

C-Roads Italy – First Steps Towards the Deployment of C-ITS Technologies



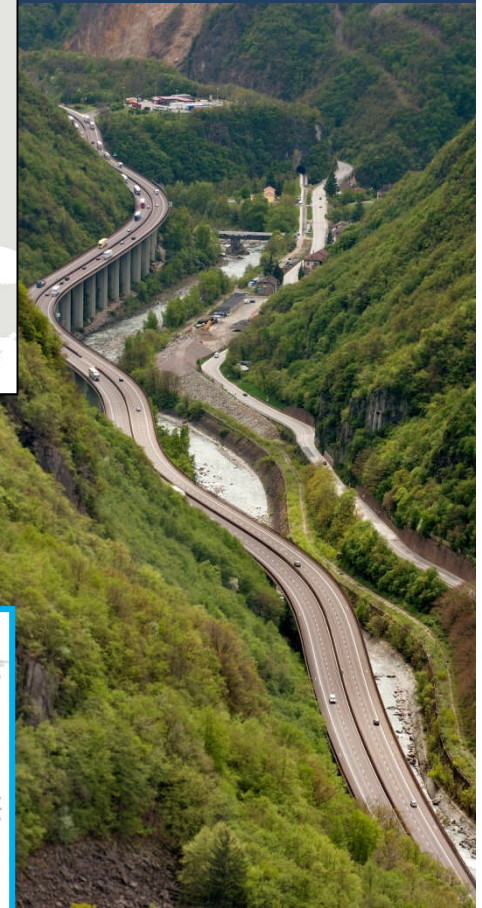
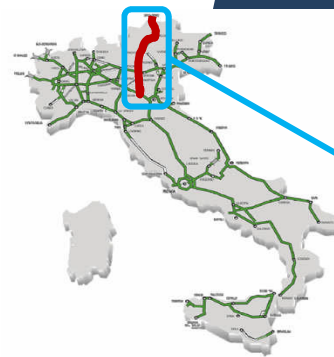
Ilaria De Biasi
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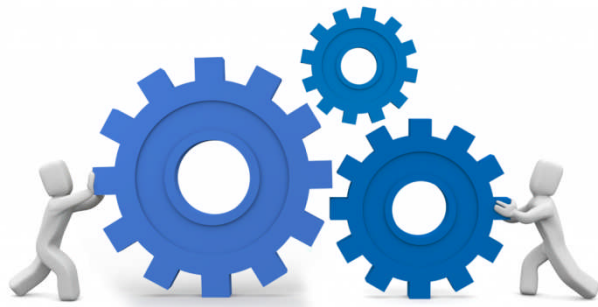
THE A22 MOTORWAY

- 314 KM
- 23 TOLL GATES + 1 TOLL BARRIER
- 6 MAINTENANCE CENTRES
- 6 SERVICE CENTRES
- 22 SERVICE AREAS + 1 TRUCK PARK
- 147 OVERPASSES
- 30 TUNNELS (12.6 km)
- 144 BRIDGES AND VIADUCTS (31.2 km)
- 427 LAY-BYS
- 84.1 KM OF NOISE BARRIERS
- > 3,600 PARKING AREAS FOR CARS
- > 1,200 PARKING AREAS FOR HGVs

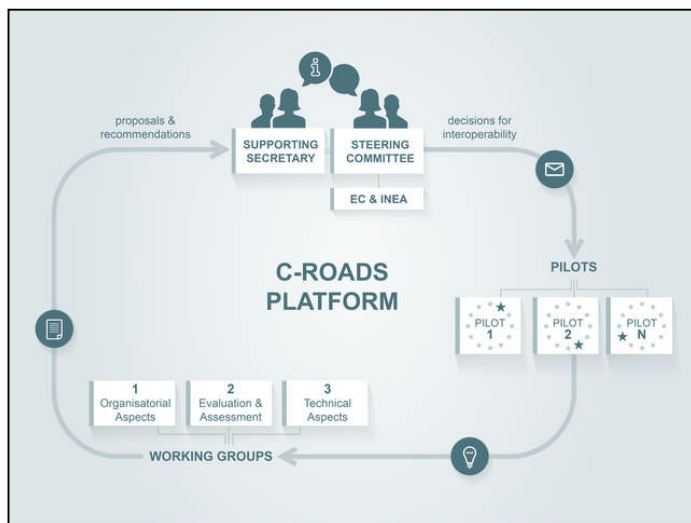




08.02.2017 → 31.12.2020



Implementation and testing,
in real-traffic condition, of
cooperative communication
based on V2X technology to
evaluate the real impact on
safety, traffic efficiency
and environment



Joint initiative of European Member States and road operators for testing and implementing C-ITS services in light of **cross-border harmonisation** and **interoperability**



THE PROJECT TEAM



TECHNOLOGY IMPLEMENTED



ETSI ITS-G5 DSRC
(short-range communication)



CELLULAR

(long-range communication)

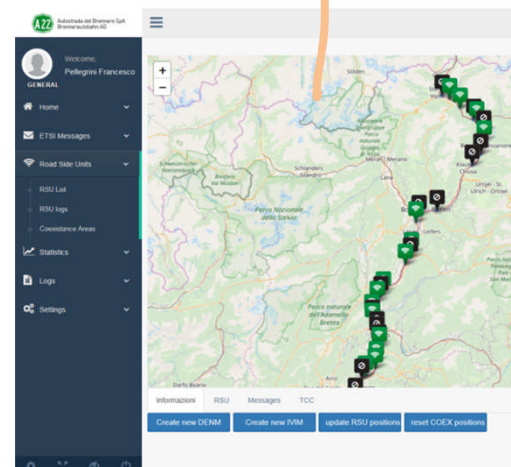
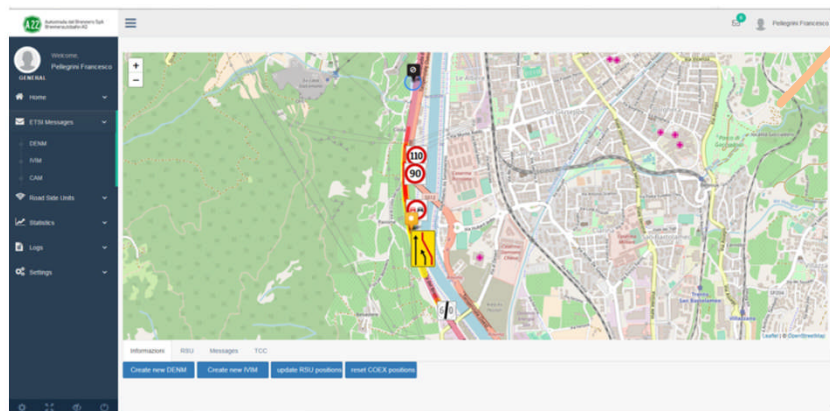
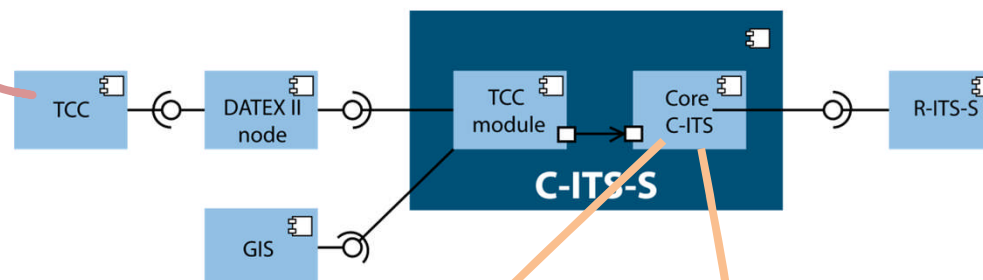
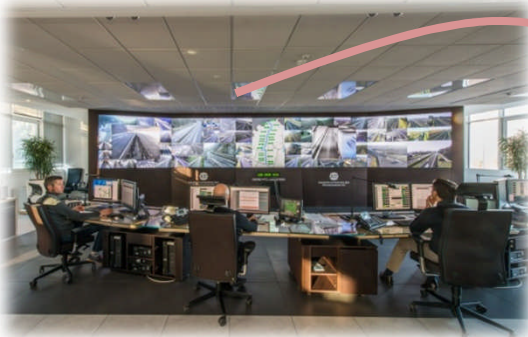


Vehicles can establish communication among themselves without the need of an external network node to negotiate

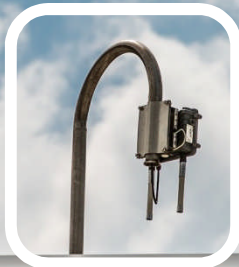
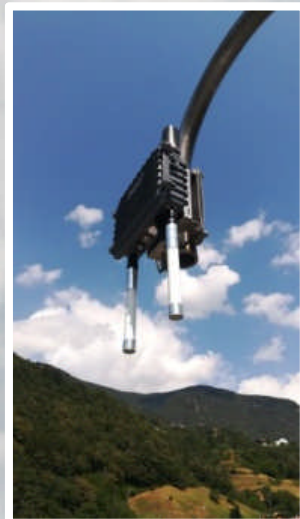
Delivery of information granted even with reduced stays in limited coverage areas

Maximized coverage

THE C-ITS INFRASTRUCTURE



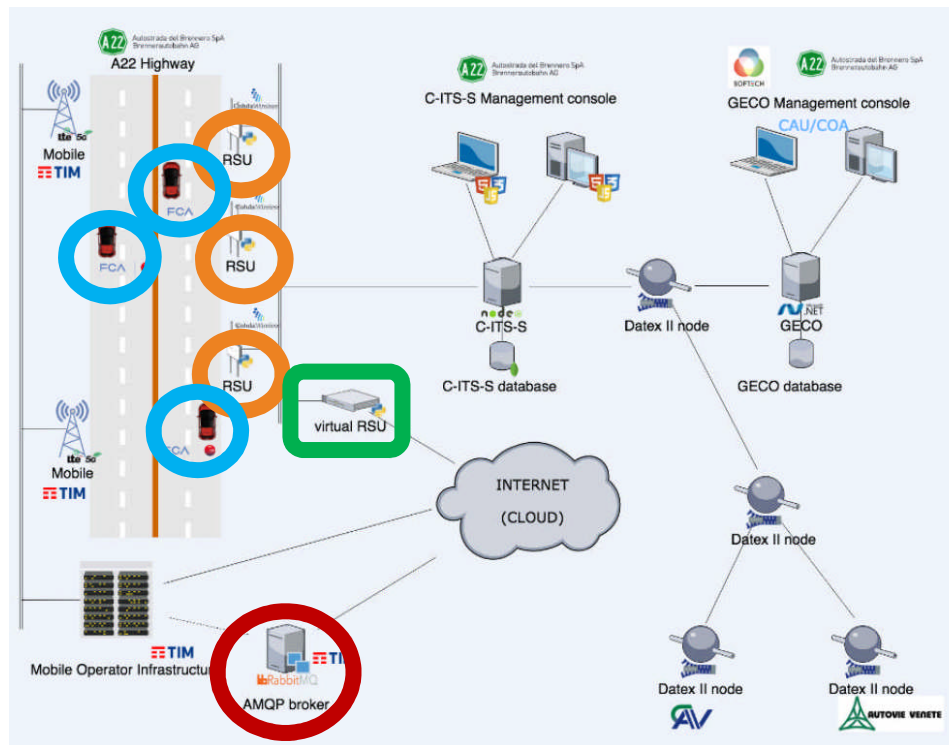
53 ROAD SIDE UNITS



THEY...

- ... manage the transmission and reception of I2V and V2I messages on the DSRC ETSI ITS-G5/802.11p wireless network
- ... are equipped with Power Over Ethernet technology
- ... are interconnected to the C-ITS-S through a proprietary interface over IP
- ... manage G5 security with encrypted keys

HYBRID COMMUNICATION



- Transfer of ETSI messages on AMQP protocol
- Connection between **producers** / **consumers** and the **broker** is persistent
- Asynchronous forwarding of messages means real-time notification
- Implementation of a **virtual RSU** as a gateway point
- Direct transporation of messages in the ASN.1 UPER binary format

SAFETY-ORIENTED SERVICES

Day-1 Services	Road Works Warning	Closure of part of a lane, whole lane or several lanes
		Alert planned road works - mobile
	Hazardous Location Notification	Accident Zone
		Traffic Jam Ahead
		Stationary Vehicle
		Weather Condition Warning
		Temporarily Slippery Road
		Animal or Person on the Road
		Obstacle on the Road
	In-Vehicle Signage	Dynamic Speed Limit Information
		Embedded VMS "Free Text"
		Other Signage Information
	Probe Vehicle Data	Probe Vehicle Data



TRUCK
PLATOONING

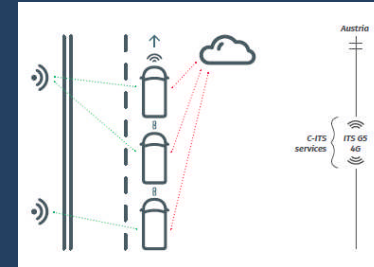


HIGHWAY
CHAUFFEUR

IVECO

PLATOONING

First European manufacturer to test
the Truck Platooning technology on
public roads in Italy



Truck Platooning concept

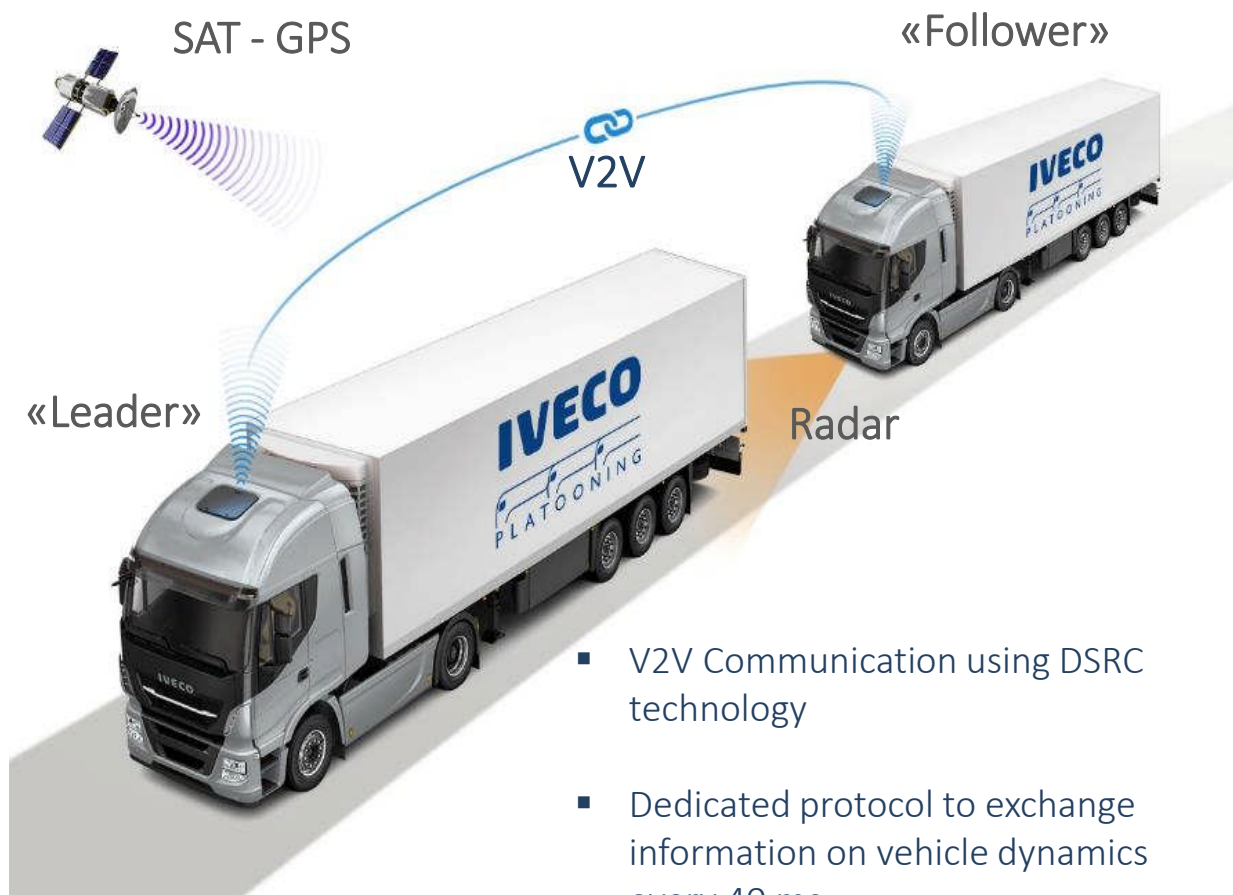
Two or more trucks travelling
with reduced gap at cruising
speed, taking advantage of
drag reduction and reducing
road impact

IVECO

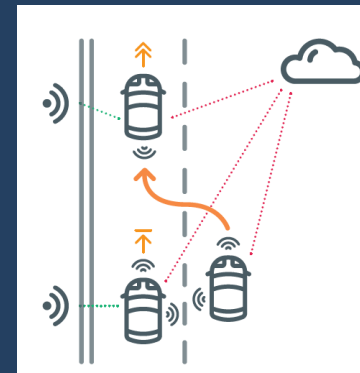
Synchronous
management of
acceleration and braking

Reduction of distances
between trucks

More safety



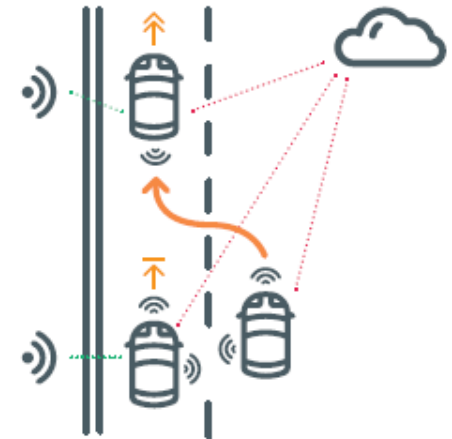
- V2V Communication using DSRC technology
- Dedicated protocol to exchange information on vehicle dynamics every 40 ms



Highway Chauffeur concept

Automated function, in which vehicles autonomously perform both the **side control** (lane) and the **longitudinal control** (speed, acceleration) in a motorway scenario

- Great potential in terms of **preventive safety**
- FCA cars receive localized and in real time updated information on:
 - the presence of cooperative vehicles and their manouver data
 - notifications on events (road works, stationary vehicles, adverse weather, etc.)
- V2X offers a **key support in relation to the Operational Design Domain**
- V2X messages are geo-referenced



Cross-border tests with Austria

both for Truck Platooning and Highway Chauffeur

“seamless driving” → interoperability

Tests with ITS-G5 and 4G LTE connection



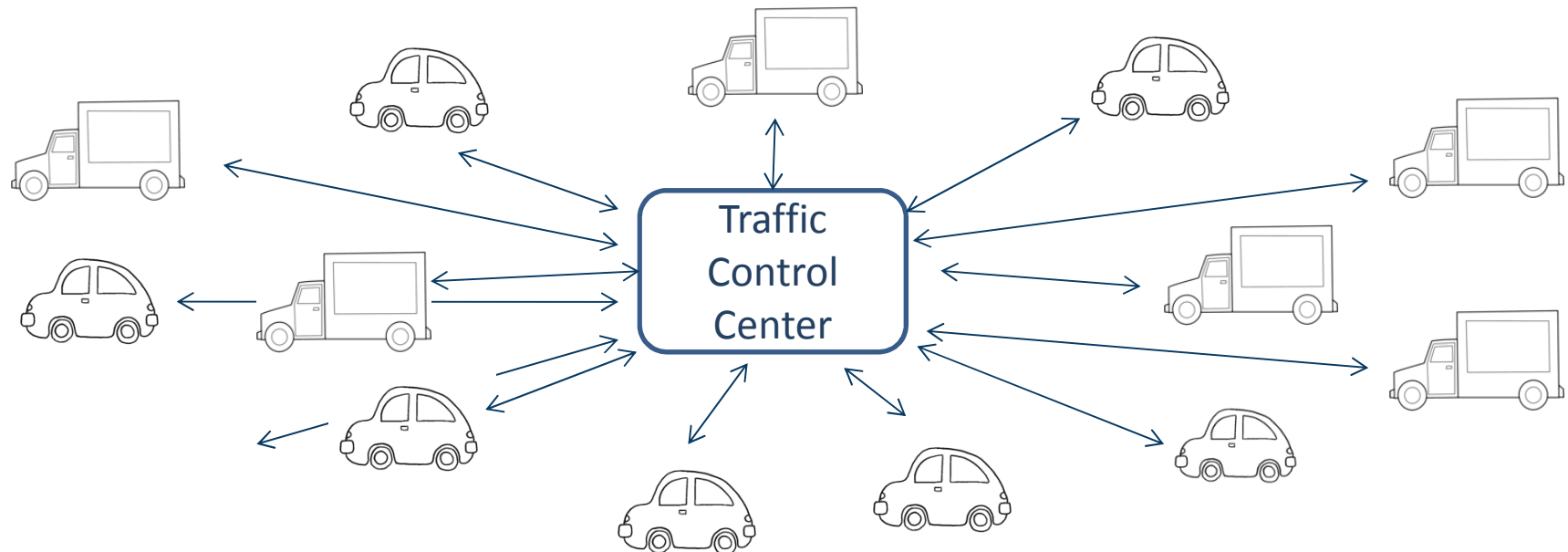
THE REAL CHALLENGE OF DIGITALIZATION

is not technology, but culture change



BENEFITS FOR ROAD OPERATORS

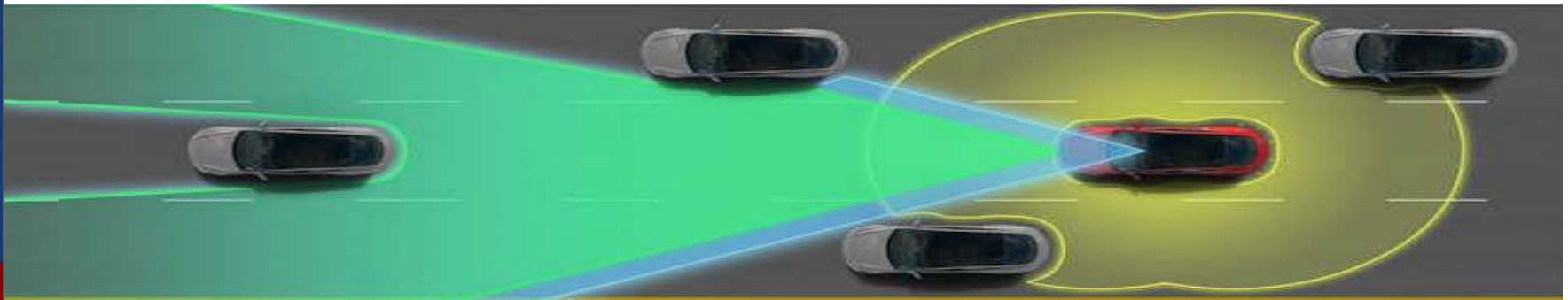
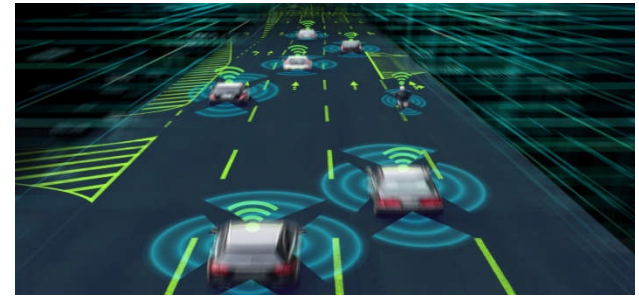
A higher number of data at disposal
because vehicles become mobile sensors



BENEFITS FOR ROAD OPERATORS



More data for a better
road management
efficiency



BENEFITS FOR ROAD OPERATORS

Real-time transmission of data along
the whole network

SAFETY

Human error is the cause of 93%
of all road accidents in the EU and
in 2018 25,100 people died on EU
roads



CHALLENGES FOR ROAD OPERATORS

- ☐ Synergy between all actors involved
- ☐ Rapidly provide accurate information
- ☐ Grant interoperability
- ☐ Change national norms (street codes)
- ☐ Cyber security issue
- ☐ Data ownership
- ☐ Data quality
- ☐ Easy and affordable access to digital solutions
- ☐ Fallback procedures to grant the performance of electronic systems in case of system breakdown
- ☐ Transition strategy

THE ITALIAN EXPERIENCE – THE SMART ROAD DECREE

Issued on February 28th, 2018 by the Italian Ministry of Infrastructure and Transport to define:

- which roads can be considered smart
- what rules there are to experiment on public roads

Establishment of an **Observatory** having the task to:

- monitor the impact of a smart road system
- take in charge and evaluate the authorization requests
- verify that the law is appropriate to such application and compliant to the technical norms
- keep a list of all Italian roads considered “smart” and update it



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