5G enabled road digitalization

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CaaS (Corridor as a Service) ecosystem pilots on key corridors

Intelligent infrastructure

vedia *CaaS*
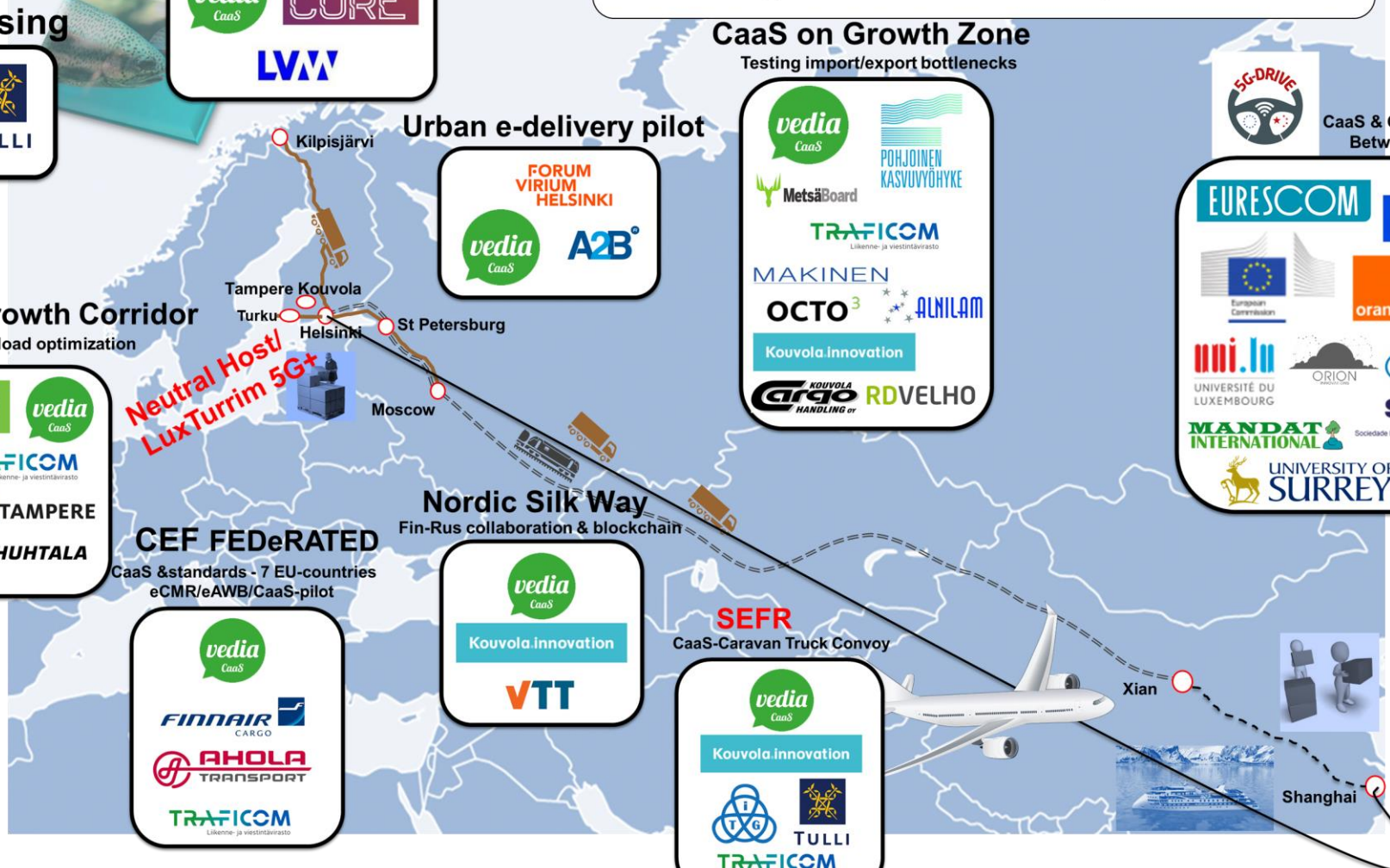
New business

V2X

Intelligent
infrastructure

Vehicles ➤

Telematics ◄

Networks &
equipment

5G

Telecommunication ➤

◄ Industry & trade

Data &
information

Authority ➤

◄ Smart city

Regulation &
requirements

IoT

Alternatives: 3G, 4G, wifi, DSRC (ETSI G5)

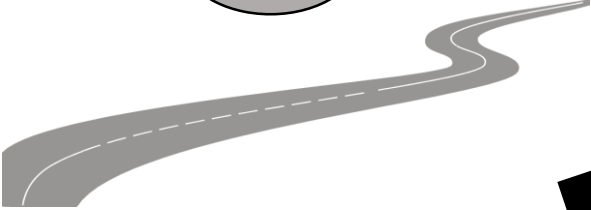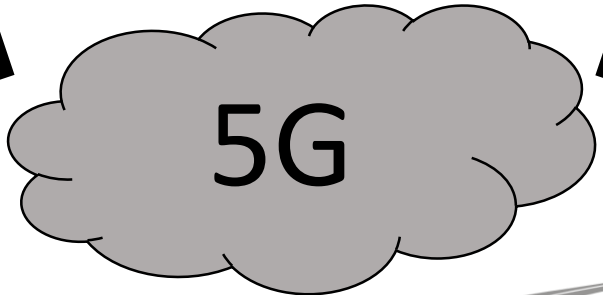# Hybrid positioning system for exploration of new location based services in 5G

End user scenarios

- Energy-efficient buildings
- Driver or car assistance indoors and outdoors
- Navigation support for drones and autonomous vehicles
- City and communication infrastructure planning and maintenance

Real-time dashboard
Mobile devices

- RTK +INS
- Lidar

Device	Company
RTK-base station	Indagon Oy
Outdoor display	Teleste
Video cameras	Teleste
5G radios	Nokia
Light composite pole	Exel Composites
LED lights (custom)	Ensto
Air quality sensor	Vaisala
Weather station	Vaisala

Building key enablers for a Digital Smart City

LuxTurrim5G is a Nokia Bell Labs driven ecosystem project developing and demonstrating fast 5G network based on smart light poles with integrated antennas, base stations, sensors, screens and other devices. This joint project opens new digital services and business opportunities for a real smart city.
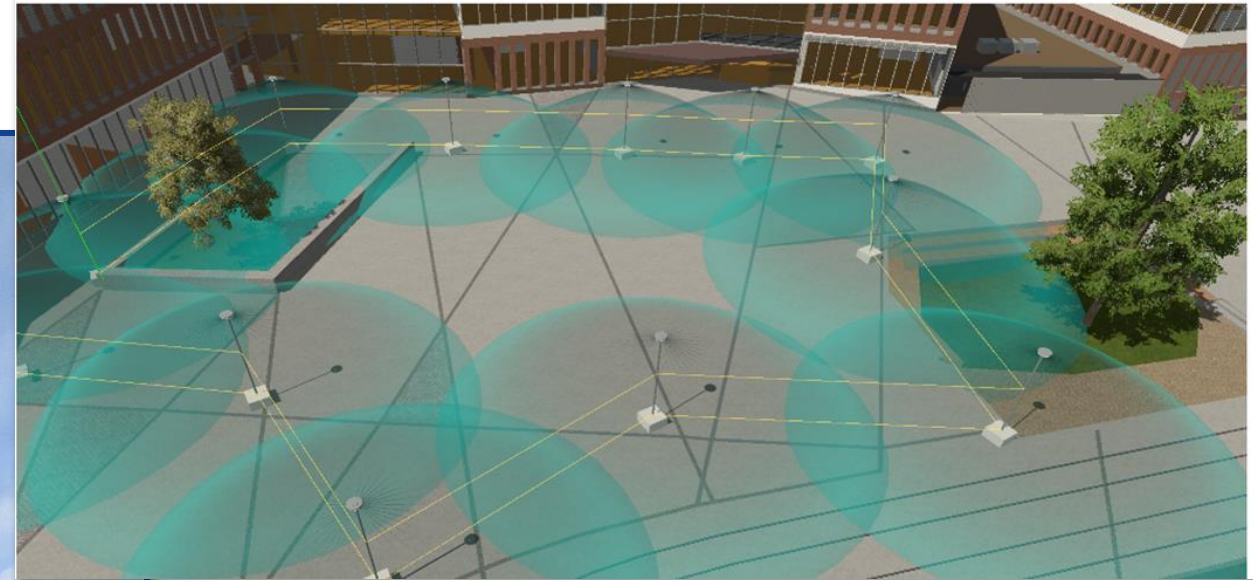
Arctic Challenge

AC/CAD hybrid V2X communication tests:

- Via **ETSI G5** Day 1 message channel works very well, however short coverage distance (<1km) causes challenges for scaling

- **LTE/5G** provides interesting solution because of wide coverage, however LTE development is behind ETSI G5 development in Day 1 messages

- Day 1 messages are useful and a good way to inform drivers and vehicles about risks. However, there are still many open questions:
  - What, when, how, to whom?
  - Impact area?
  - Business models?

EU consortium

5G Product Large-Scale Trial Consortium

Technical Innovation

Spectrum Usage

Common 5G KPIs

eMBB

5G NR | Architecture | SDN/NFV

Slicing
Security
MEC

V2X

V2N | V2V

Joint Trials

5G-DRIVE Consortium

Central Cooperative Services Platform

Cloud server
Day-1 service messages

LTE release 14

Cellular 5G Test Network

V2N
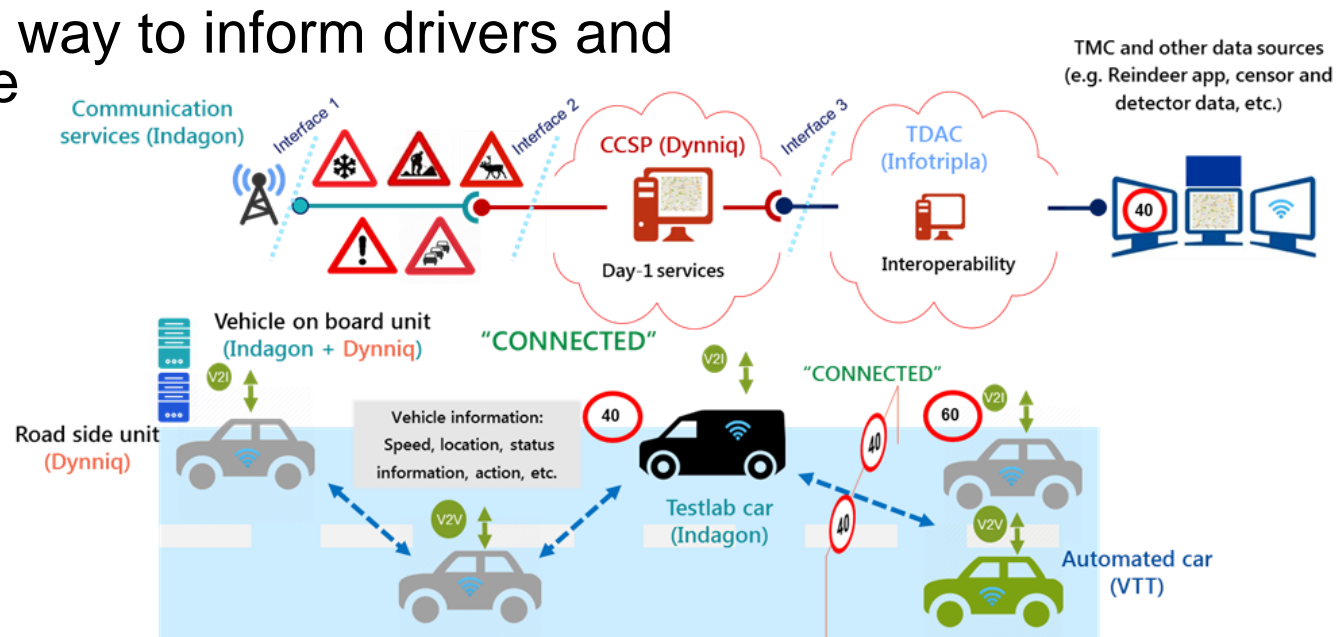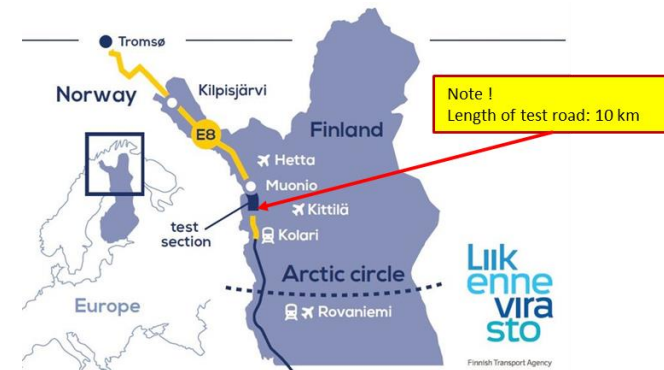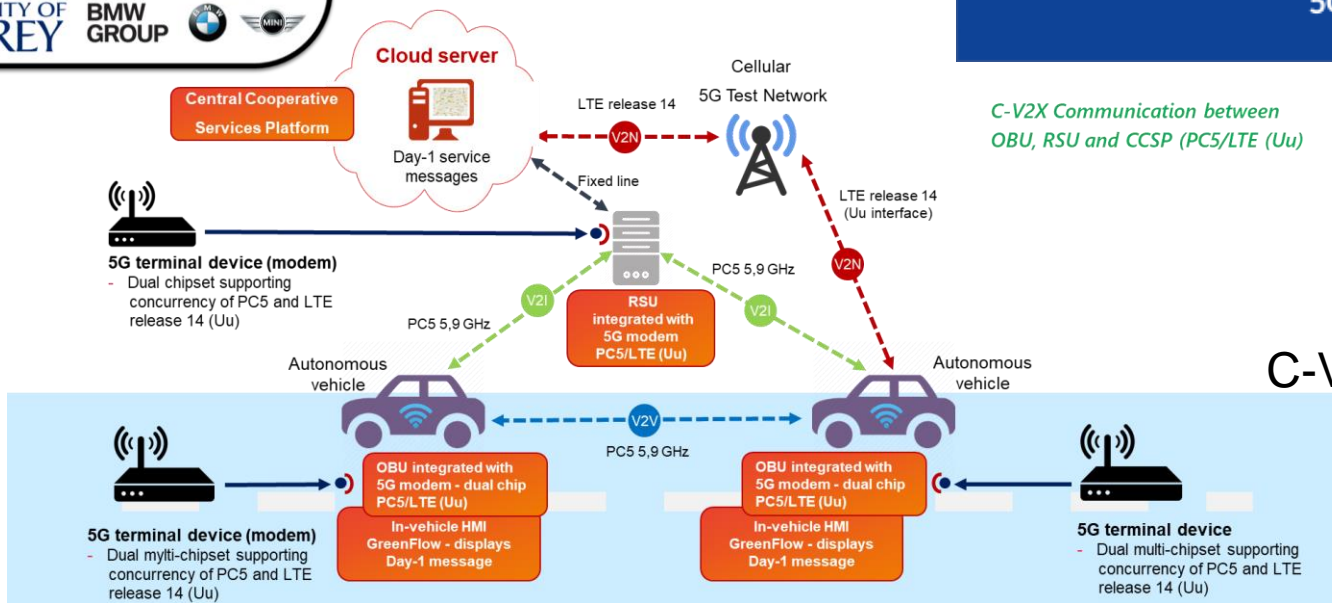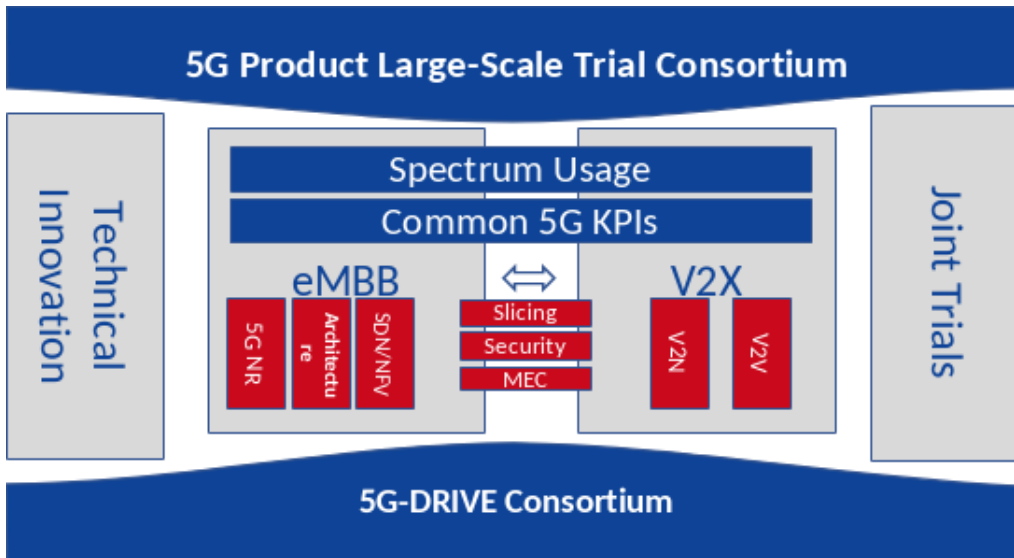
C-V2X Communication between OBU, RSU and CCSP (PC5/LTE (Uu)

Fixed line

LTE release 14 (Uu interface)

5G terminal device (modem)
- Dual chipset supporting concurrency of PC5 and LTE release 14 (Uu)

V2I

PC5 5,9 GHz

RSU integrated with 5G modem PC5/LTE (Uu)

V2I

V2N

PC5 5,9 GHz

Autonomous vehicle

Autonomous vehicle

V2V

PC5 5,9 GHz

5G terminal device (modem)
- Dual mylti-chipset supporting concurrency of PC5 and LTE release 14 (Uu)

OBU integrated with 5G modem - dual chip PC5/LTE (Uu)

In-vehicle HMI GreenFlow - displays Day-1 message

OBU integrated with 5G modem - dual chip PC5/LTE (Uu)

In-vehicle HMI GreenFlow - displays Day-1 message

5G terminal device
- Dual multi-chipset supporting concurrency of PC5 and LTE release 14 (Uu)

VTT - 5G test site Espoo, Finland
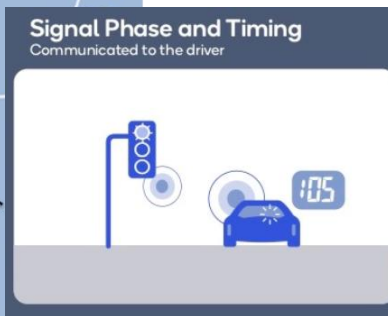
HORIZON 2020

C-V2X OBUs and RSUs with European and Chinese standards.

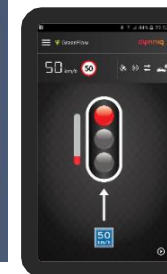Hybrid communication:
LTE + ITS G5 → 5G

C-V2X tests from Espoo to Wuxi

Joint 5G-Drive C-V2X pilots with Vedia testlab vehicle to verify service interoperability at both ends of the China- North Europe transport corridor.

Joint V2X use cases: Glosa and vulnerable road user warning (V-Alert)

Helsinki · St Petersburg

Moscow

Vulnerable Road User Protection
When pedestrians & cyclists are present

@Qualcomm/5GAA

Signal Phase and Timing
Communicated to the driver

@Qualcomm/5GAA

<Intelligent Transportation Systems for the safe future , Riga, 16th May 2019 >

CaaS Corridor as a Service

CaaS: it's all about data

vedia CaaS | CAAS NORDIC

CaaS Nordic promotes Corridor as a Service expertise, data sharing and living lab activities in regional and international cooperation. Aim is to integrate distributed data bases under one federated data model.
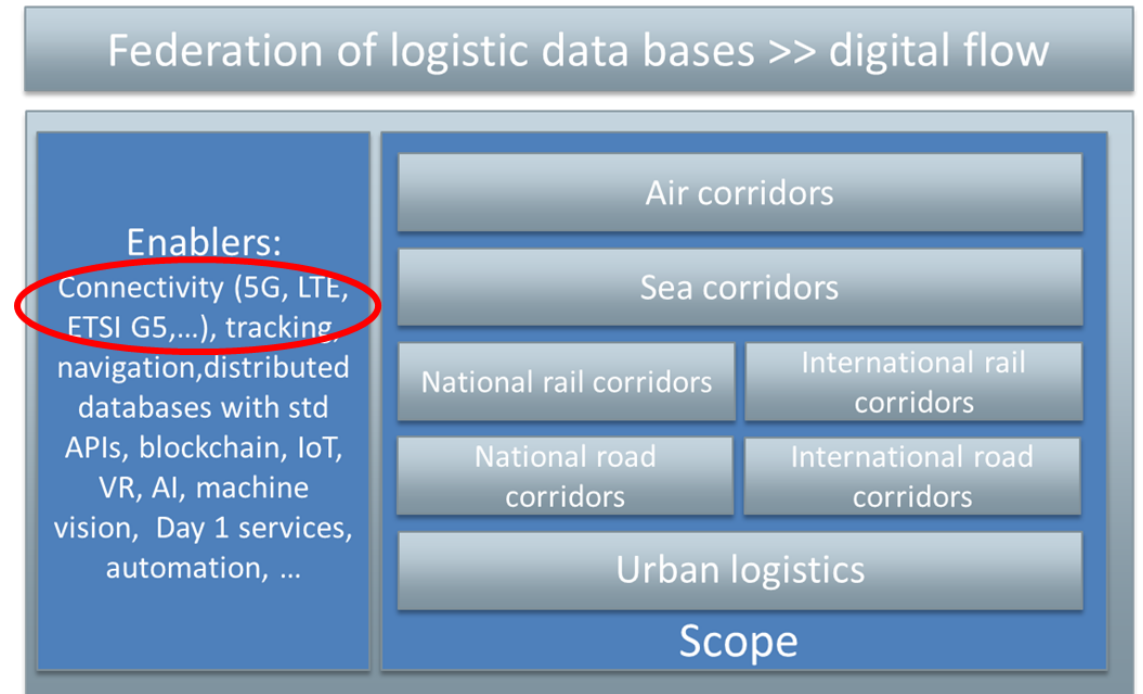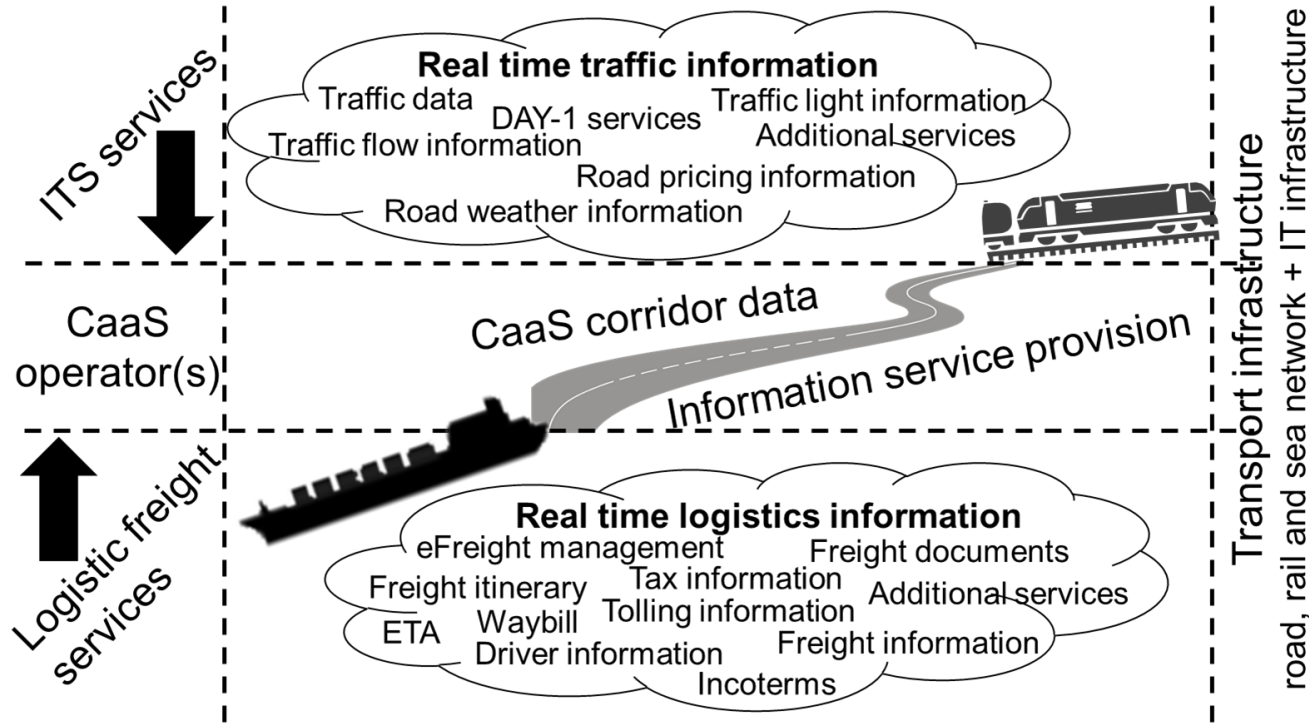
European Commission

FEDeRATED

2018-EU-TM-0119-S
7 Core Network Corridors

CEF-T-2018-MAP-TRANSPORT
Innovation and new technologies

Location(s) of the Action:
ES | FI | IT | LU | NL | SE

(Coordinating) Applicant:
Ministerie van Infrastructuur en Waterstaat (Kingdom of The Netherlands)

Implementation schedule:
Start date: January 2019
End date: December 2023

Requested funding:
Total eligible costs: €25,302,204
Requested funding: €12,651,102
Requested EU support: 50.00%

Recommended funding:
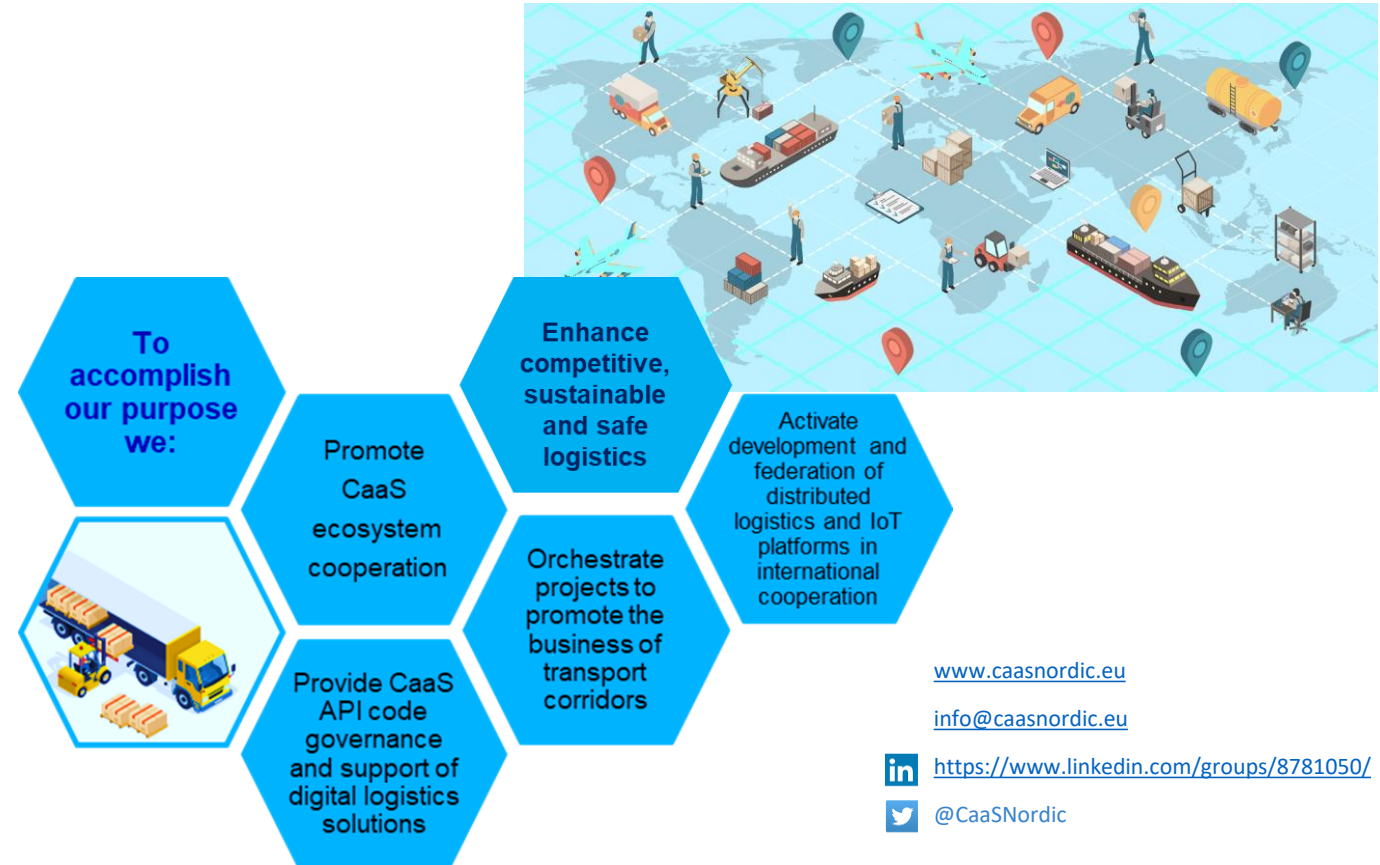Recommended total eligible costs: €25,302,204
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Action: 2018-EU-TM-0119-S   Source: INEA

The viability and validity of a federative network of platforms as enabler for Business to Administration (B2A) and Business to Business (B2B) data exchange and sharing by transport and logistics operators is an ambition of the EU member states.   The goal of the Action is to construct and validate the federative network of platforms approach as a means to enable data sharing in supply and logistics chains along TEN-T Corridors.   The Action will establish a Master Plan for the digital interoperability of existing (partial) IT systems and will provide a proof of concept through the development of Application Programming Interfaces (APIs) in Living Labs.

To accomplish our purpose we:

Promote CaaS ecosystem cooperation

Enhance competitive, sustainable and safe logistics

Activate development and federation of distributed logistics and IoT platforms in international cooperation

Orchestrate projects to promote the business of transport corridors

Provide CaaS API code governance and support of digital logistics solutions

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https://www.linkedin.com/groups/8781050/

@CaaSNordic

5G enables road digitalization?

- There are still several open issues:
  - Operation and process models
    - Always connected → possible yes, but at what level
    - High capacity, super fast and totally reliable check points
    - Roaming
    - Interoperability
  - Business models
    - Who is customer
    - What kind of value chain there is
    - Pricing
    - ….

5G Momentum Ecosystem helps Finland in becoming #1 in 5G

> promotes the development and introduction of 5G service by creating a new kind of cooperation network for the 5G trial activities.

> promotes through trials new services and innovations base on 5G technology.

> identifies challenges related to 5G operating environment.

> makes Finnish 5G expertise visible.

TRAFICOM

5G Momentum – Branches of Trials

> Cities and Municipalities

> Networks

> Agriculture and Forestry

> Industry and Energy

> Health and Wellbeing

> Media

> Transport and Logistics

>> Drones

>> Logistics

>> Marine

>> Railways

>> Harbours

>> Roads

TRAFICOM

Corridor as a Service

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Building smart logistics corridors with digitalization

Data

Optimization of the logistics pipeline.

Drive

Smart mobility services for faster delivery.

Market

Digital marketplace for logistic services.

Service

Home delivery for tourists.

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