

THE FUTURE OF ROAD TRANSPORT

IMPLICATIONS OF AUTOMATED, CONNECTED,
LOW-CARBON AND SHARED MOBILITY

Global Forum for Road Traffic Safety
Stockholm – 18 February 2019

Presenter: B. Ciuffo

Road transport challenges

Under current trends,
road transport and **private cars**
remain dominant



If no action is taken,
the **challenges** faced in road
transport will get even harder

45-100h in congestion
1-2% EU GDP

productivity
losses

>25.000 deaths
1 Million injured

accidents
and fatalities

air **pollution**

Main source of urban
pollution with heating and
2nd source of GHG emissions

Transport is the only
sector with increasing
GHG emissions



European
Commission

Addressing road transport challenges

Addressing road transport challenges to achieve sustainable development goals



New technologies to make road transport more efficient, safer, cleaner and more sustainable

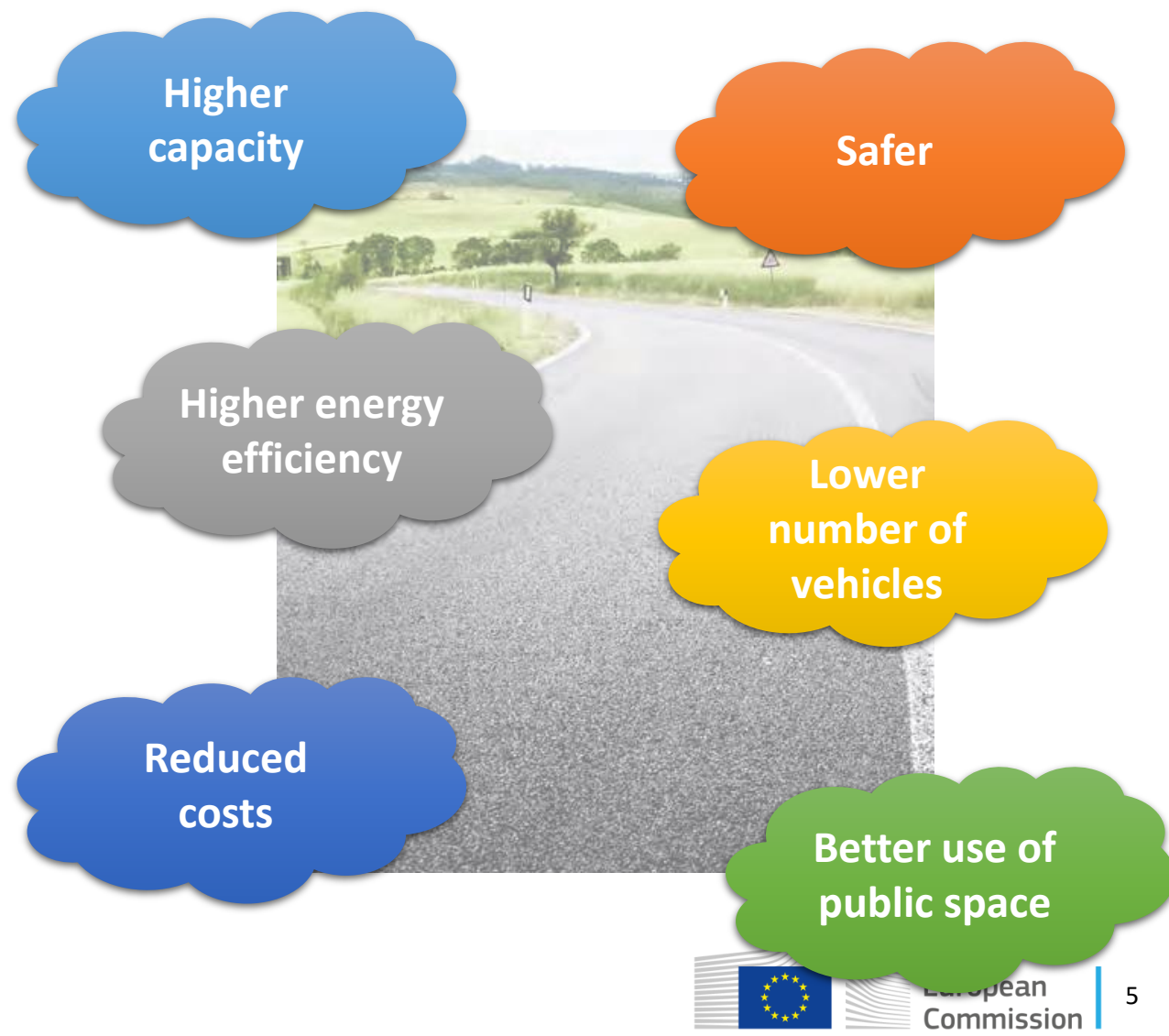
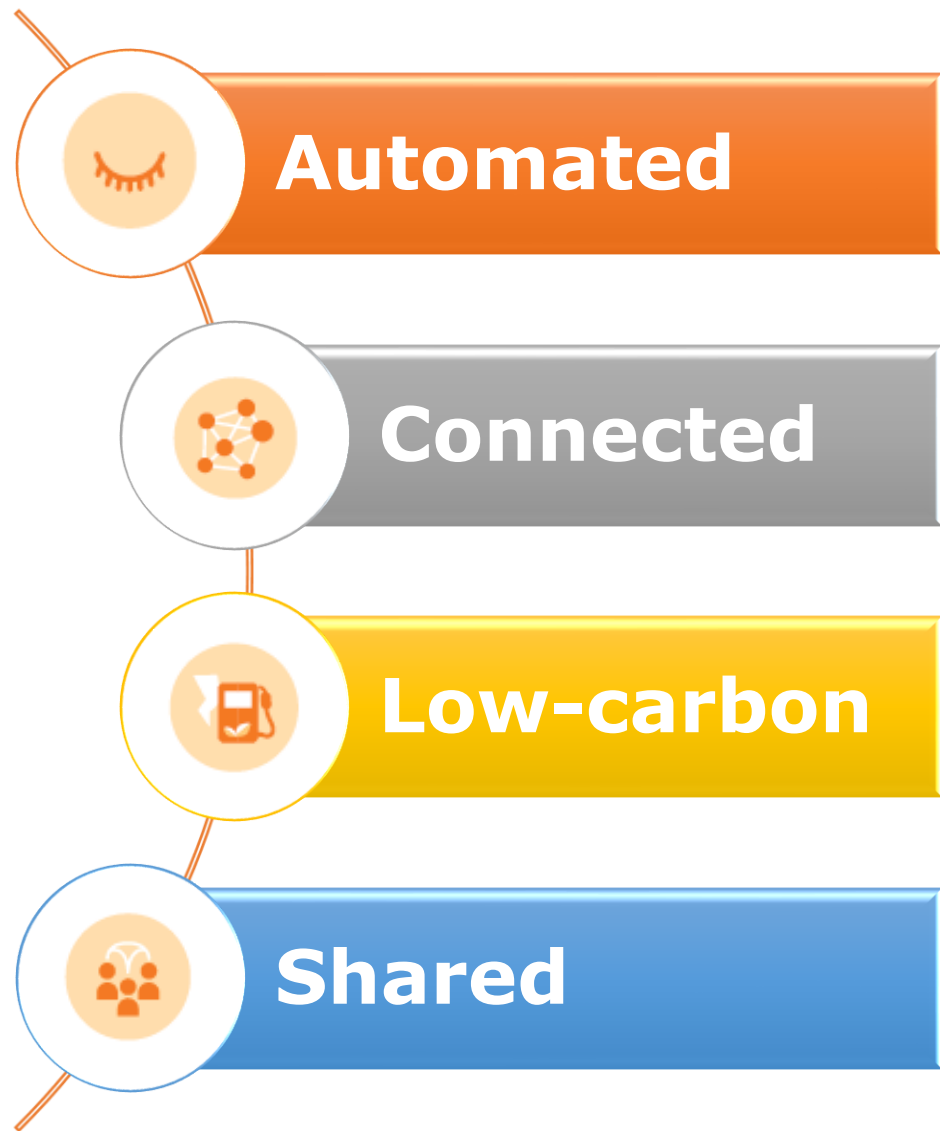
Disrupting transport



A storm of new technologies and business models is transforming everything about how we get around and how we live our lives



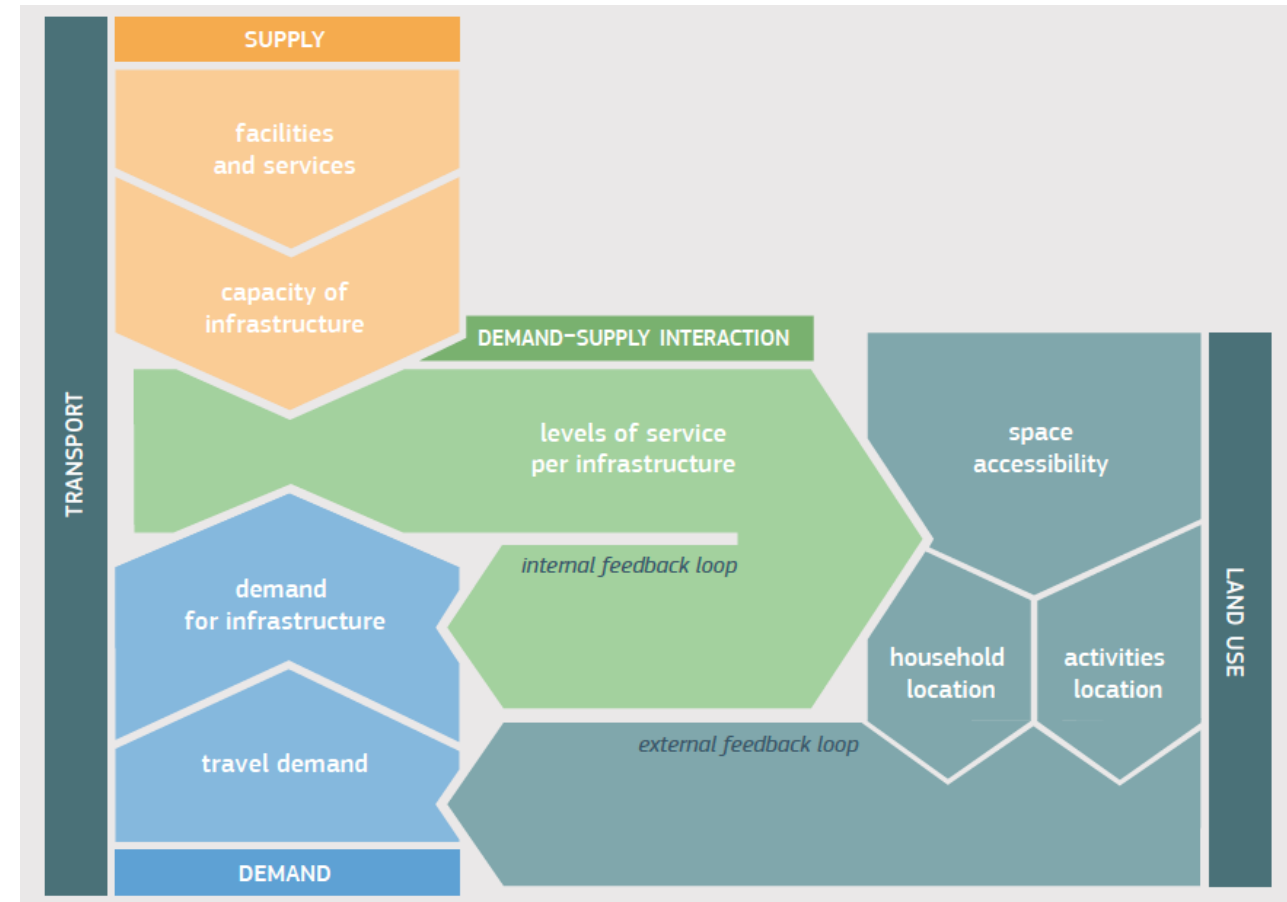
Main trends in road transport



Transport complexity

Transport systems are «**internally complex systems**, made up of many elements influencing each other both directly and indirectly, often nonlinearly, and with many **feedback cycles**»*.

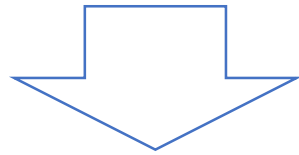
Transport policies have **implications** for the **economy, land use, environment, quality of life, and social cohesion**. In this respect, they have a «bearing on many, often conflicting, interests»*



Implications of transport complexity

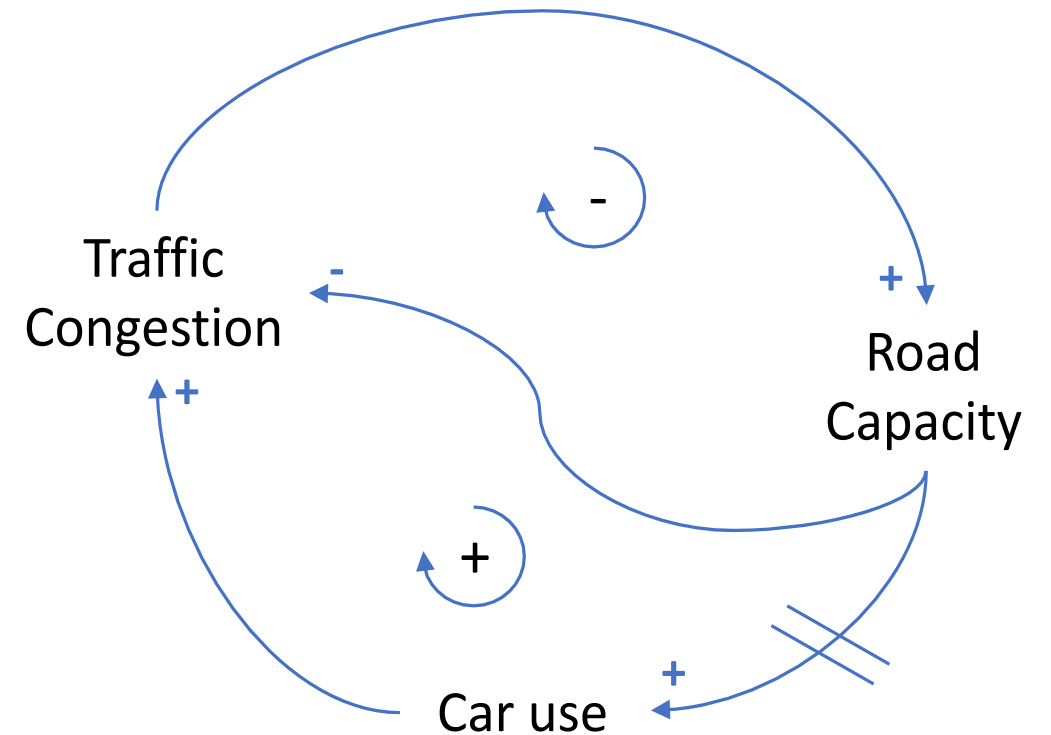
Higher capacity

- **Braess' paradox:**
 - "it is indicated [...] that an extension of the road network may cause a redistribution of the traffic that results in longer individual running times"



**Increase in road capacity does
not necessarily lead to better
traffic conditions!**

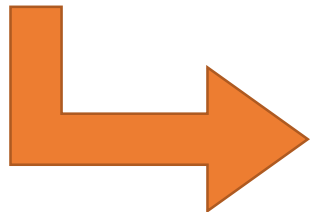
"Fixes that fail" archetype



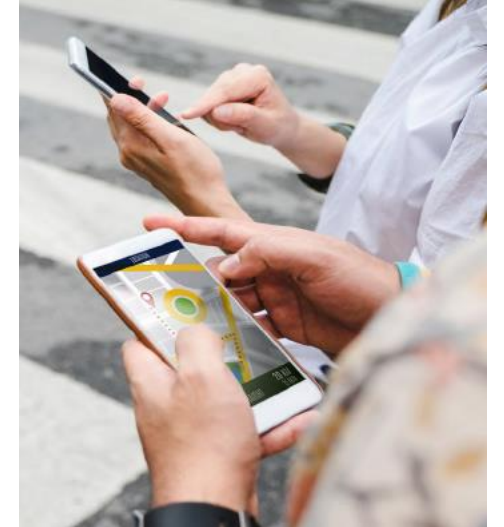
Implications of transport complexity

Lower number of vehicles

- Ride-hailing and car-sharing services are **increasing vehicles' use and congestion**
 - ~50% of trips “would not have been made at all, or made by walking, biking, or transit”*
- AVs may **generate new demand** of mobility from currently underserved population
- AVs will make **travel experience more comfortable and cheaper**



Considerable risks that **road traffic will eventually increase**

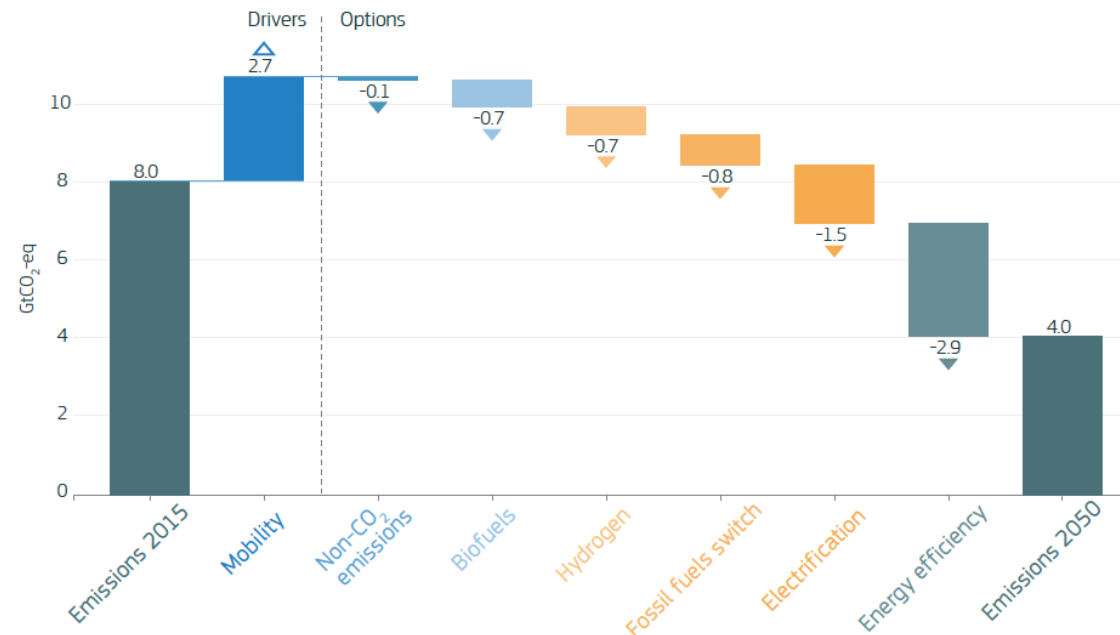


* Clewlow and Mishra, 2017

Implications of transport complexity

Higher energy efficiency

- Under current transport evolution trends, **alternative fuels** and increase in **vehicles energy efficiency** can reduce CO2 emissions from transport by 50%* or even more**



- **What's the effect of increased transport activities?**
 - **Overall energy consumption may increase by up to 30%*****

* Keramidas et al., 2018

** Krause et al., 2019

*** Taiebat et al., 2019

Road transport in the future of mobility

- A cheaper, more comfortable, more efficient, more accessible and more flexible road transport will remain the **dominant mode in the decades to come**

Is this the future of road transport we have in front of us?



NEW TECHNOLOGIES ALONE ARE NOT THE SOLUTION

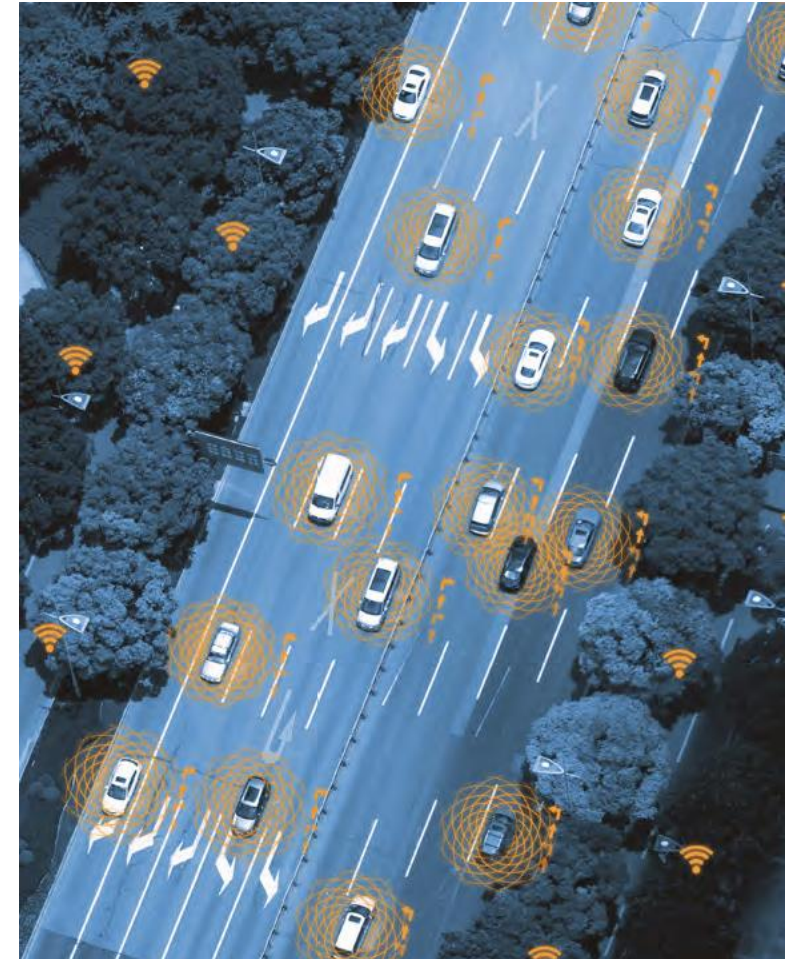


Addressing transport complexity



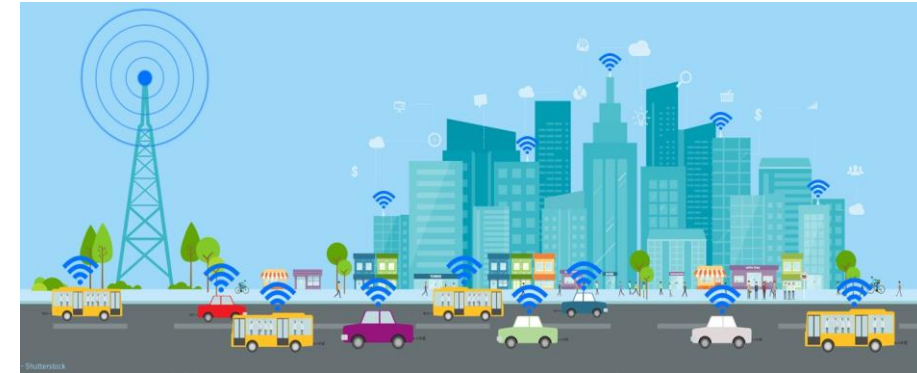
New transport governance

- Connectivity and automation open the way to new governance of road transport **as they enable a better management of the demand/supply interaction**
- **Publicly orchestrated central platforms** may define **principles of accessing the road** and **routing vehicles** in order to e.g.
 - **Maintain transport efficiency high**
 - **Control energy consumption**



Social Wardrop equilibrium

- **J. G. Wardrop (1952): a central authority could distribute vehicles over the road network reducing overall travel times of about **50%** compared to today's **selfish equilibrium****
 - Instead of **central authorities**, a **central platform** can be used
- Added value
 - Reduce **over-reliance** perception of road transport
 - Allow **better use of the different transport modes** and opportunities

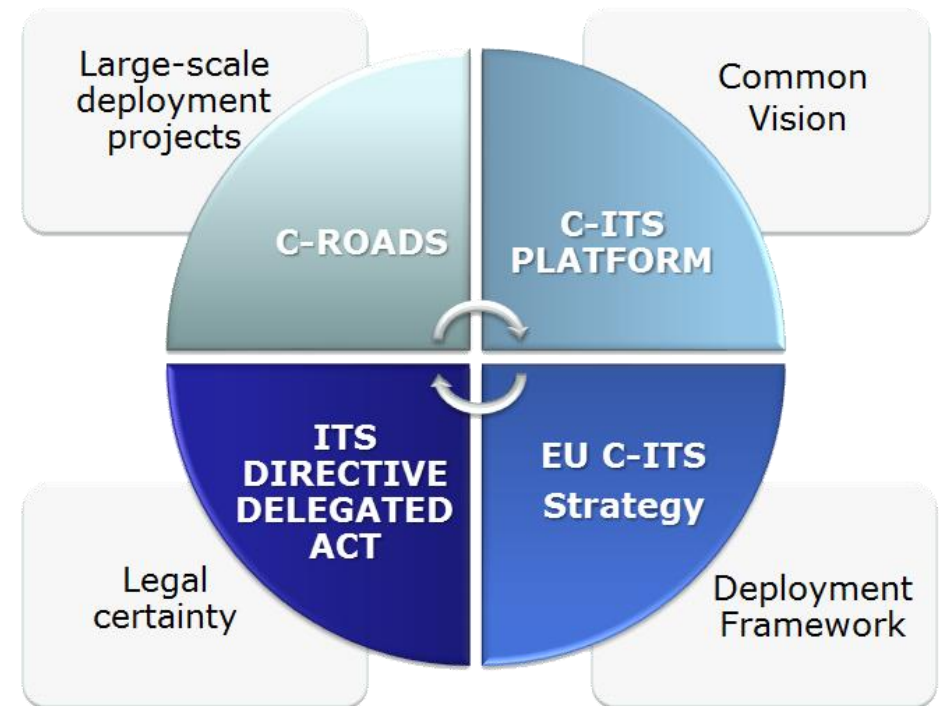


UPGRADED TRANSPORT SYSTEM AND POLICIES



COM(2018) 283: Connected,
Cooperative and Automated
Mobility

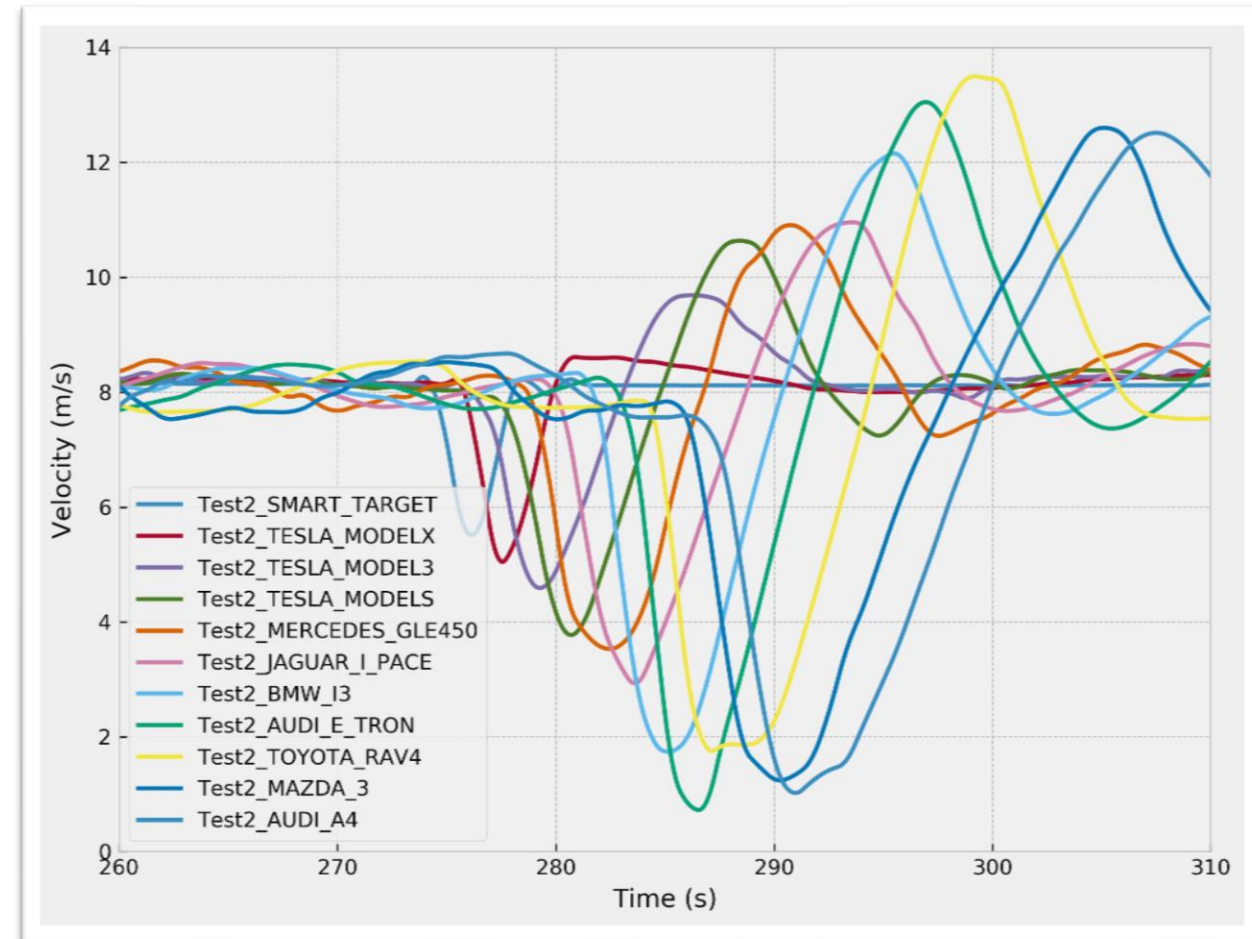
**C-ITS Platform (EC, 2017):
Public authorities as
«Orchestra Conductor»**



Lack of governance and risks for safety

The ACC case

- For 20 years **Adaptive Cruise Control** has promised to solve traffic instability and increase safety
- Driven by user's **comfort** and not considering **streams effect**, commercial ACCs make **traffic unstable with strong safety implications**
- Automation technologies require **vehicles to take traffic phenomena into account**





Citizens' perspective

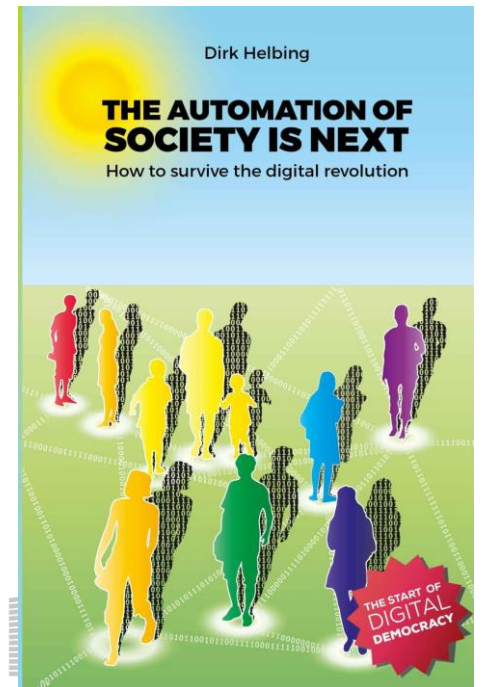


Restrictions to road use often generate heated public debates

How can we involve citizens from the beginning?

Attention is needed not to introduce risks to democracy, privacy, equity

[...]«is the automation of road transport just the first experiment in preparation for automating the society as a whole?»



THE LIVING LAB CONCEPT



- Controlled and independent environment
- **Technology performance** + user feedback
- Involvement of **users**, not just researchers
- **Complex real-life environment** close to the real research setting, (bad weather, human errors)
- **Facilitates co-creation, co-design** with all stakeholders



Living Labs at the JRC!

Call for expressions of interest - Pilot living labs at the JRC

Living labs are a modern way of creating user-centred environments that enable innovation, co-creation and start-up development.

We launch a call for expressions of interest to co-create living labs in two of our research sites [Ispra, Italy](#) and [Petten, the Netherlands](#) for smart city solutions.

Future mobility solutions in Ispra encompassing

- ad-hoc shared rides
- door-to-door automated delivery
- vehicle connectivity and communication (V2X)
- automated shuttle, robo-taxi
- clean vehicle solutions

Digital energy solutions in Ispra and Petten encompassing

- smart meters, sensors and devices to collect energy and well-being data
- ICT infrastructure

Related topics

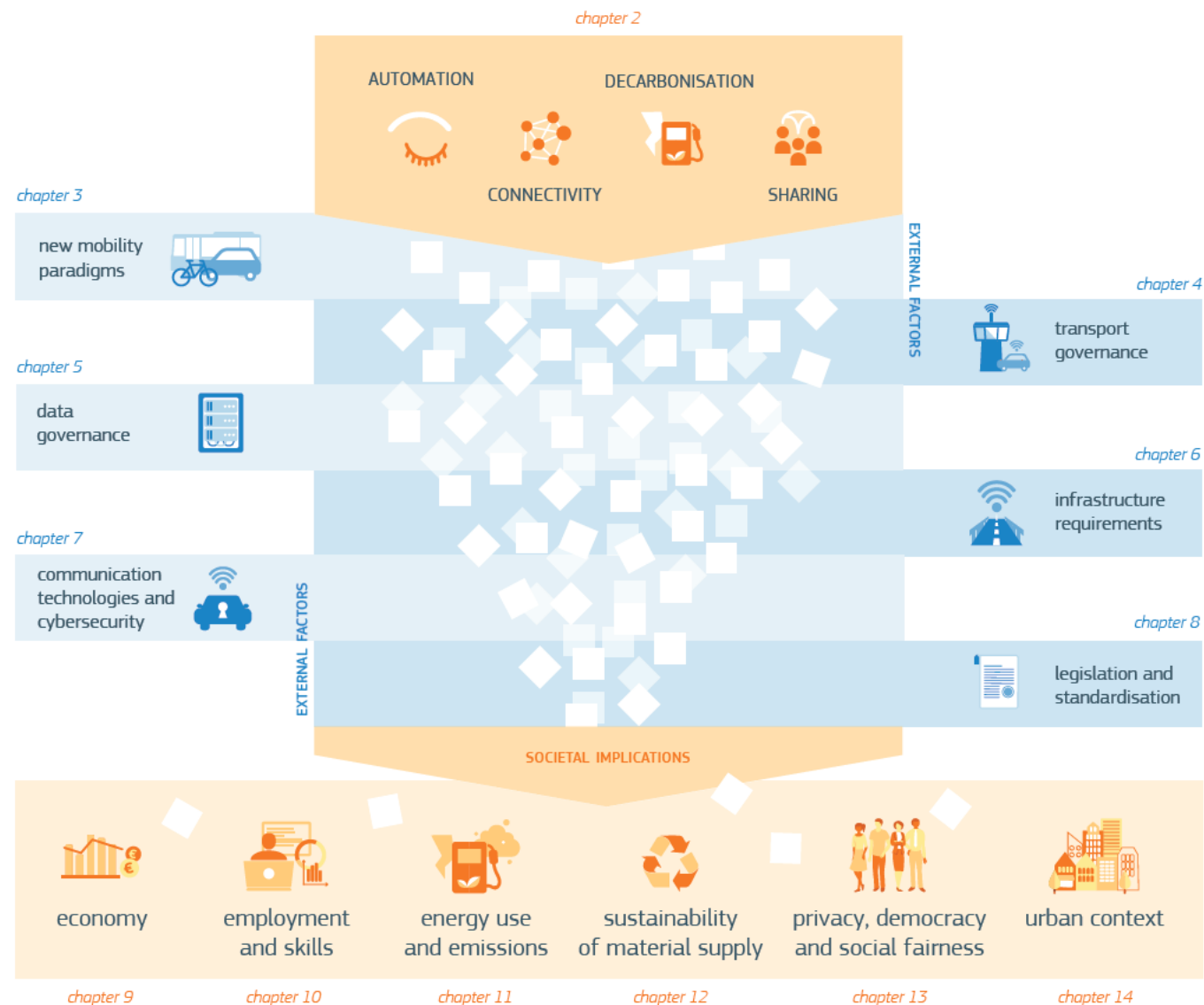
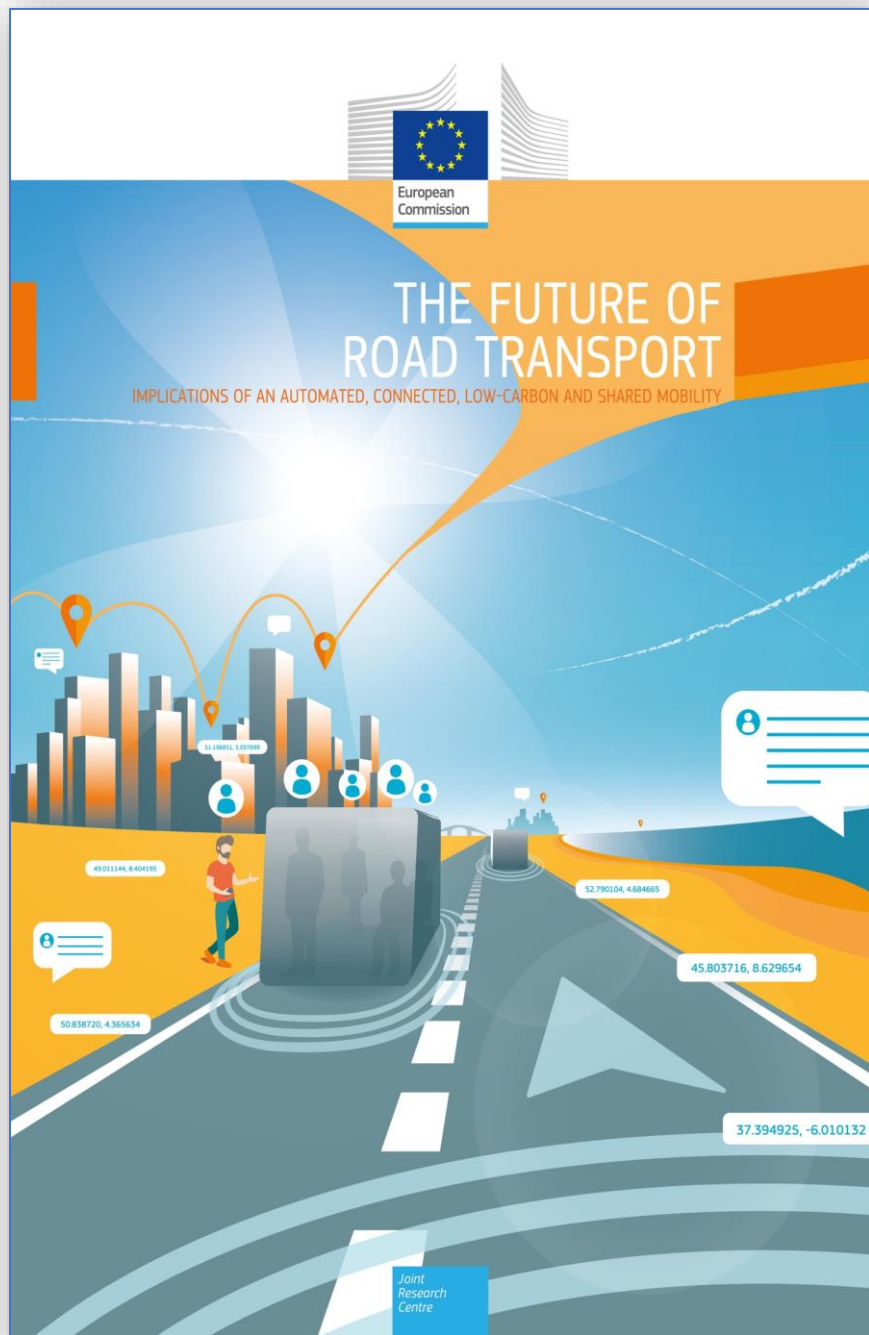
[Energy efficiency](#)
[Energy security, distribution and markets](#)
[Energy technology & innovation](#)
[Renewable energy](#)
[Sustainable transport and fuels](#)
[Transport safety and security](#)
[Transport sector economic analysis](#)



JRC Ispra as living lab for future mobility solutions

- Main characteristics:
 - Fully-fenced **170ha site**
 - ~**2.500** staff+visitors
 - **>100** buildings
 - **37km** of internal roads
 - Special **environmental** conditions
 - Advanced scientific **infrastructure** in transport/energy/communication field
 - **Private car** as main mobility option





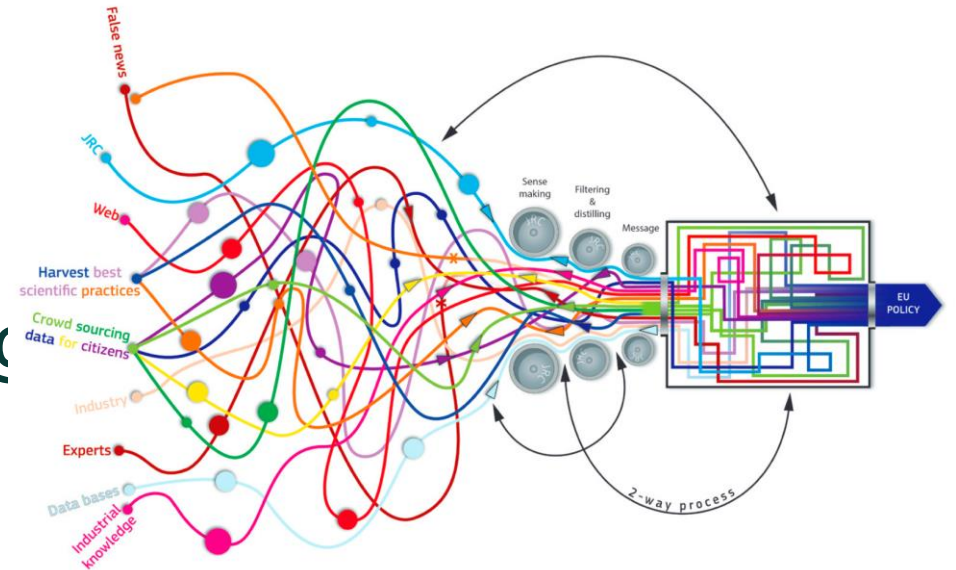
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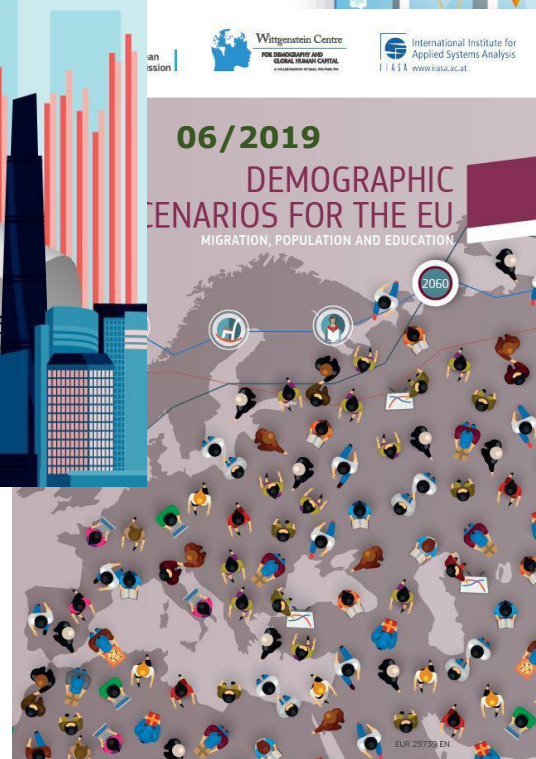
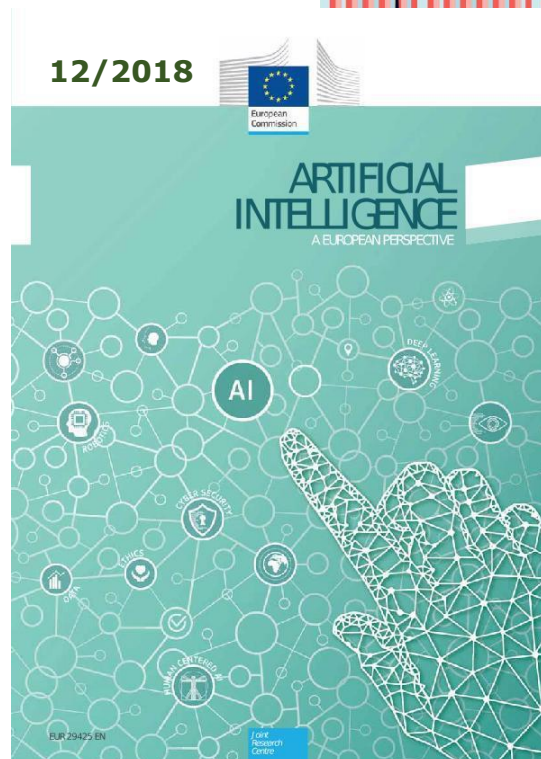
<https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/future-road-transport>



The JRC “flagship” report series

- An example of the **anticipatory and analytical capacity** of the JRC to understand the possible **wide implications of global transformative trends** that will challenge the EU in the years to come.
- The **need for governance**, the importance of **rebuilding trust**, **ensuring sustainability**, and investing in the EU's competitiveness at global level **core challenges the EU will have to face in the near future**





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LOW-CARBON AND SHARED MOBILITY



45.803716, 8.629654



Thanks

Questions?

You can contact me at **Biagio.CIUFFO@ec.europa.eu**

Stay in touch!



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