

02.05.2024

# C-ITS operation across Europe

Intelligent Transportation Systems: A Global Perspective

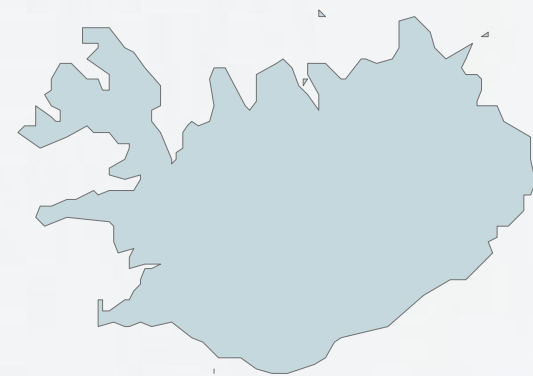
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AustriaTech / C-Roads Platform





# Facts on C-ITS

- ☉ In Europe wide scale C-ITS deployments are a reality
- ☉ Without cooperation, that would not have happened
  - ☉ Cooperation between authorities
  - ☉ Cooperation between road operators
  - ☉ Cooperation with the car-industry
- ☉ Connectivity is a key enabler for C-ITS
- ☉ but the willingness to cooperate and the trust between all stakeholders forms the basis for the status quo
- ☉ The current deployment status forms the basis for further research and development activities



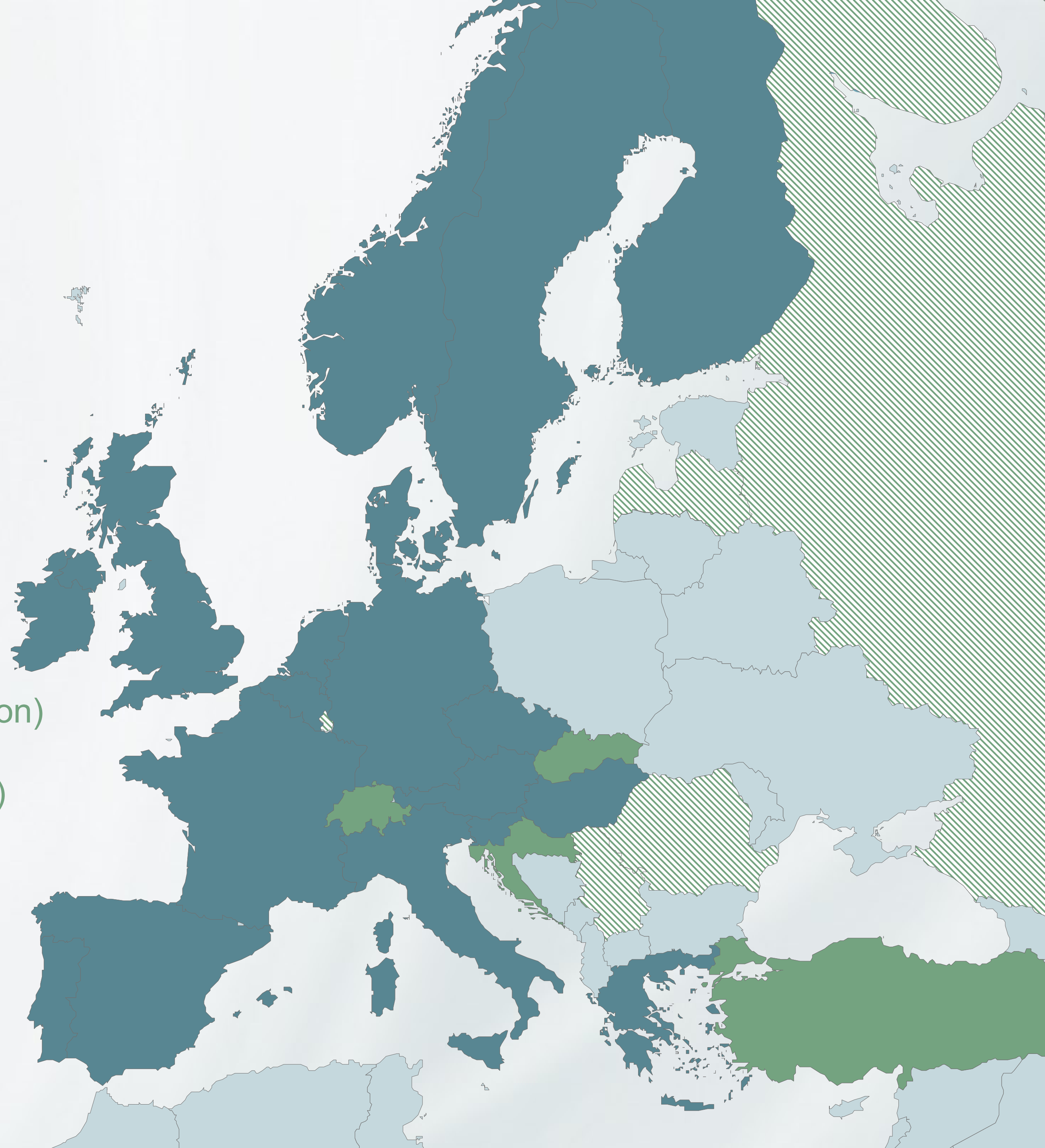
**2016: Eight founding Member States**

**2017: Enlargement to 16 States**

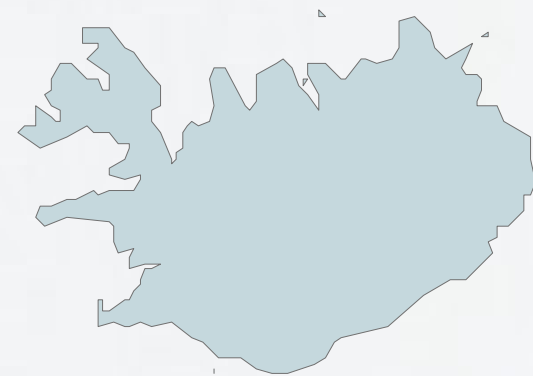
**2019: Further enlargement to 18 States**

## Associated Countries

- Australia (Queensland, Victoria)
- Croatia
- Israel
- Latvia (in negotiation)
- Luxembourg (in negotiation)
- New Zealand
- Romania (in negotiation)
- Russia (frozen)
- Serbia (in negotiation)
- Slovakia
- Switzerland
- Türkiye



Co-funded by  
the European Union



## > 50 European cities

Starting with C-ITS deployment in urban areas

## Short range C-ITS

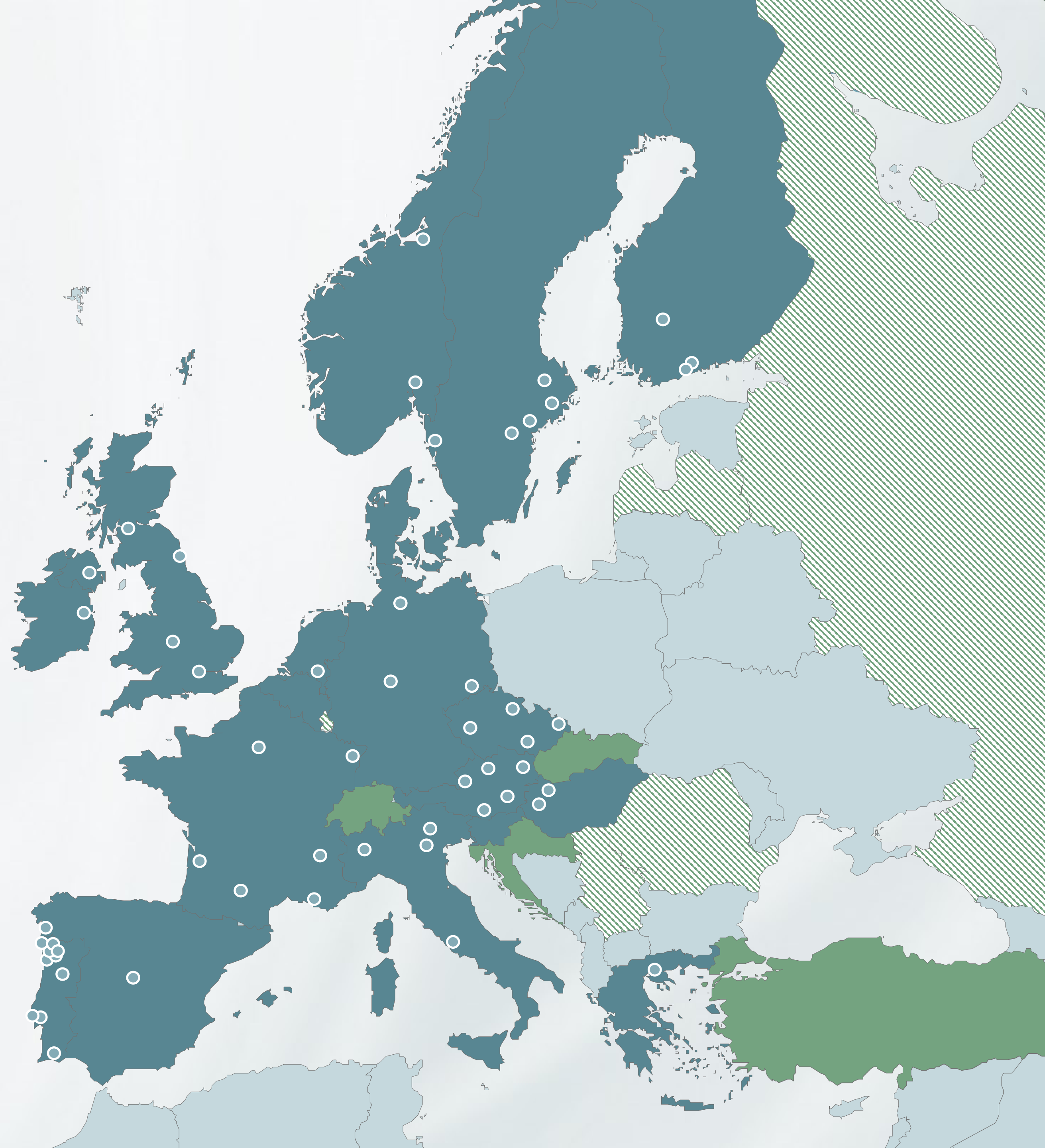
20,000 km of European road sections are equipped with C-ITS equipment

## Long range C-ITS

100,000 km of European roads in total are covered by C-ITS services

## approx. 1.5 M C-ITS equipped vehicles

are connected and exchange information



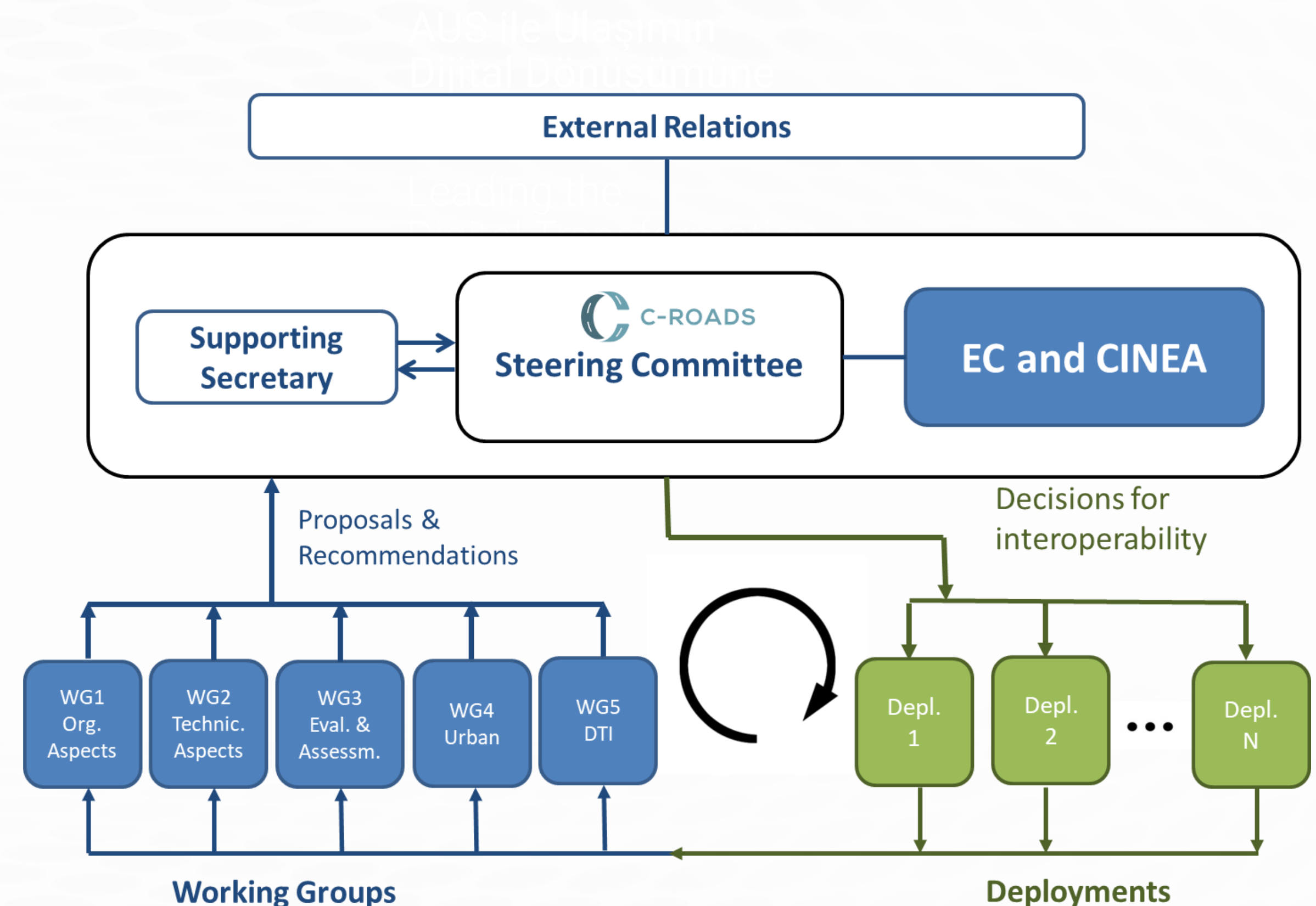
Co-funded by  
the European Union



# The aim of the C-Roads Platform

Starting in 2016 the aim was to

- link all **C-ITS deployments** across Europe
- develop, share and publish common **technical specifications** (including the common communication profiles) – available at [www.c-roads.eu](http://www.c-roads.eu)
- plan intensive cross-testing to verify **interoperability**
- develop system tests based on the common communication profiles by focusing on **hybrid communication** mix, which is a combination of ETSI ITS-G5 and operational cellular networks.

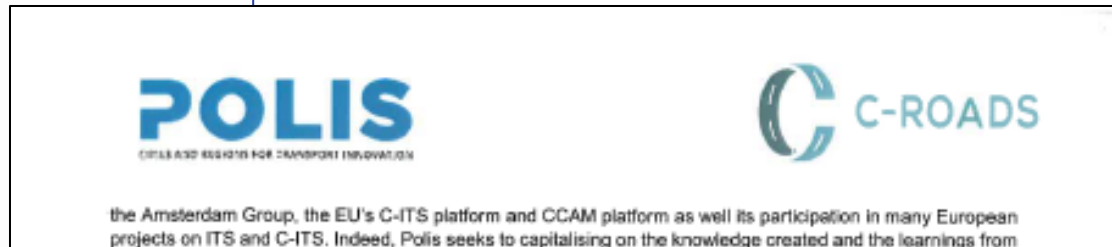
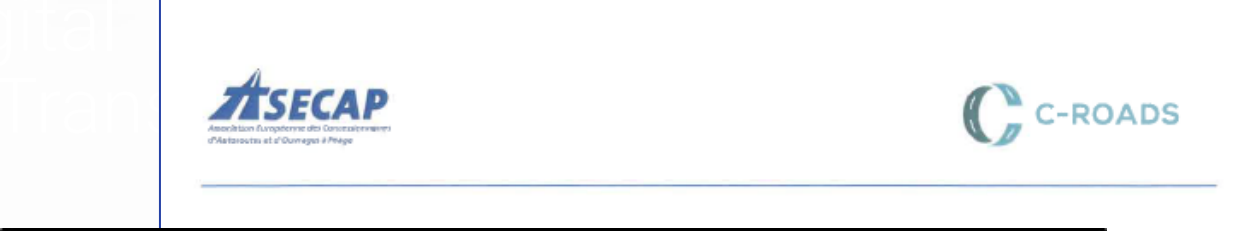




# Cooperation as key factor for success



AUS ile Ulaşımın  
Dijital Dönüşümüne  
Ünvanlık Eylem



**napcore** **C-ROADS**

### Agreement on the co-operation and dialogue between C-Roads Platform and NAPCORE

National Access Points (NAPs) serve as central platforms for mobility data, facilitate access, easy exchange and reuse of transport related data in Europe, in order to support the provision of EU-wide interoperable travel and traffic services to end users. In this context, C-ITS, enabling vehicles to interact directly with each other and the surrounding road infrastructure, will bring great improvement in terms of traffic safety, mobility management and emission reduction.

Therefore, this Cooperation Agreement between NAPCORE and the C-Roads Platform should foster the envisioned interoperability between different actors as well as between data and services for the benefit of European travellers.

**Agreement Objectives**

- Discuss the role of C-ITS and NAPs to support mobility services and future developments in the mobility domain
- Jointly work on processes and procedures to ensure utmost benefits by linking NAPs and C-ITS
- Join forces to align and increase data quality, usability and standardisation to guarantee a functioning exchange of information
- Identify actions needed to achieve these objectives, also going beyond the scope of undergoing work of both platforms

Whereas:

**C-Roads Platform**

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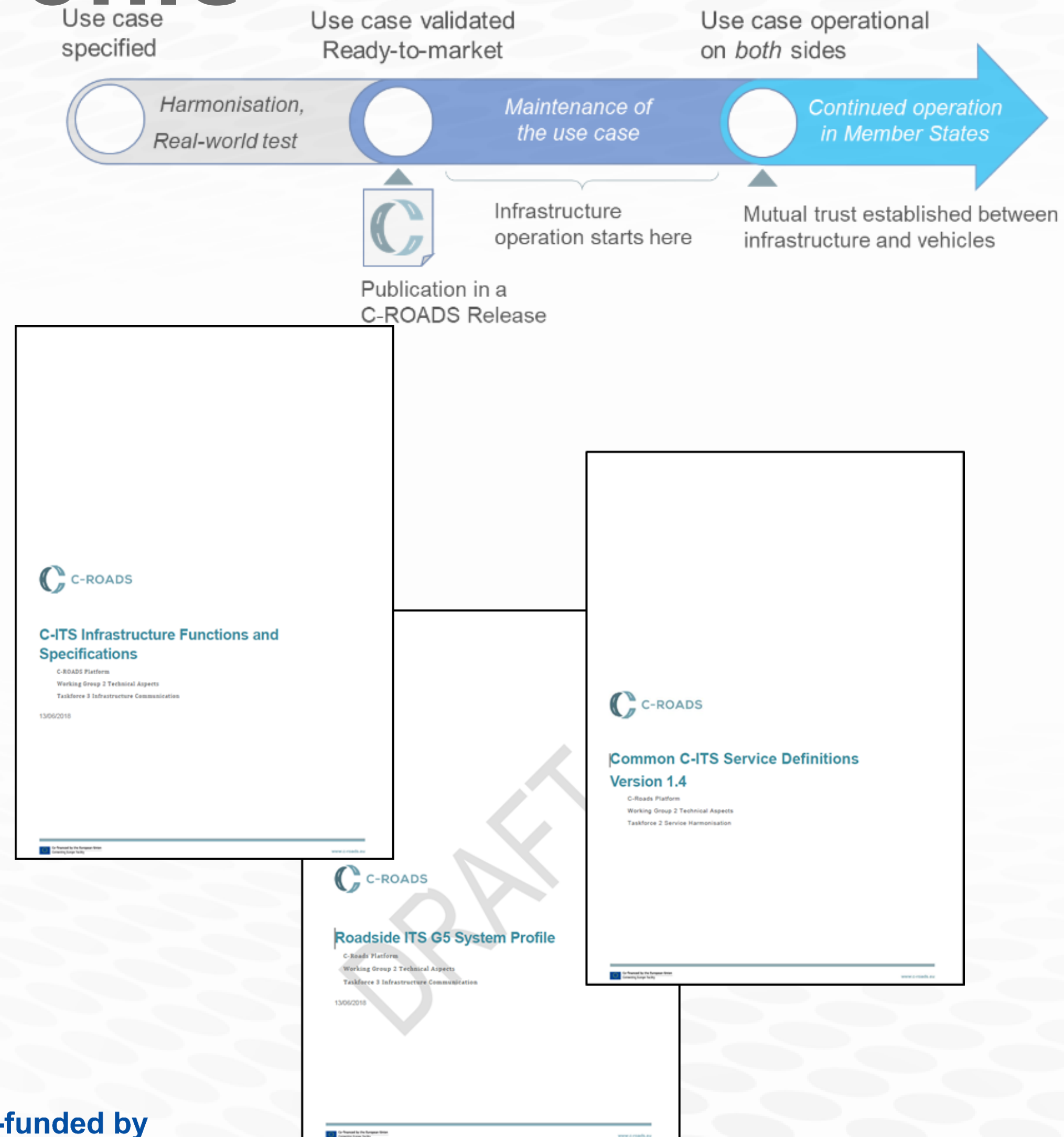
...secretary



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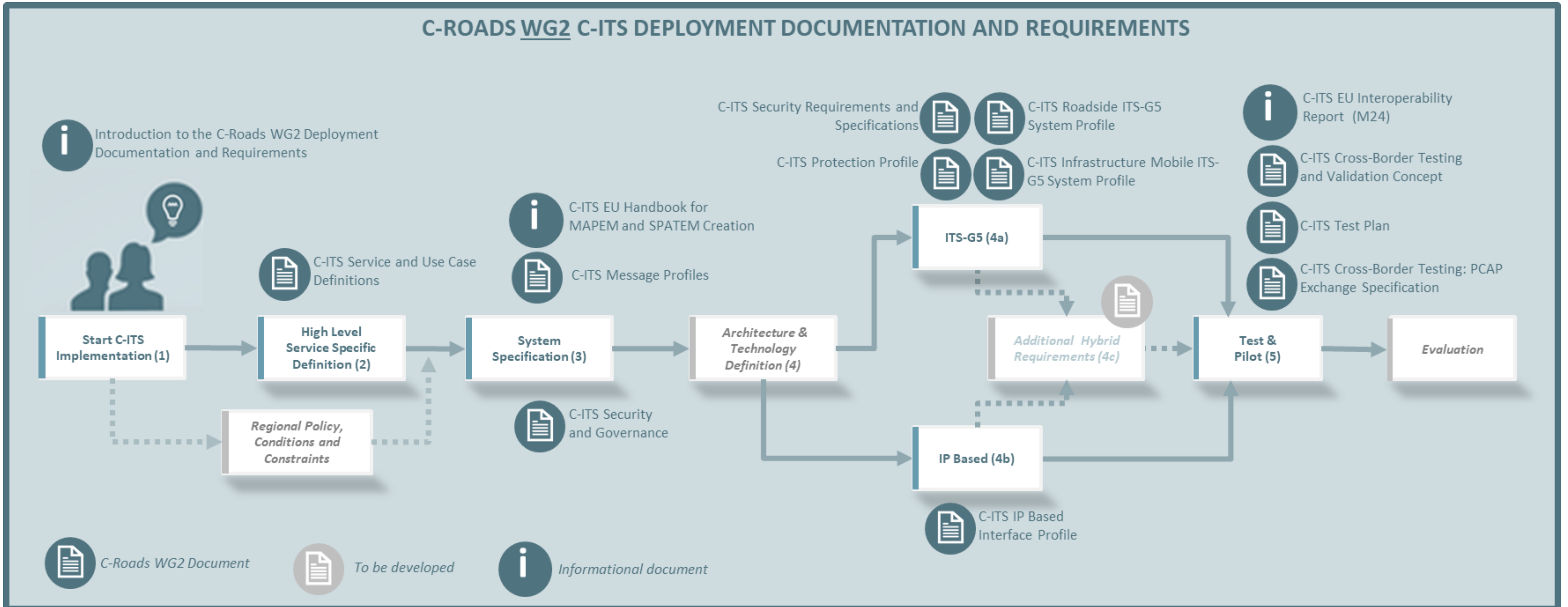


# Publication of the Communication Profile



- Ⓒ Rel. 1.0 published on 14th of September 2017
- Ⓒ Rel. 1.3 published on 23rd of October 2018 (harmonised with the Car 2 Car Communication Consortium)
- Ⓒ Rel. 1.5 published on 8th of July 2019 – including the specification for interoperability of backend hybrid C-ITS communication
- Ⓒ Rel. 1.7 published on 7th of August 2020 – includes the “Cross-Border Testing and Validation Concept”
- Ⓒ Rel. 2.0 published on 30th of September 2021 – the first full hybrid specification
- Ⓒ Rel. 2.0.1 released on 16th of December 2021
- Ⓒ Today we stand with Rel. 2.1.0
- Ⓒ Access: <https://releases.c-roads.eu/>

# Publication of the Communication Profile



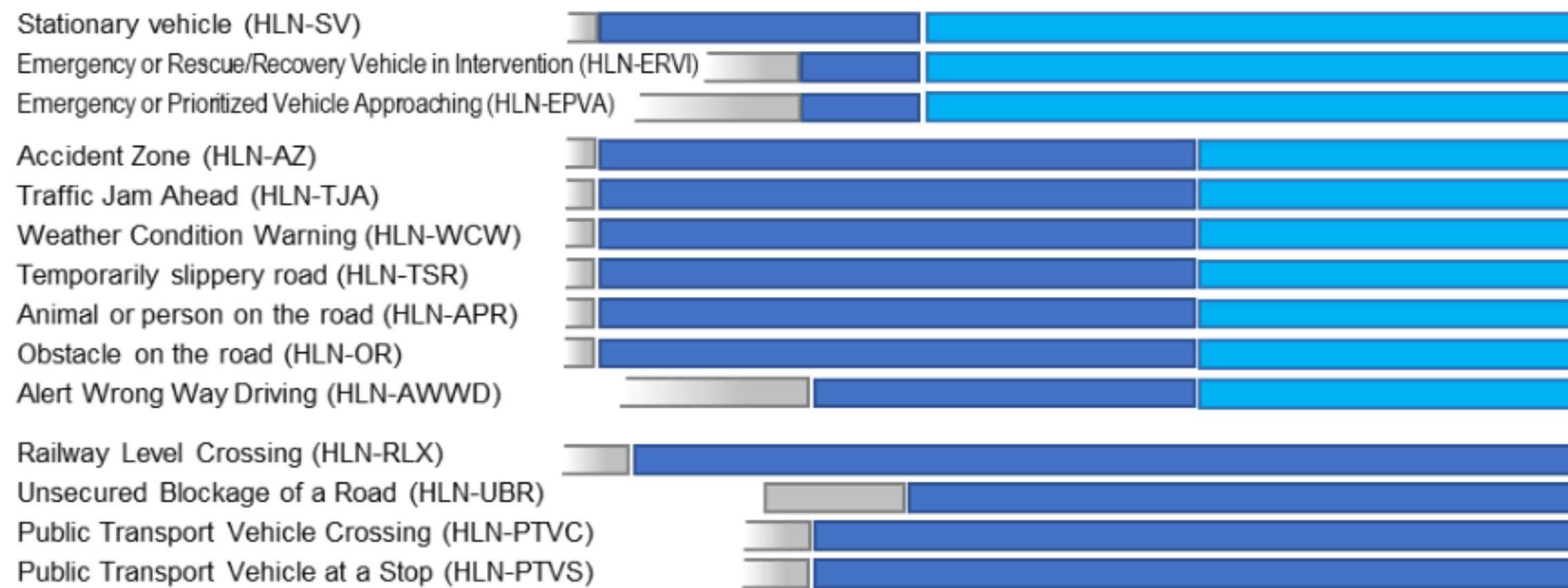





# C-ITS Road Map

## Road Works Warning (RWW)



## Hazardous Locations Notification (HLN)



 Use case specified  
 Published in a C-ROADS Profile - Validated and Ready to Market – Infrastructure operation starting  
 Operational on both sides - Trust between Infrastructure and vehicles (OEM vehicles or special fleet)

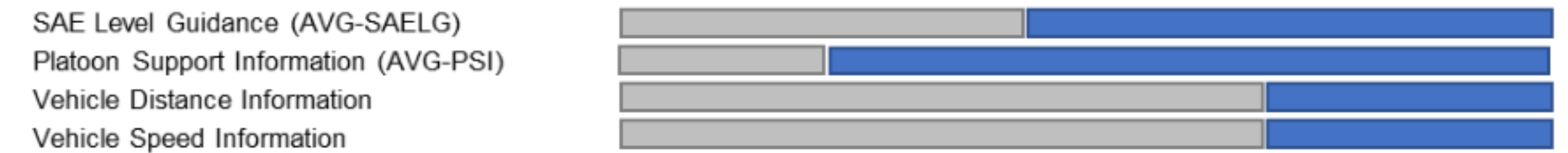
## Signalized Intersections (SI)



## In-Vehicle Signage (IVS)



## Automated Vehicle Guidance (AVG)



## Collective Perception (CP)



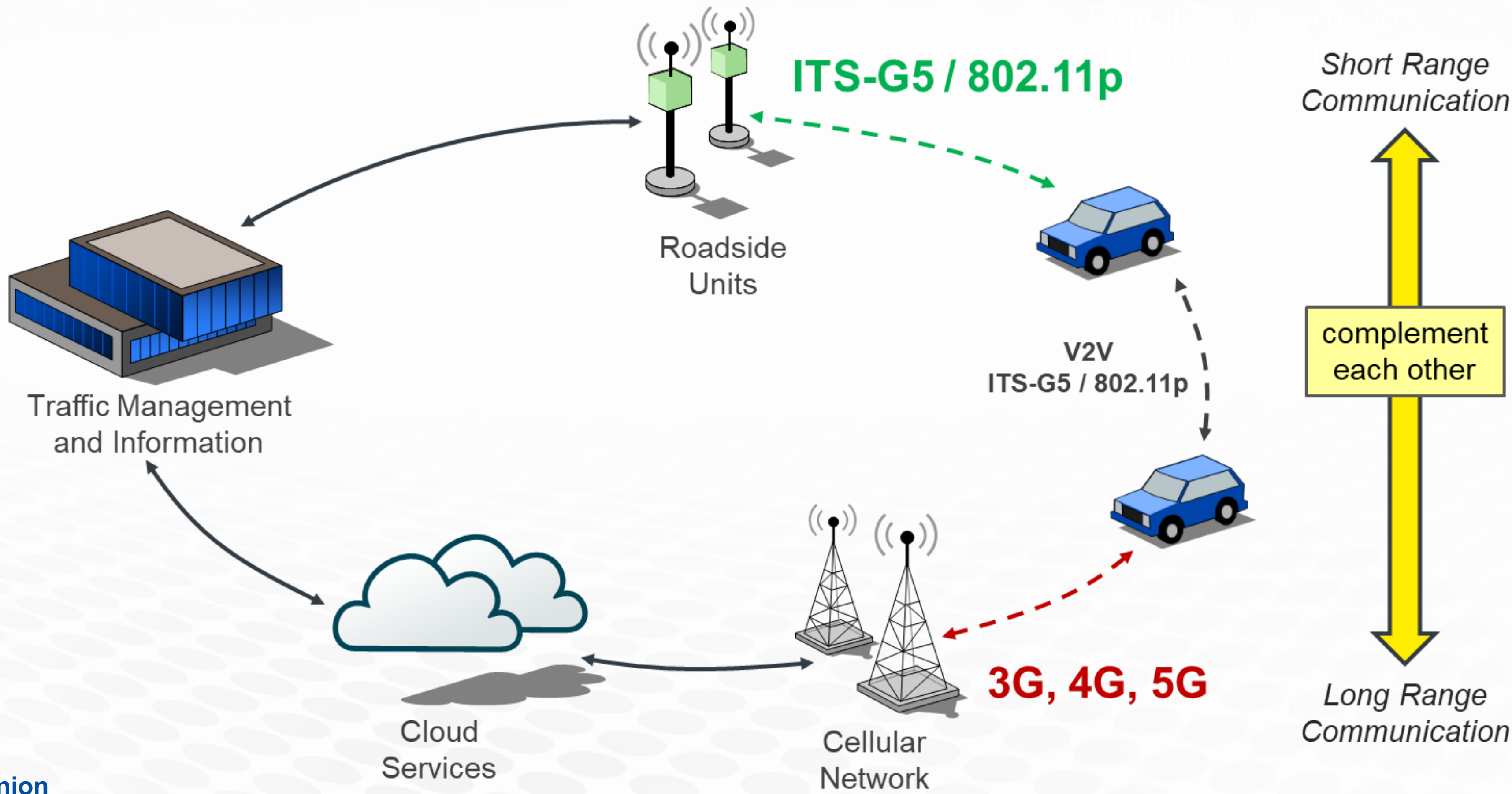
## Probe Vehicle Data (PVD)



# C-ITS based on a hybrid communication mix...



Short and long range communication complement each other:





# C-Roads position on C-ITS technologies



C-Roads has a clear and aligned position on short-range C-ITS technologies:

*C-Roads is technology-neutral, supporting every technology that*

*a.) is in line with the rules of shared communication in the 5.9 GHz ITS Band and*

*b.) does not interfere with EU applications in the 5.8 GHz band and*

*c.) supports C-Roads' work on interoperability of the harmonized use cases*

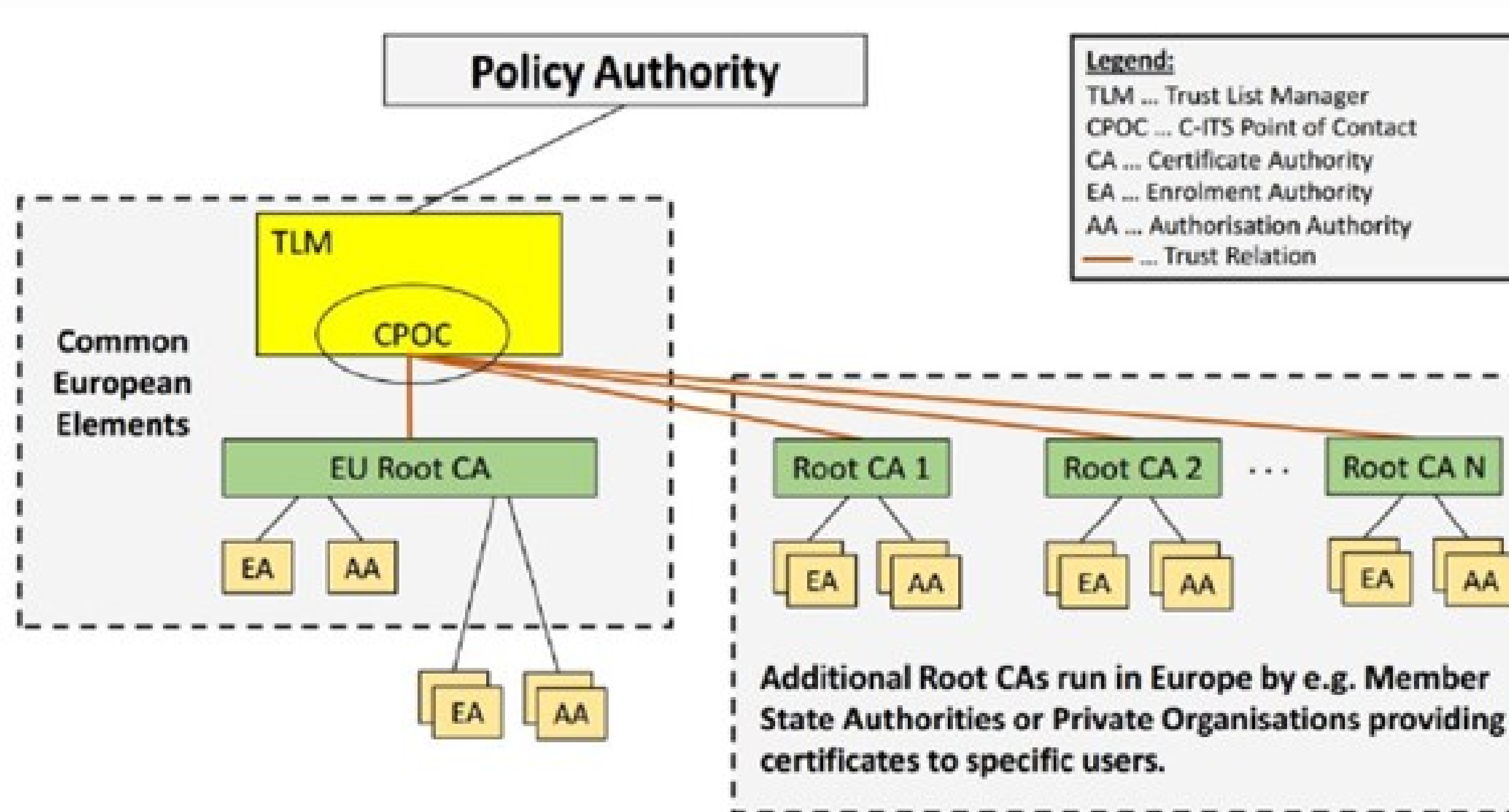


# ...and includes security as core element.

AUS ile Ulaşımın  
Dijital Dönüşümüne

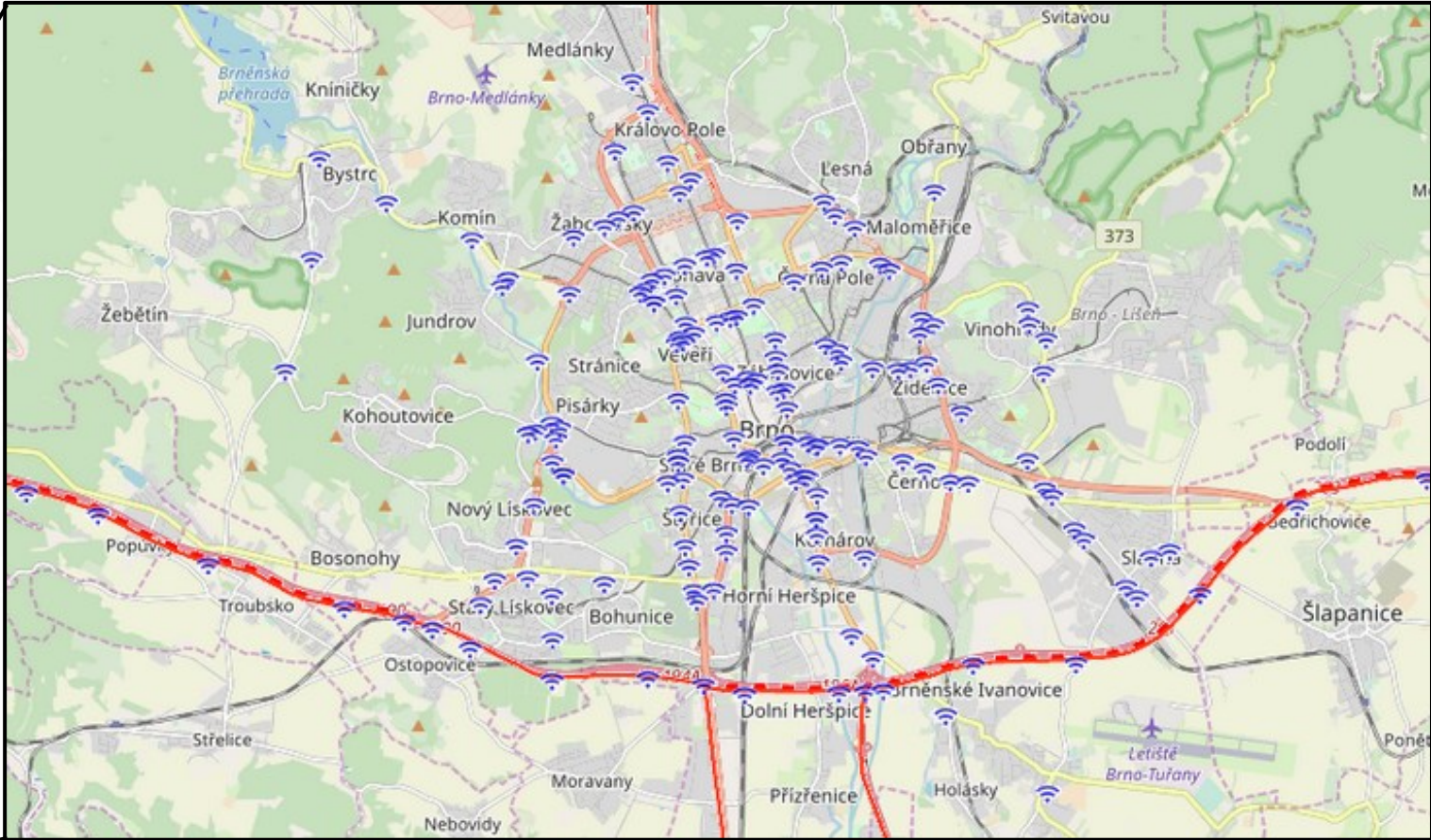
Geleceğin Ulaşımını  
Güvenle Sağlamak İçin

- ☉ with one single trust domain
- ☉ security elements for message transmission between C-ITS stations based on a PKI – Public Key Infrastructure
- ☉ Linking to the EU CCMS - EU C-ITS security credential management system





# Current deployment status of ITS-G5 road side units





# Today we can state

We started along motorways but see huge potential in multimodal (urban) environments





# City of Kassel (GER)

C-ITS equipped traffic light controller with C-ITS coverage (until 07/2023)



currently:

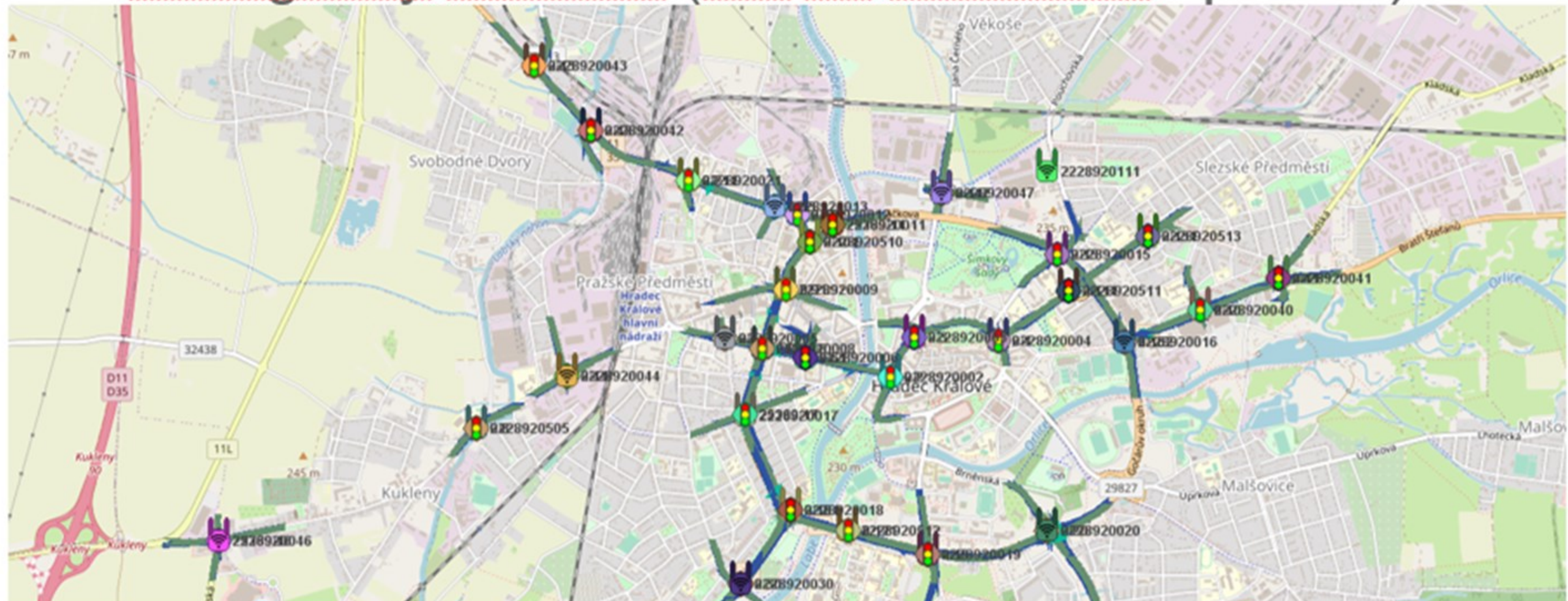
100 R-ITS-S

40 busses  
with ETSI ITS G5  
components



# City of Hradec Králové (CZ)

- 40 RSU at intersections (all signalized intersections)
- 130 OBUs on public transport vehicles (full fleet)
- 7 roadwork vehicles
- 3 emergency vehicles (will be increased up to 25)





# Next steps in Europe

- Ⓢ **Revised EU ITS-Directive:** renamed Priority Area IV: **ITS services for cooperative, connected and automated mobility**
  - Ⓢ The definition of necessary **measures to further progress the development and implementation** of cooperative (vehicle-vehicle, vehicle-infrastructure, infrastructure-infrastructure) intelligent transport systems, in particular to support CCAM
  - Ⓢ **Specifications** for services
  - Ⓢ Specifications for the EU C-ITS **security** credential management system
  
- Ⓢ **C-Roads Platform:**
  - Ⓢ Will support European goals
  - Ⓢ Future **focus is on operation** of the C-ITS Infrastructure in a multi-stakeholder environment
  - Ⓢ Continuation of deployments, including as well “new” focus areas (urban areas, blue-light organisations, public transport)
  - Ⓢ **Enlargement** of the community





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Thank you

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