
- Timetable
- Admissibility and eligibility criteria
- Exclusion, selection and award criteria
- Procedure for submission and evaluation of proposals
- Legal and financial provisions
- Information for Applicants

European Commission co-funding

The 2018 CEF Transport call

- Proposals for **studies, works and mixed** proposals **are eligible** under the call
- Maximum co-funding rates (% of eligible costs):
 - ✓ Studies: 50%
 - ✓ Works/Telematic applications: from 20% to 50%
- The minimum size of the Action is not an eligibility requirement (but no less than **€500,000** requested funding for studies and **€1 million** for works is strongly encouraged)
- **Start of eligibility of costs:** as from the date of submission of the application
- **End date of the Action:** no later than 31 December 2023

European Commission co-funding

The 2018 CEF Transport call

Indicative call timeline	Date
Call opening	17 May 2018
Deadline for submission	CLOSED: 24 October 2018 (17:00:00 Brussels time)
Evaluation of proposals	November 2018 - March 2019
Consultation of the CEF Coordination Committee / Information to the European Parliament	March 2019
Adoption of the Selection Decision	April 2019
Preparation and signature of individual grant agreements	As of April 2019

European Commission co-funding

The 2018 CEF Transport call

Priority	Number of proposals	Requested funding, €	Available funding, €
Rail interoperability	14	86.7 million	100 million
European Rail Traffic Management Systems (ERTMS)	6	93.3 million	
Safe and secure infrastructure	23	158.5 million	200 million
Innovation and new technologies	44	202.5 million	
Intelligent Transport Services for road (ITS)	23	192.5 million	150 million
River Information Services (RIS)	2	2.3 million	
Multimodal logistics platforms	36	192.8 million	
Total	148	928.6 million	450 million



C-ROADS

The C-ROADS PLATFORM

Started in 2016, The **C-Roads Platform** is a joint initiative of European Member States (16MS) and road operators which are in the phase of installing C-ITS for the testing and later operation of “C-ITS Day-1 services”.

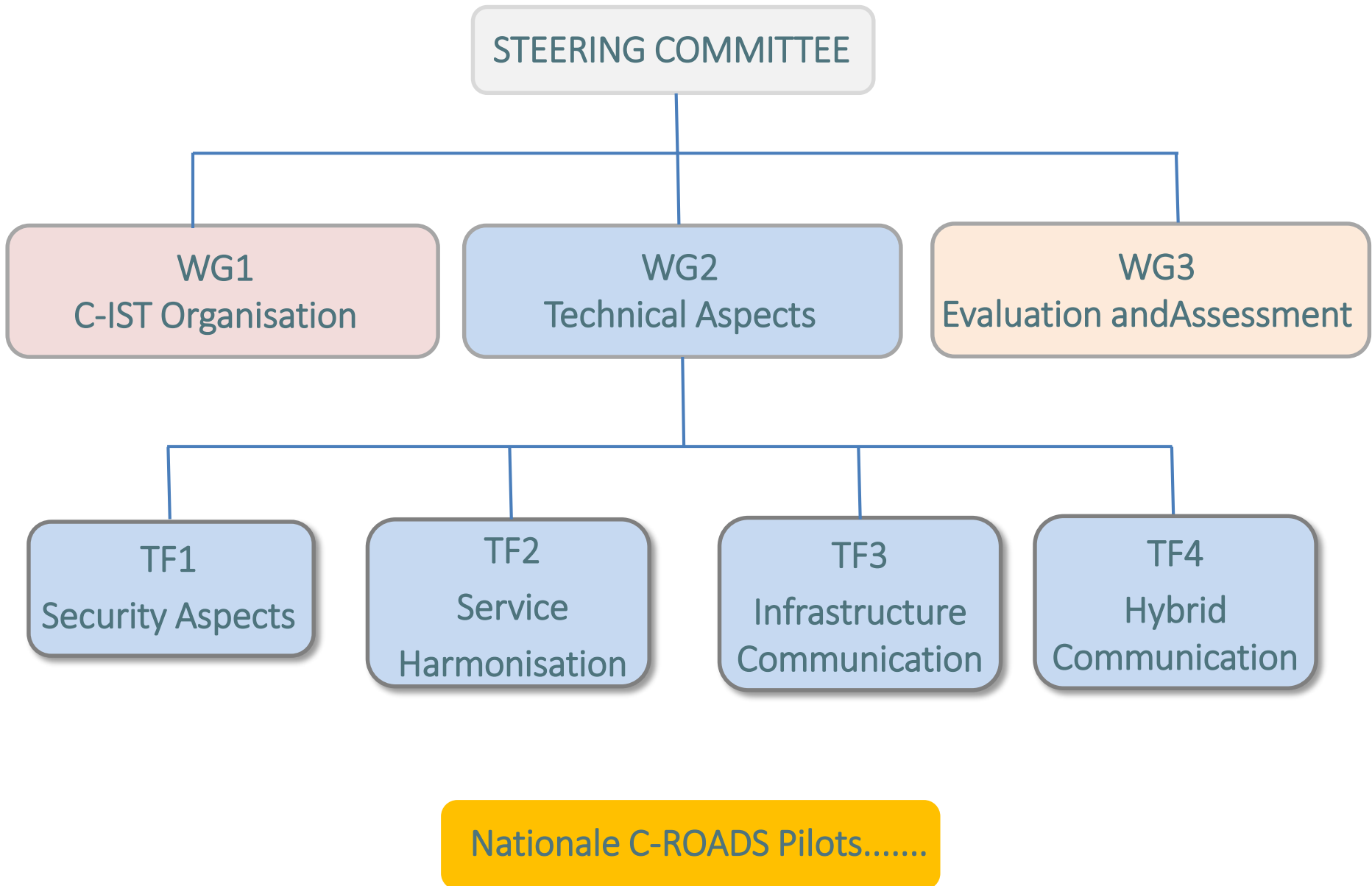
Pilot installations will be harmonised, in light of cross-border interoperability based on cooperation within the C-Roads Platform.



The C-ROADS PLATFORM

Key elements are the joint development of **technical specifications** which are to provide the basis for all pilot deployments, as well as commonly prepared cross-site tests to demonstrate interoperability of the deployed C-ITS services.

All developed specifications will be publicly available and form the basis for pilot installations on the road network.



Action N. 2016-IT-TM-0052-S

DURATION EXPECTED

08.02.2017



31.12.2020

BENEFICIARY

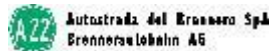
Ministero delle Infrastrutture e dei Trasporti
Direzione Generale per lo sviluppo del territorio, la
programmazione e i progetti internazionali
Divisione IV- Sviluppo della rete di trasporto
transeuropea e dei corridoi multimodali



IMPLEMENTING BODIES

Under the coordination of the Ministero della Infrastrutture e dei Trasporti (MIT) the “Implementing bodies” are the following:

ROAD OPERATORS



SERVICE PROVIDERS



VEHICLE OEMs



LOGISTIC OPERATOR



TRAFFIC POLICE



EVALUATION & ASSESSMENT

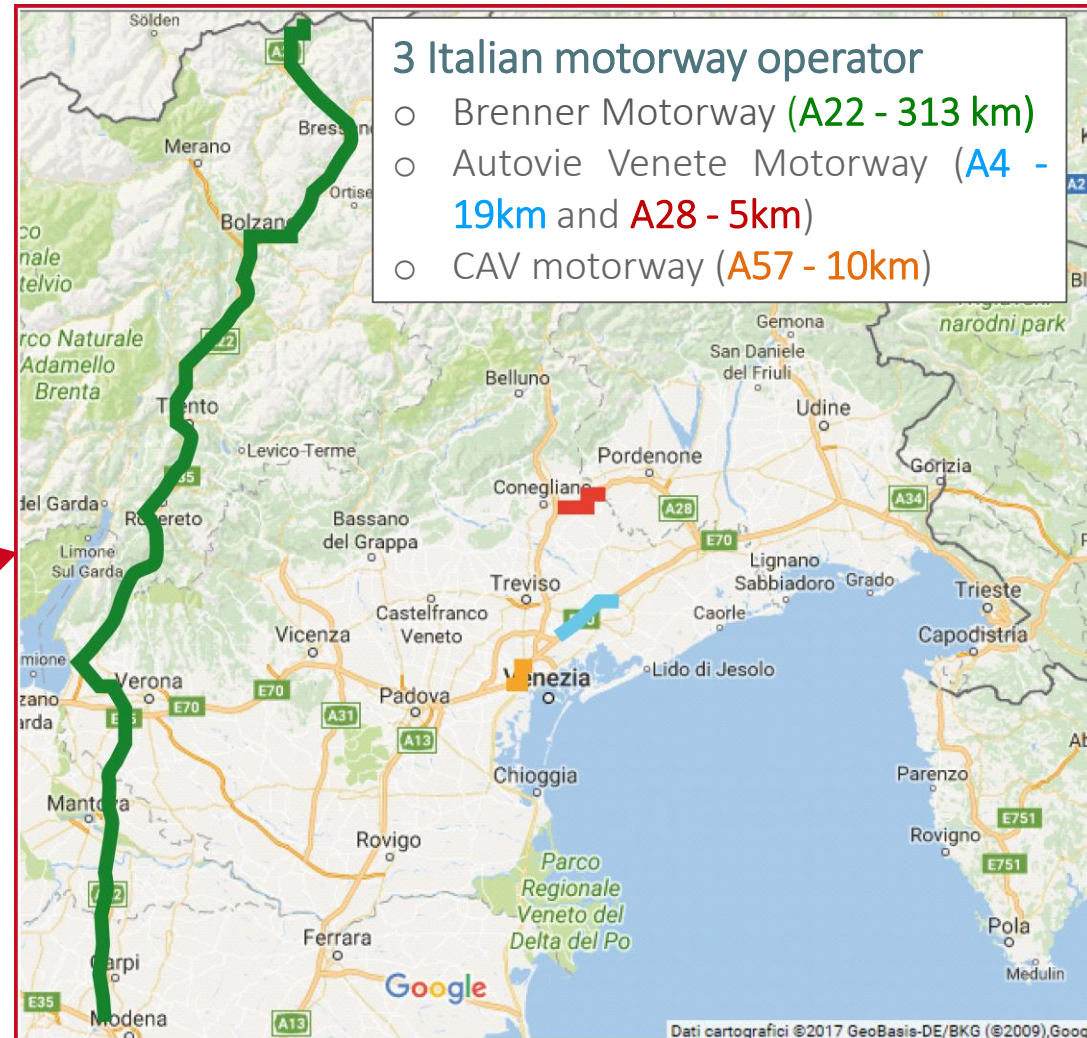


Project Management

North Italy
Communications S.r.l.

LOCATION OF THE ACTION

Total 347Km



Scope and Objectives

C-ROADS Italy planned to pilot a set of “Day1” C-ITS services as recommended by the European Commission C-ITS Platform.

That implies the infrastructure upgrade and the integration of the C-ITS service in the control logic architecture of the vehicles.

This through the implementation and test, in real traffic conditions, of a complete cooperative system based on V2X technologies, for the following automated driving applications:

- Trucks - Platooning;
- Passenger cars - Highway Chauffeur;
- Combined scenarios of trucks and passenger cars.
- Interaction with road infrastructure

During the pilot phase, the cooperation among vehicles and infrastructure will be tested, collecting all useful data and information about the system management and its results.

Scope and Objectives

The expected impact to be demonstrated are mostly on mobility, considered in terms of:

1. **Safety** – to demonstrate the reduction of risk related to cooperative/automated technology in truck and passenger cars scenarios, and also in combined scenarios
2. **Traffic fluidity** – to show the potential for efficient use of the infrastructure with Platooning technology and Highway Chauffeur technology
3. **Energy efficiency** – to measure in real life conditions the potential for fuel consumption and related emission reduction.

The Italian implementing bodies (Road concessionaires, OEMs, telecom operator, research centre, etc...) will invest in their infrastructure and the industry will use that pilot test infrastructure to test components and services.

Interaction with the C-ROADS PLATFORM



All Italian Implementing Bodies, according to their technical expertise, are involved in the different **Working Groups** and **Task Forces** established by the ***C-ROADS PLATFORM***; reporting about the status of national pilots, contributing to the harmonization of the different technical issues that will be discussed within the C-ROADS PLATFORM.

The results and lessons learned from C-ROADS ITALY will be fully shared across Europe through the cooperation in the C-ROAD PLATFORM.

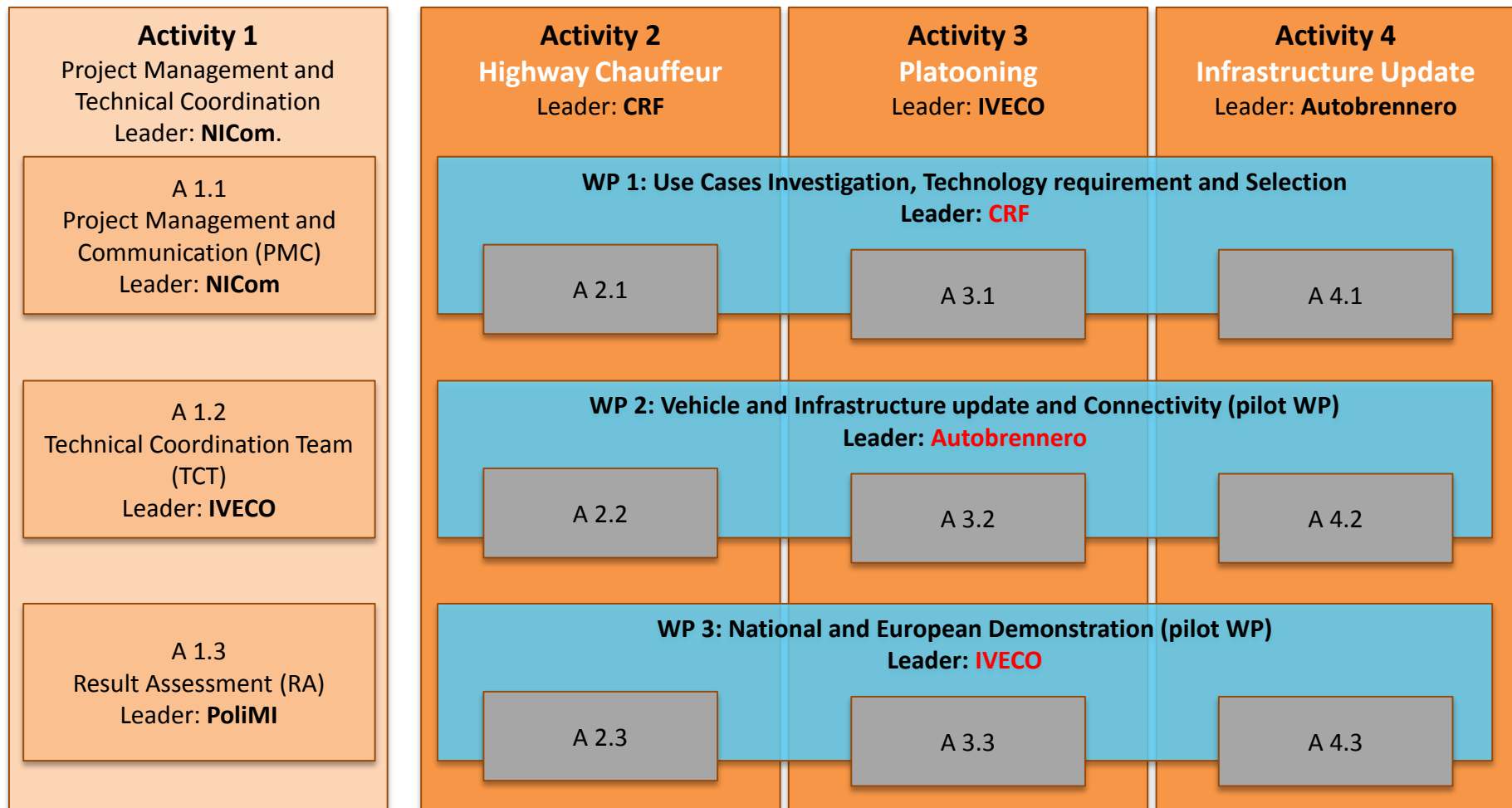
C-ROADS ITALY has assumed the role of:

- **Leader** (Politecnico di Milano) of the **Working Group 3 Evaluation and assessment**.
- **Co-leader** (Autostrada del Brennero) of the **WG2 Technical Aspects**

C-ROADS ITALY - OVERVIEW PROJECT STRUCTURE



The C-ROADS ITALY Activity 1 structure has been organized in order to provide contribution in each of the WGs and TFs of the C-ROADS PLATFORM.



Day - I Services

Emergency electronic brake light	X
Slow or stationary vehicle(s)	X
Traffic jam ahead warning	X
Road works warning	X
Weather conditions	X
In-vehicle signage	X
In-vehicle speed limits	X
Probe vehicle data	X



Communication technologies

ETSI G5	X
Cellular Communication	X



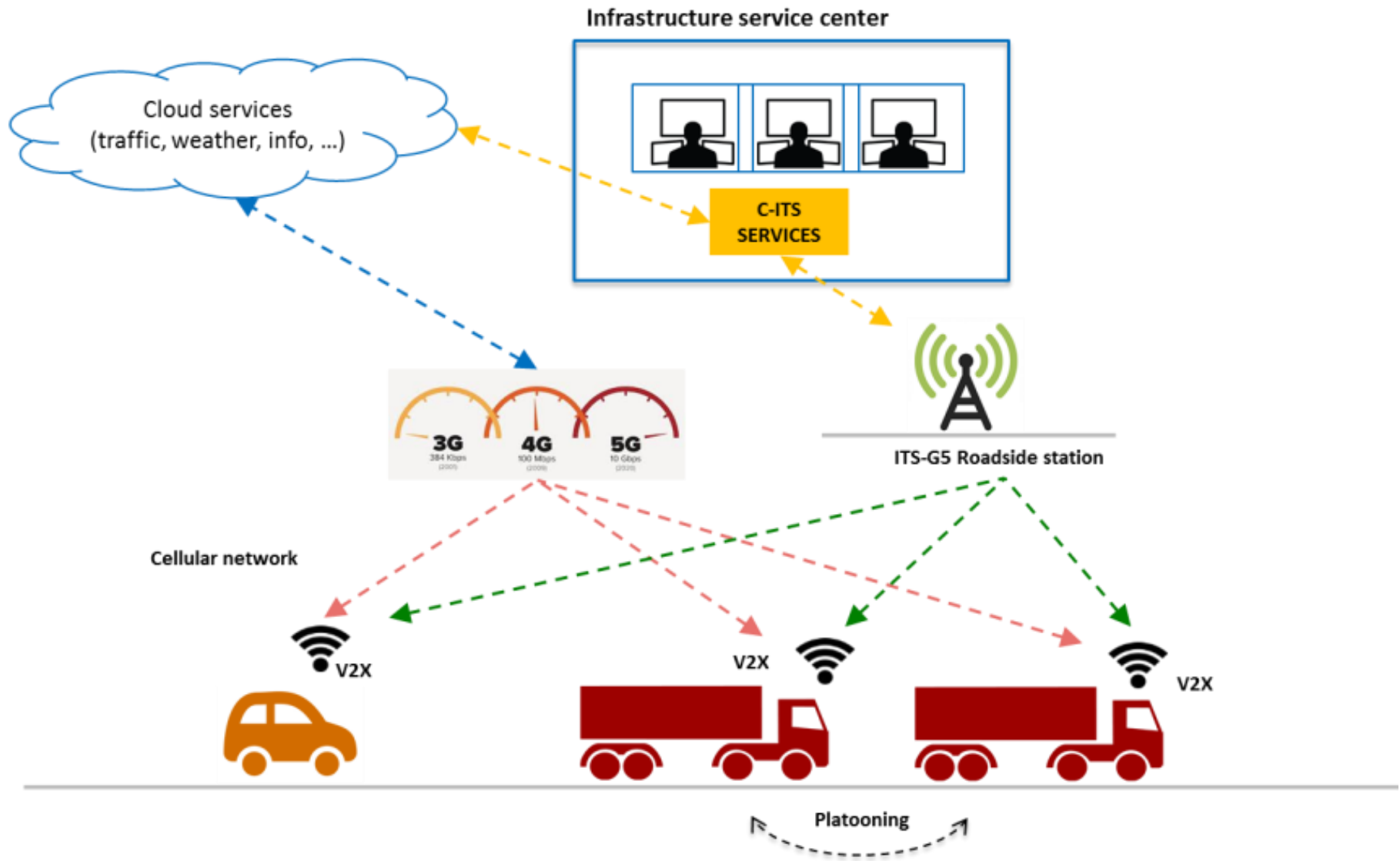
**HIGHWAY CHAUFFEUR
TRUCK PLATOONING**

RWW: Road Works Warning

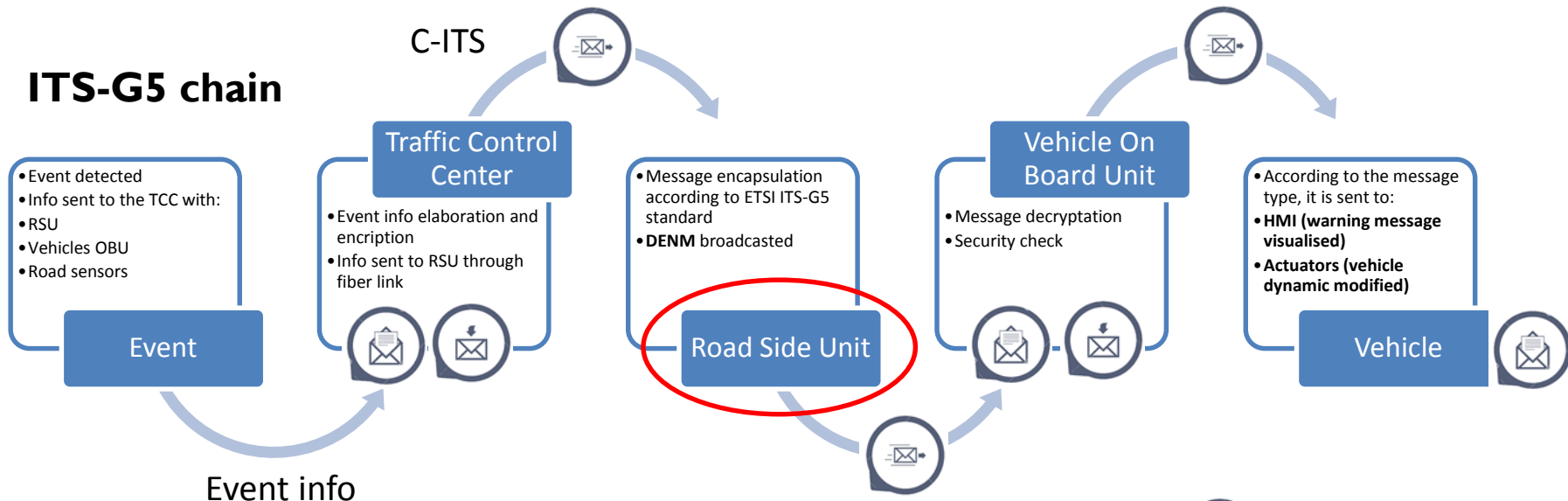
IVS: In Vehicle Signage

OHLN: Other Hazardous Locations Notification - Slow or stationary vehicle; Emergency brake light; Weather conditions; Traffic Jam Ahead Warning

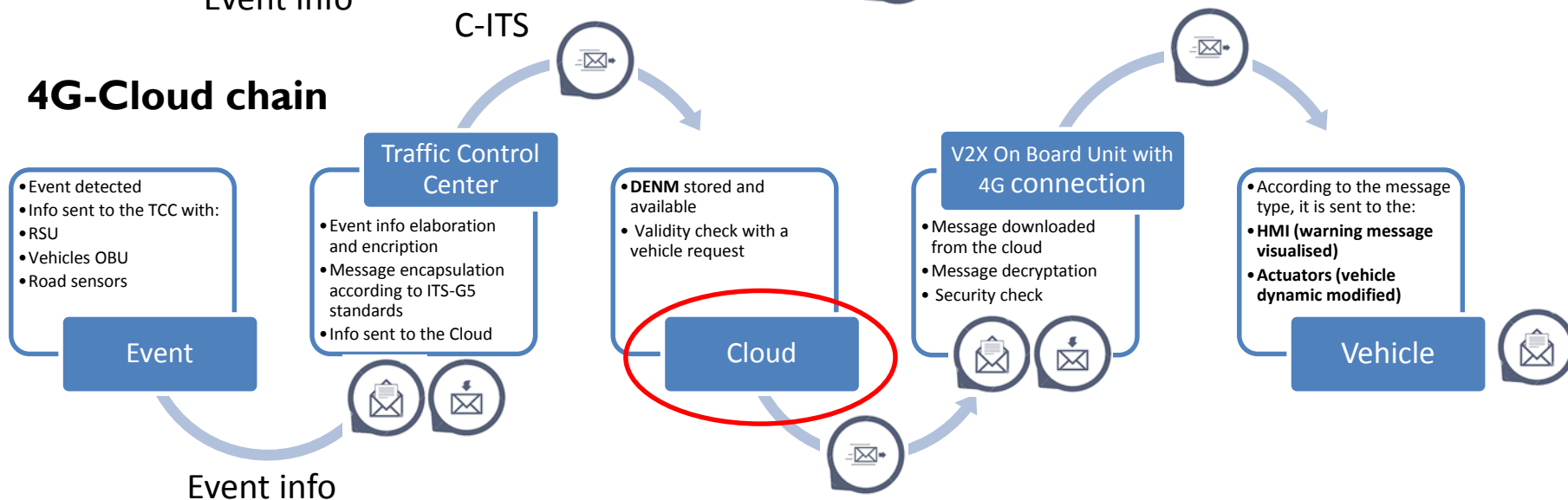
C-Roads Italy: Hybrid communication scheme



ITS-G5 chain



4G-Cloud chain



Highway Chauffeur



Supervised automated and cooperative driving functionality intended for passenger cars in motorways or motorway-like roads with velocities up to 130 km/h.

The goal is to demonstrate the benefits of V2X hybrid communication (ITS G5 and LTE) to Highway Chauffeur Operational Design Domain.

Expected benefits

- enhancement of safety as a result of the additional information from V2X
- cooperation between passenger cars and truck platooning

Expected results

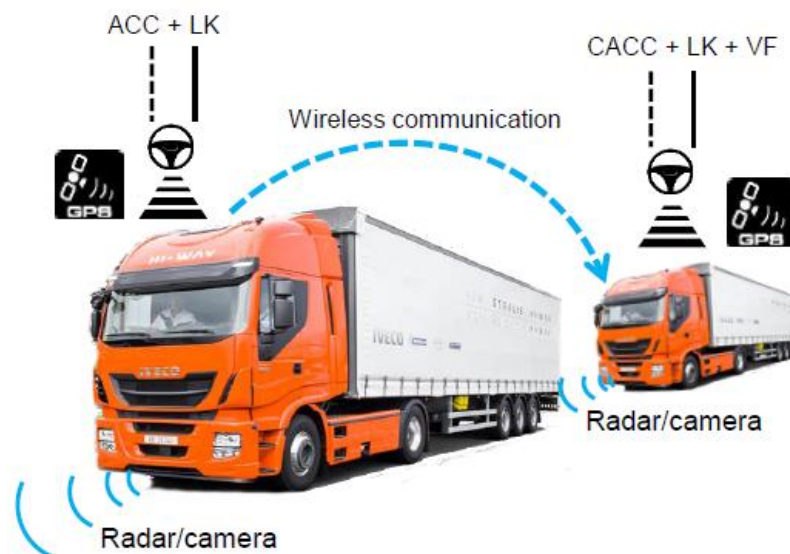
- a complete understanding of the benefits and limitations of V2X support to Highway Chauffeur Operational Design Domain
- evaluation of C-ITS “Day 1” applications for passenger cars
- evaluation of the role and benefits of C-ITS infrastructure to overcome technology penetration limitation
- pilot testing in the Brenner area in order to have data and results also in a cross-border environment

Platooning

- Platooning concept: 2 or more trucks travelling with reduced gap at cruising speed taking advantage of drag reduction and reducing road impact
- 1st vehicle is leading, the remaining are following using Vehicle To Vehicle (V2V) communication information and on-board sensors (ACC radar/camera)
- Basic configuration is 2 vehicle with longitudinal control only (Level I automation). The driver is in control of the lateral maneuvering

Goal

Demonstrate the enhancement of Platooning via V2X, ITS, G5 and LTE, enabling data exchange and negotiations among involved vehicles



ACC : Automatic Cruise Control
CACC : Cooperative ACC using V2V communication
LK: Lane Keeping
VF: Vehicle Following

Objective:

- Test Platooning technology ,Vehicle to Vehicle (V2V) and Vehicle to Infrastructure (V2I) communication to evaluate the real impact on **safety, traffic efficiency and environment.**

Expected Benefits:

- Vehicle to Infrastructure (V2I) communication system development based on G5 technology and on 4G/5G technology. Tested on the A22 Highway.
- C-ITS services integration with Platoon Technology.
- Pilot activity for Platooning impact evaluation, with a specific focus on Safety.
- Evaluate the interaction with Passenger Car with Highway Chauffeur functions.
- Collect element for Platooning technology real life deployment.

Today Status

- C-ITS service implementation proposal at the C-Roads Platform
- Hybrid communication architecture proposal at the C-Roads Platform (short range and mobile communication integration)
- V2V technology defined and testing on-going

Next steps:

- First Test on Track – Q1 2019
- First Demonstration on National Road - Q1 2020

Work overview: Road Operators

The main objective of the road operators is to provide the required infrastructure for the appropriate testing of the Activity 2 and 3.

To do so, the software and hardware of the existing V2X test sites will be upgraded according to the ETSI standards.

In addition, new RSUs will be installed to increase the coverage of C-ITS services along the highways involved.

A dedicated SW development will be carried on to implement the C-ITS messages codification standard.

TCC will be also upgraded in order to permit its communication with Cloud infrastructure.



Pilots: Cross border test with Austria

Another important pilot test is the “Cross border” test with Austria, valid for both Platooning and Highway Chauffeur vehicles.

The aim is to receive the “Day 1” services as in Italy, with no differences for the driver in terms of HMI notifications and vehicle behavior.

The cloud/RSU will recognize the position of the vehicle (or the network operator) and will start to share local event information.

This test could be executed:

- On ITS-G5 connection only
- Through 4G LTE connection, in order to prove also the Cloud interoperability
- Both







Last October 23, a new project proposal named *“C-Roads Italy 2”*, has been formally submitted to the European Commission answering the 2018 CEF Transport Call.

The main goal of the **C-ROADS ITALY 2** action is to study and pilot, principally in real **urban traffic** conditions (Torino, **Verona** and Trento Municipality are involved), a set of “Day1” and “Day1,5” C-ITS services as recommended by the EC C-ITS Platform.

The project is now under the evaluation procedure of the European Commission. Results about the evaluation will be available around March 2019.

IMPLEMENTING BODIES



Comune di Trento



**Project
Management**





THANK YOU!

For any additional questions please contact:
Alessandro Iavicoli (itsprojects@ramspa.it)

