Road transport challenges

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

- 45-100h in congestion
- 1-2% EU GDP
- >25,000 deaths
- 1 Million injured

**productivity losses**

**accidents** and fatalities

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

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

**Transport is the only sector with increasing GHG emissions**
Addressing road transport challenges to achieve sustainable development goals

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

- Automated
- Connected
- Low-carbon
- Shared

- Higher capacity
- Safer
- Higher energy efficiency
- Lower number of vehicles
- Reduced costs
- Better use of public space
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»*

* Cascetta, 2009
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!

* Braess, 1968

“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
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

unbalanced service provision

uncoordinated competition

traffic

emissions

energy use

demand

lack of leadership
New Governance

• Cooperation of all actors
• Coordination by public
• System rather than «selfish» perspective

Living Labs

• Technology and users interaction
• Real-life environment
• Co-creation and Co-design
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
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

POLICYMAKING

- regulating road access
- routing coordination
- upgrading public transport
- promoting more sustainable transport modes

#MobilityEU #Facts4EUFuture
EC Strategy

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**
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
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
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
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.
Thanks

Questions?
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