ADA
ADVANCED DATA ANALYTICS IN BUSINESS
CERTH CENTRE FOR RESEARCH & TECHNOLOGY HELLAS
SRPSKA ASOCIJACIJA MENADŽERA
Co-funded by the Erasmus+ Programme of the European Union

Hellenic Institute of Transport

Center for Research and Technology Hellas

Hellenic Institute of Transport

Web: www.hit.certh.gr

Advanced Data Analytics in business – 02/07/2019

Smart Cities of the Future

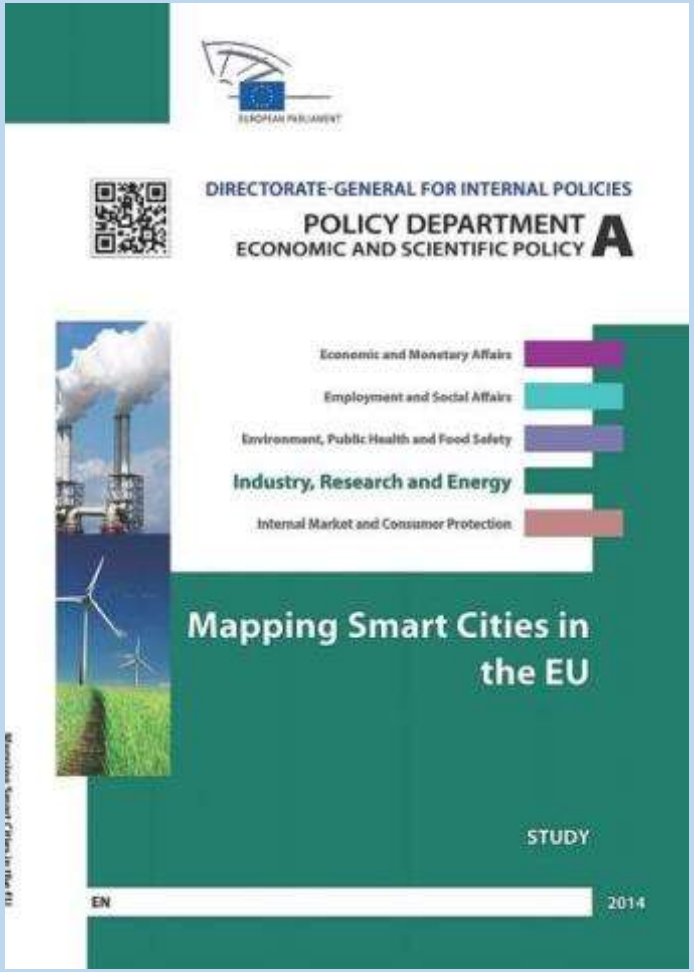
"The 19th century was a century of empires,

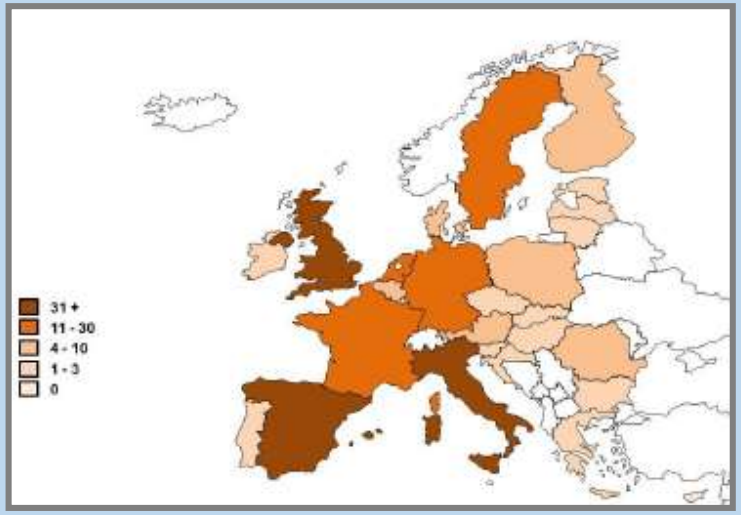
the 20th century was a century of nation states.

The 21stcentury will be a century of cities."

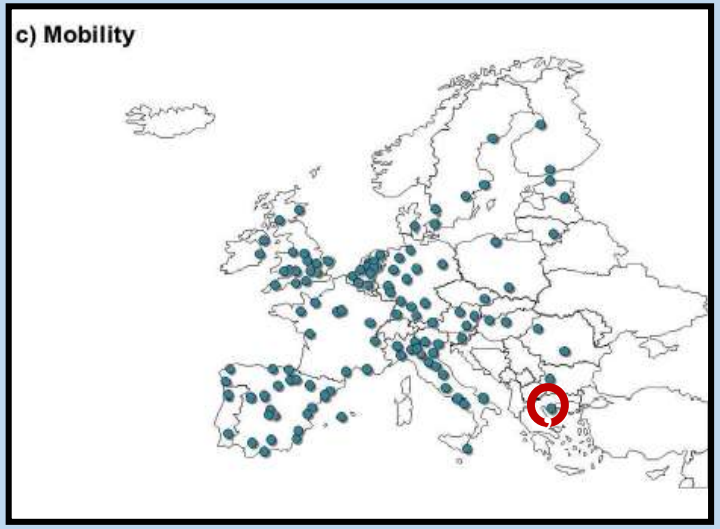
Wellington E. Webb, Former Mayor of Denver, Colorado

Thessaloniki is one of the smart cities in the EU-28



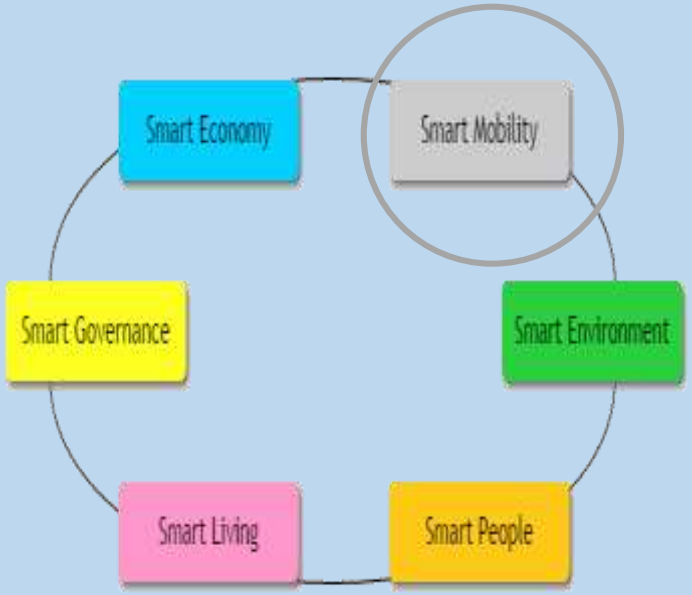


Number of smart cities per country



Strategy of THESSALONIKI SMART CITY

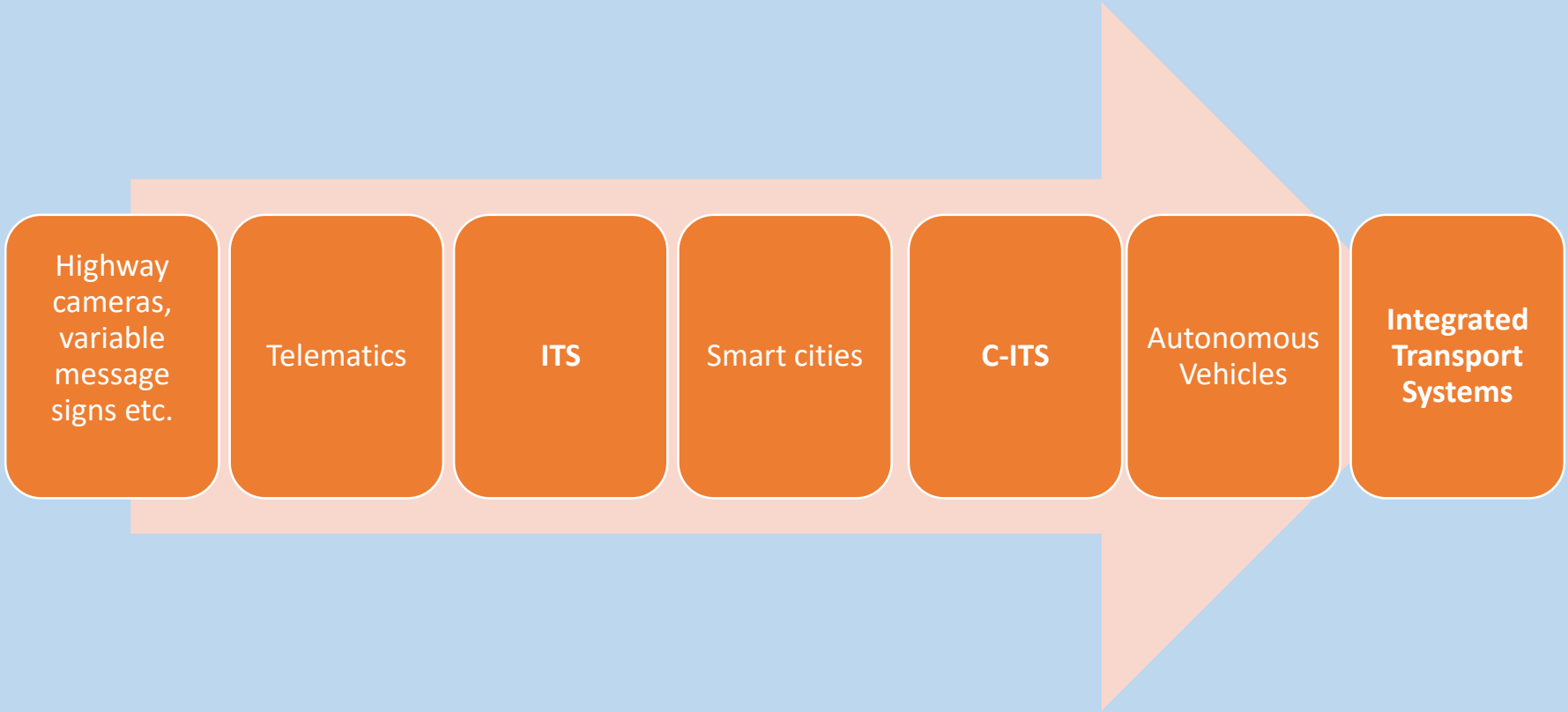
- COMMON efforts and services for added value
- EXCHANGE of knowledge, data and services
- Systems INTEGRATION & ecosystems DEVELOPMENT



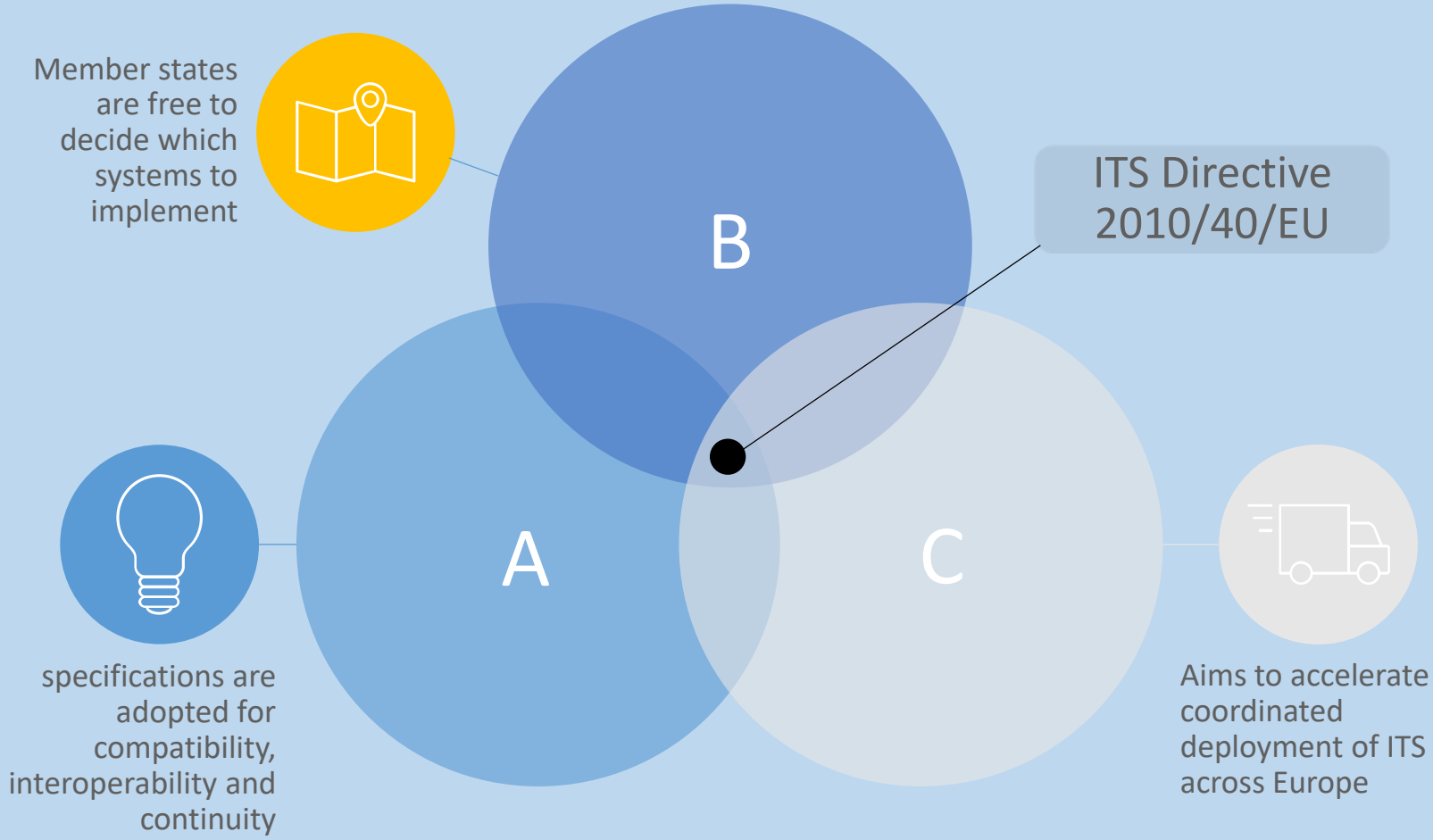
Our Future Mobility Now
JOIN. SHARE. CONNECT.

Intelligent Transport Systems

- *ITS are information and communication technologies applied to improve the **efficiency**, **robustness** and **safety** of transport*

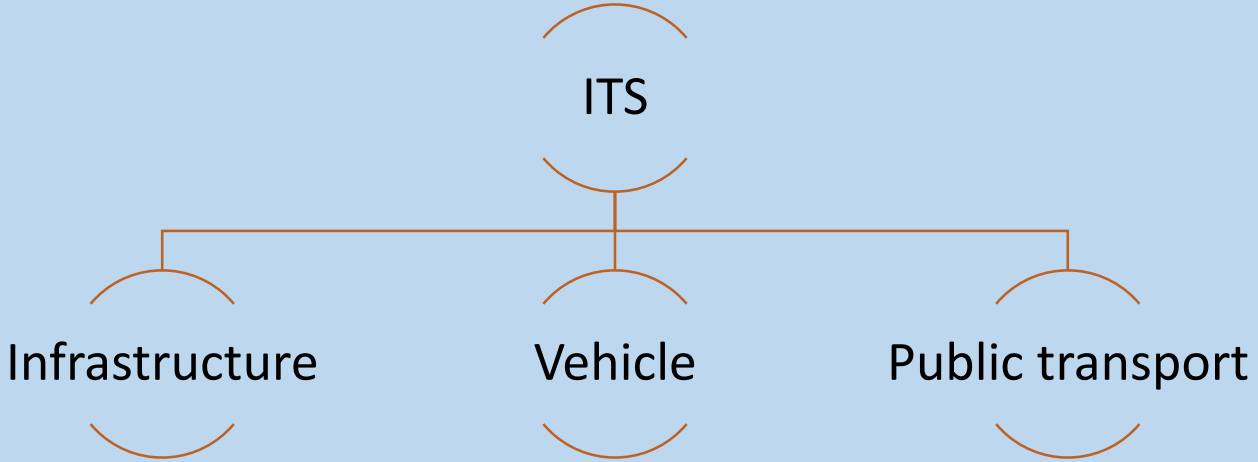


ITS in Europe

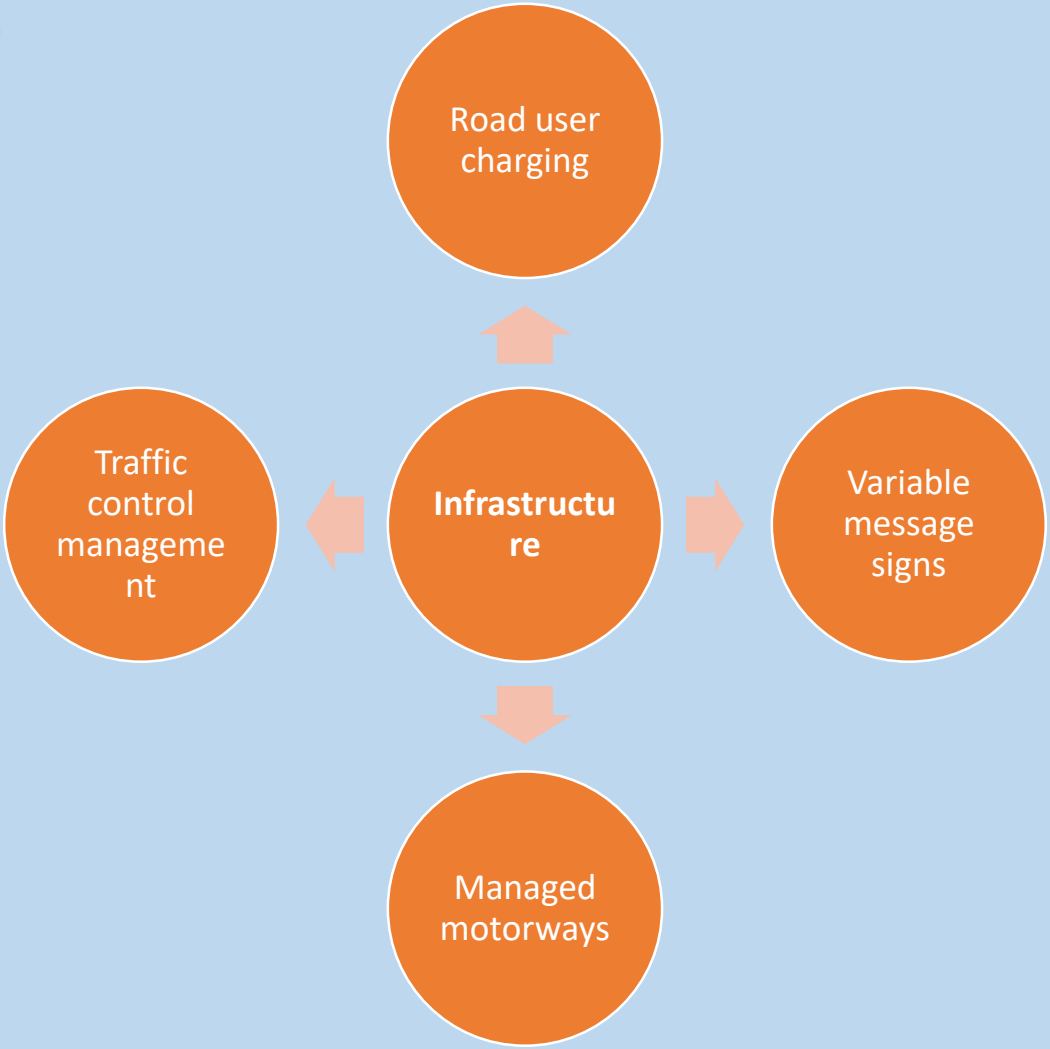


https://capital-project.its-elearning.eu/

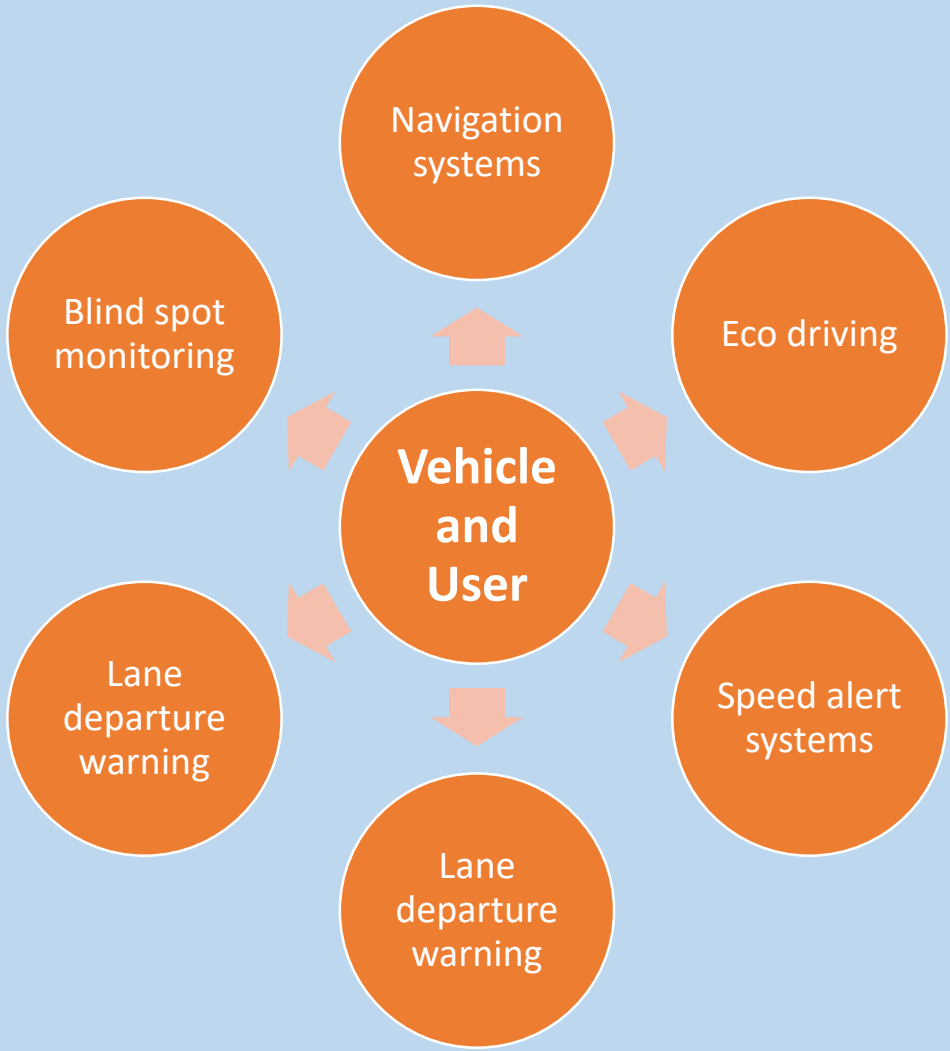
ITS categories



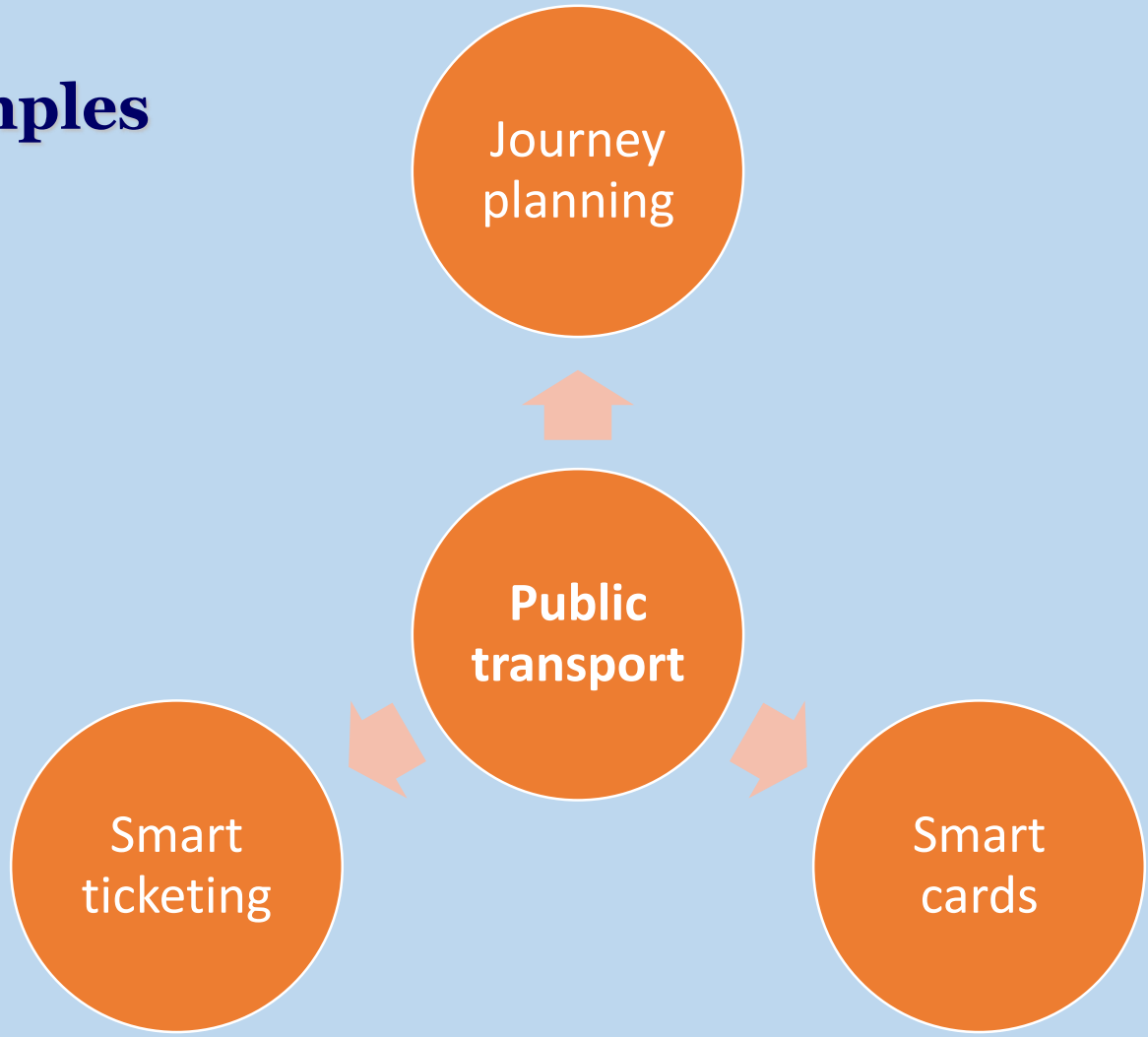
ITS examples



ITS examples

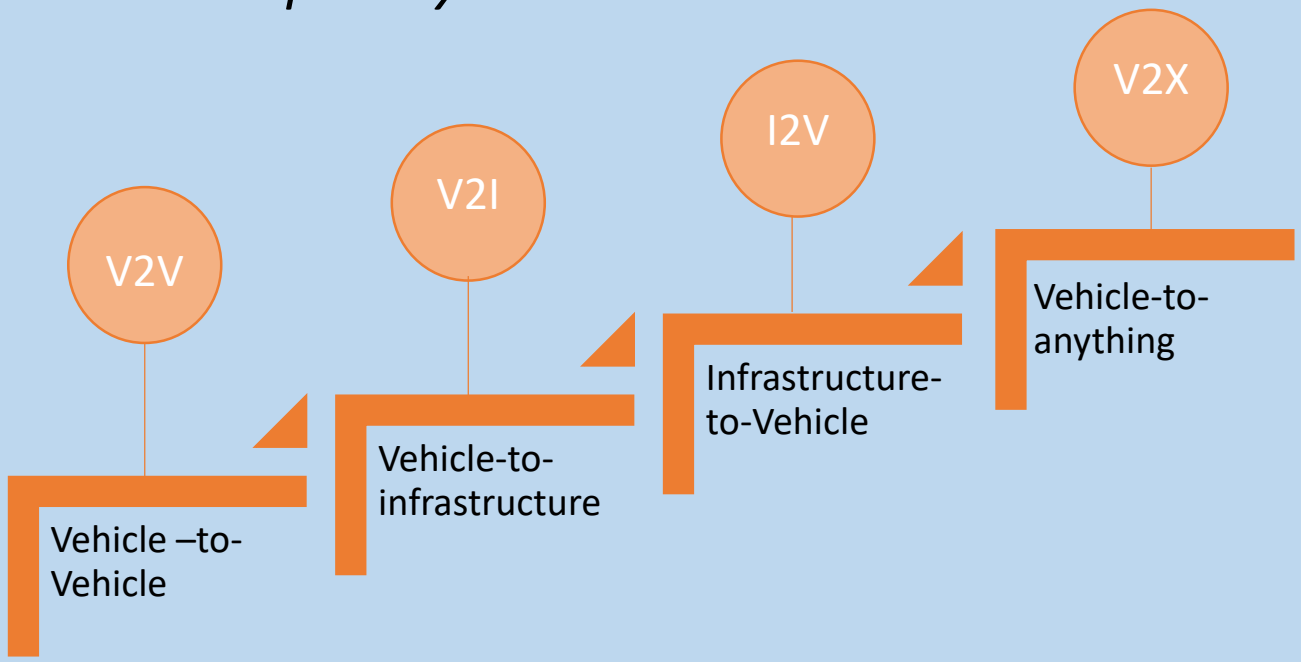


ITS examples

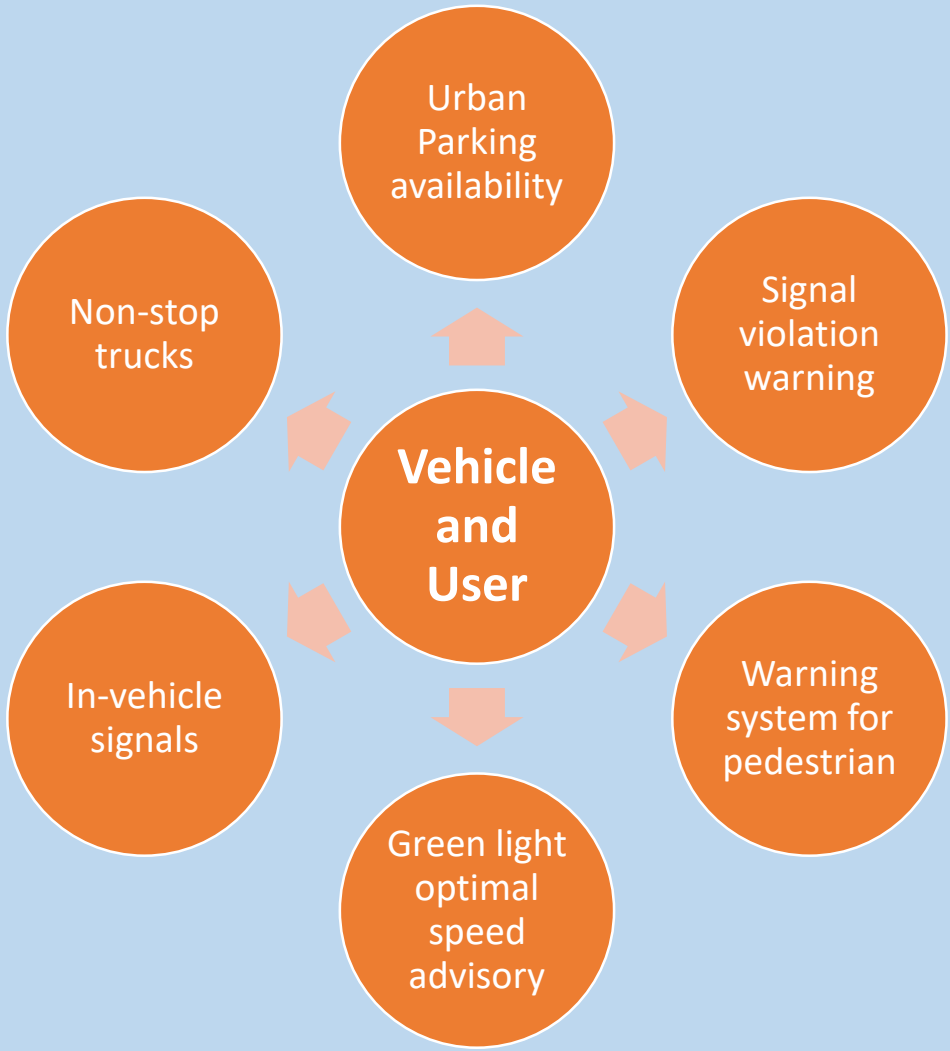


Cooperative Intelligent Transport Systems

- *C-ITS are information technologies (computer, communications etc.) that enable data exchange through wireless technologies so that vehicles can **connect and interact** with other vehicles, the infrastructure and users*
- *C-ITS provides a toolkit of solutions for a more secure, efficient and accessible transport system*



C-ITS examples

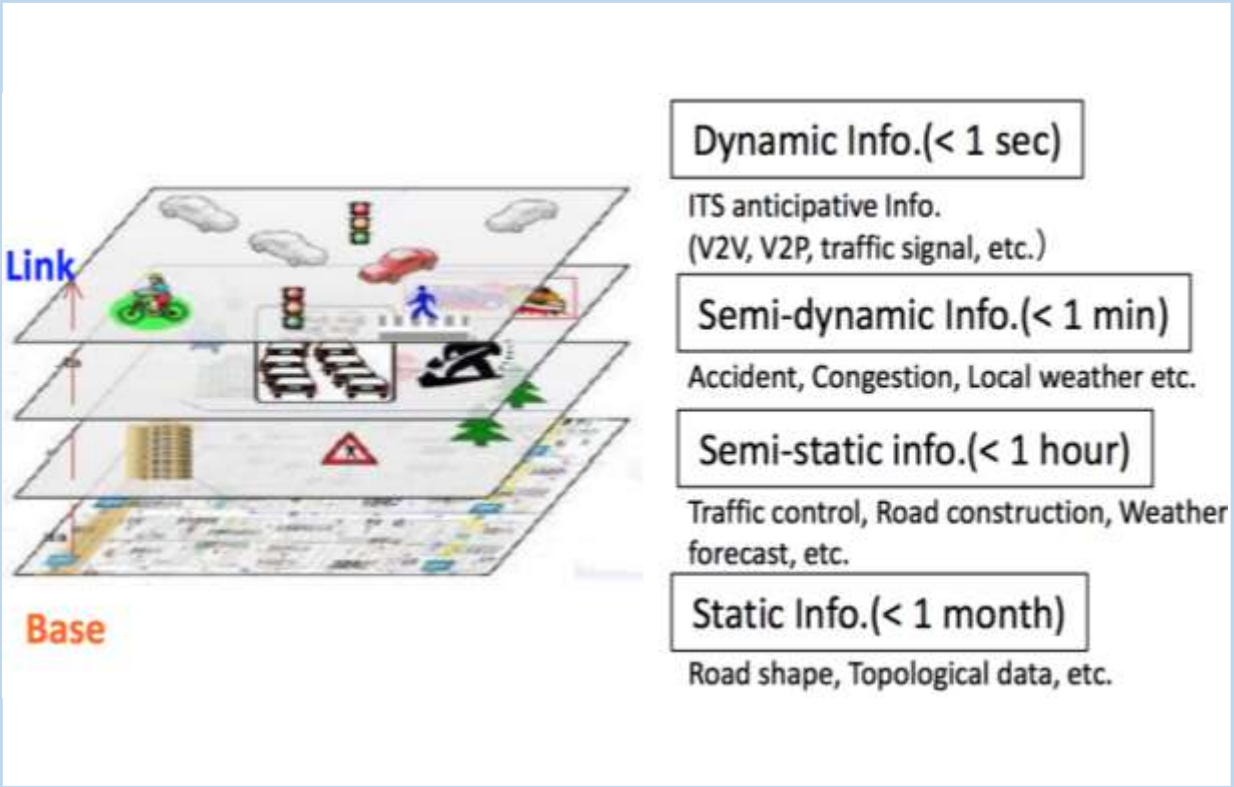


Cooperative Intelligent Transport Systems

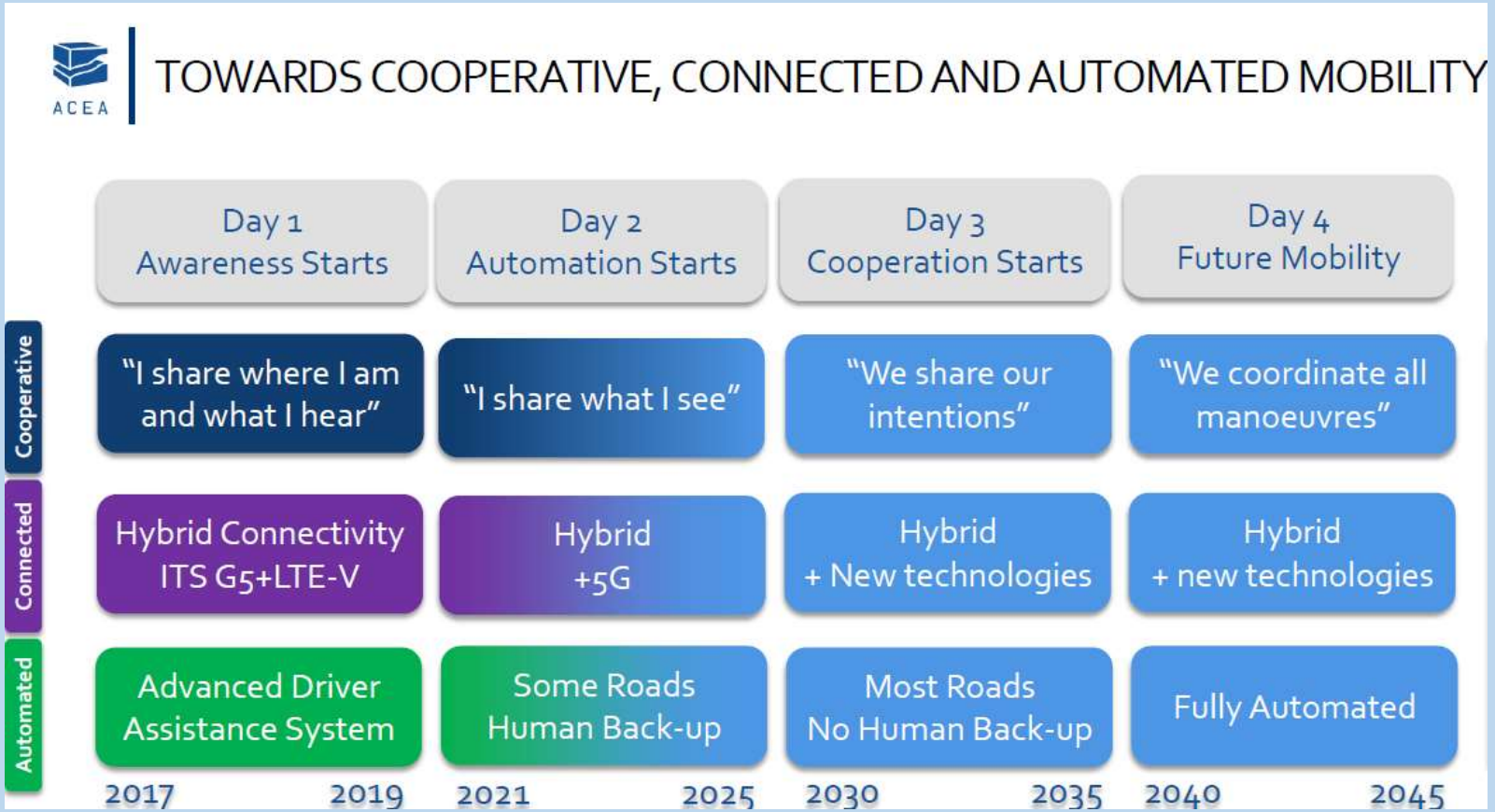
Main communication channels

- Dedicated Short Range Communication: 802.11p - G5
- LTE (Long Term Evolution): 4G - 5G

- Main messages (layers)
  - CAM
  - SPAT
  - TOPO/MAP
  - DENM



C-ITS in Europe



C-ITS in Europe

ACEA | TOWARDS COOPERATIVE, CONNECTED AND AUTOMATED MOBILITY

Day 1 Awareness Starts	Day 2 Automation Starts	Day 3 Cooperation Starts	Day 4 Future Mobility

Cooperative
Connected
Automated

List of Day1 services - Summary

Hazardous location notifications:

- Slow or stationary vehicle(s) & Traffic ahead warning
- Road works warning
- Weather conditions
- Emergency brake light
- Emergency vehicle approaching
- Other hazardous notifications

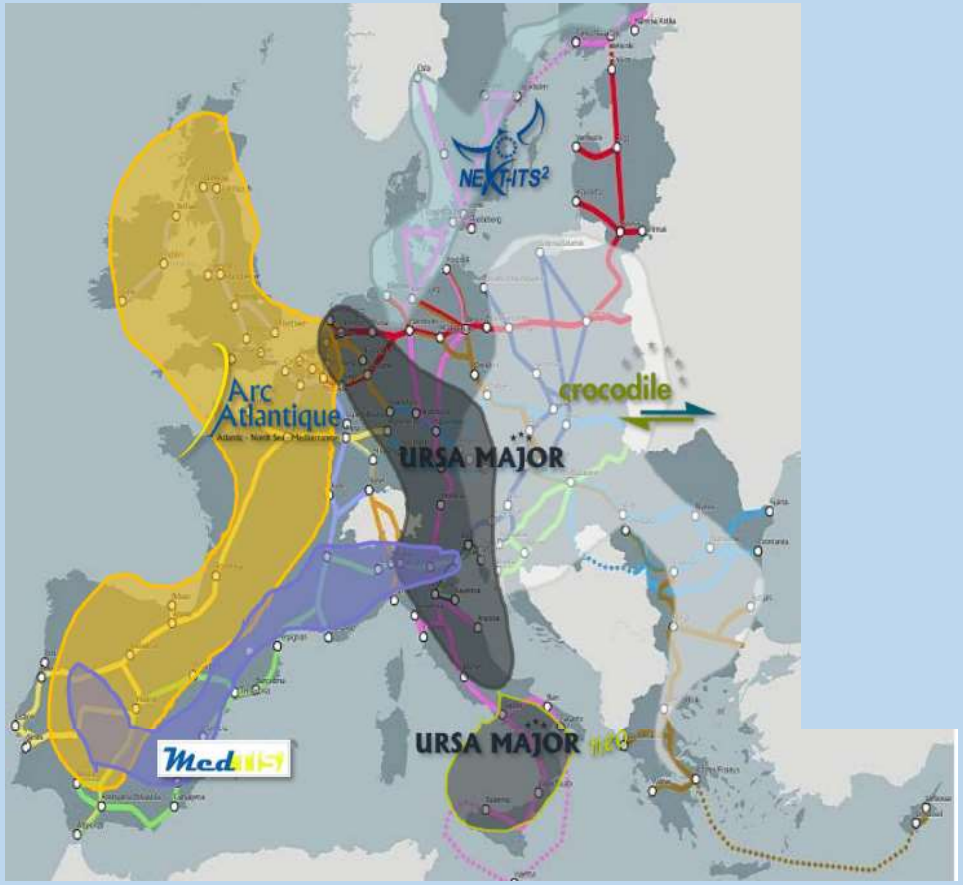
Signage applications:

- In-vehicle signage
- In-vehicle speed limits
- Signal violation / Intersection Safety
- Traffic signal priority request by designated vehicles
- Green Light Optimal Speed Advisory (GLOSA)
- Probe vehicle data: CAM Aggregation
- Shockwave Damping

Identified "Day 1,5 applications"

- **Information on fuelling & charging stations for alternative fuel vehicles**
- **Vulnerable Road user protection**
- **On street parking management & information**
- **Off street parking information**
- **Park & Ride information**
- **Connected & Cooperative navigation into and out of the city (1st and last mile, parking, route advice, coordinated traffic lights)**
- **Traffic information & Smart routing**

C-ITS in Europe



C-ITS in Europe

C-ROADS

- CEF 2015: 8 countries
- CEF 2016: + 9 countries
- CEF 2018: more countries to be added + C-roads 2 (urban)

	Austria	Belgium	Czech Republic	France	Germany	Hungary	Slovenia	Spain
Communication technologies used								
ETSI G5	X		X	X	X	X	X	X
Cellular Communication	X	X	X	X	X		X	X
DAB					X			
RDS							X	
WiFi and Bluetooth				X				
Day-1-services covered								
Emergency electronic brake light								X
Emergency vehicle approaching			X					X
Slow or stationary vehicle(s)	X	X	X	X	X			X
Traffic jam ahead warning	X	X	X	X	X	X	X	X
Hazardous location notification	X	X	X	X		X	X	X
Road works warning	X	X	X	X	X	X	X	X
Weather conditions	X	X	X	X		X	X	X
In-vehicle signage	X		X	X	X	X	X	X
In-vehicle speed limits	X					X	X	X
Probe vehicle data	X		X	X	X		X	X
Shockwave damping		X			X			X
Green Light Optimal Speed Advisory (GLOSA) / Time To Green (TTG)	X			X	X			X
Signal violation/intersection safety	X		X					X
Traffic signal priority request by designated vehicles								X

C-ITS in Europe

Technology / Innovation Element	Current TRL	Target TRL	Barcelona	Bilbao	Bordeaux	Copenhagen	Newcastle	North Brabant	Thessaloniki	Vigo
Bundle 1: urban efficiency										
a.Rest time management	**8-9**	**9**		x	x			x		
b.Motorway parking availability	**8-9**	**9**		x	x			x		
c.Urban Parking availability	**7**	**9**		x	x					
Bundle 2: infrastructure-to-vehicle safety										
a.Road works warning	**8**	**9**	x	x	x	x	x	x	x	x
b.Road hazard warning (incl. traffic jams)	**7-8**	**9**	x	x	x	x	x	x	x	x
c.Emergency Vehicle Warning	**7-8**	**8-9**	x		x			x	x	x
d.Signal Violation Warning	**5**	**7**	x		x			x	x	x
e.Warning system for pedestrian (not limited to crossings)	**5**	**6-7**	x		x	x	x	x	x	x
Bundle 3: traffic efficiency										
a.Green priority	**7**	**9**	x		x	x	x	x	x	x
b.Green light optimal speed advisory / Dynamic eco-driv	**6-7**	**8-9**	x		x	x	x	x	x	x
c.Cooperative traffic light for pedestrian	**5**	**6-7**	x		x	x		x	x	
d.Flexible infrastructure (HOV, peak-hour lanes)	**5-6**	**7-8**	x		x		x		x	
e.In-vehicle signage (e.g. Dynamic speed limit)	**5-6**	**7-8**	x		x		x		x	x
f.Mode & trip time advice (e.g. by incentives)	**7**	**8**	x		x				x	
g.Probe Vehicle Data	**6**	**8**	x		x		x		x	x
Bundle 4: vehicle-to-vehicle safety										
a.Emergency Brake Light	**7-8**	**8-9**			x					x
b. Cooperative (Adaptive) cruise control (Urban ACC)	**5-6**	**7-8**			x			x		x
c.Slow or Stationary Vehicle Warning	**7-8**	**8-9**			x					x
d.Motorcycle approaching indication (including other VRUs)	**6-7**	**7-9**			x			x		x
e.Blind spot detection / warning (VRUs)	**5**	**6-7**		x	x		x	x		

C-MOBILE

Accelerating C-ITS Mobility Innovation and depLoyment in Europe

C-ITS in Europe

Technology / Innovation Element	Current TRL	Target TRL	Barcelona	Bilbao	Bordeaux	Copenhagen	Newcastle	North Brabant	Thessaloniki	Vigo
Bundle 1: urban efficiency										
a.Rest time management	8-9	9		x						
b.Motorway parking availability	8-9	9		x						
c.Urban Parking availability	7	9		x						
Bundle 2: infrastructure-to-vehicle safety										
a.Road works warning	8	9	x	x						x
b.Road hazard warning (incl. traffic jams)	7-8	9	x	x						x
c.Emergency Vehicle Warning	7-8	8-9	x							x
d.Signal Violation Warning	5	7	x							x
e.Warning system for pedestrian (not limited to crossings)	5	6-7	x							x
Bundle 3: traffic efficiency										
a.Green priority	7	9	x							x
b.Green light optimal speed advisory / Dynamic eco-driv	6-7	8-9	x							x
c.Cooperative traffic light for pedestrian	5	6-7	x							
d.Flexible infrastructure (HOV, peak-hour lanes)	5-6	7-8	x							
e.In-vehicle signage (e.g. Dynamic speed limit)	5-6	7-8	x							x
f.Mode & trip time advice (e.g. by incentives)	7	8	x							
g.Probe Vehicle Data	6	8	x							x
Bundle 4: vehicle-to-vehicle safety										
a.Emergency Brake Light	7-8	8-9								x
b. Cooperative (Adaptive) cruise control (Urban ACC)	5-6	7-8								x
c.Slow or Stationary Vehicle Warning	7-8	8-9								x
d.Motorcycle approaching indication (including other VRUs)	6-7	7-9								x
e.Blind spot detection / warning (VRUs)	5	6-7		x						

C-MOBILE

Accelerating C-ITS Mobility Innovation and depLoyment in Europe

Thank you!

Dr. Josep Maria Salanova Grau jose@certh.gr +30 2310 498 433

Dr. Georgia Aifandopoulou gea@certh.gr +30 2310 498 457