Impact assessment

Potential business and societal impacts of the systems and applications demonstrated

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Main objectives of impact assessment

Evaluation of impacts of seamless service provisioning across borders from a socio-economic perspective

- Potential impacts on **quality of life**, in terms of
  - personal mobility,
  - traffic efficiency,
  - traffic safety and
  - the environment
- **Costs and benefits** of 5G-MOBIX solutions from the perspectives of the society

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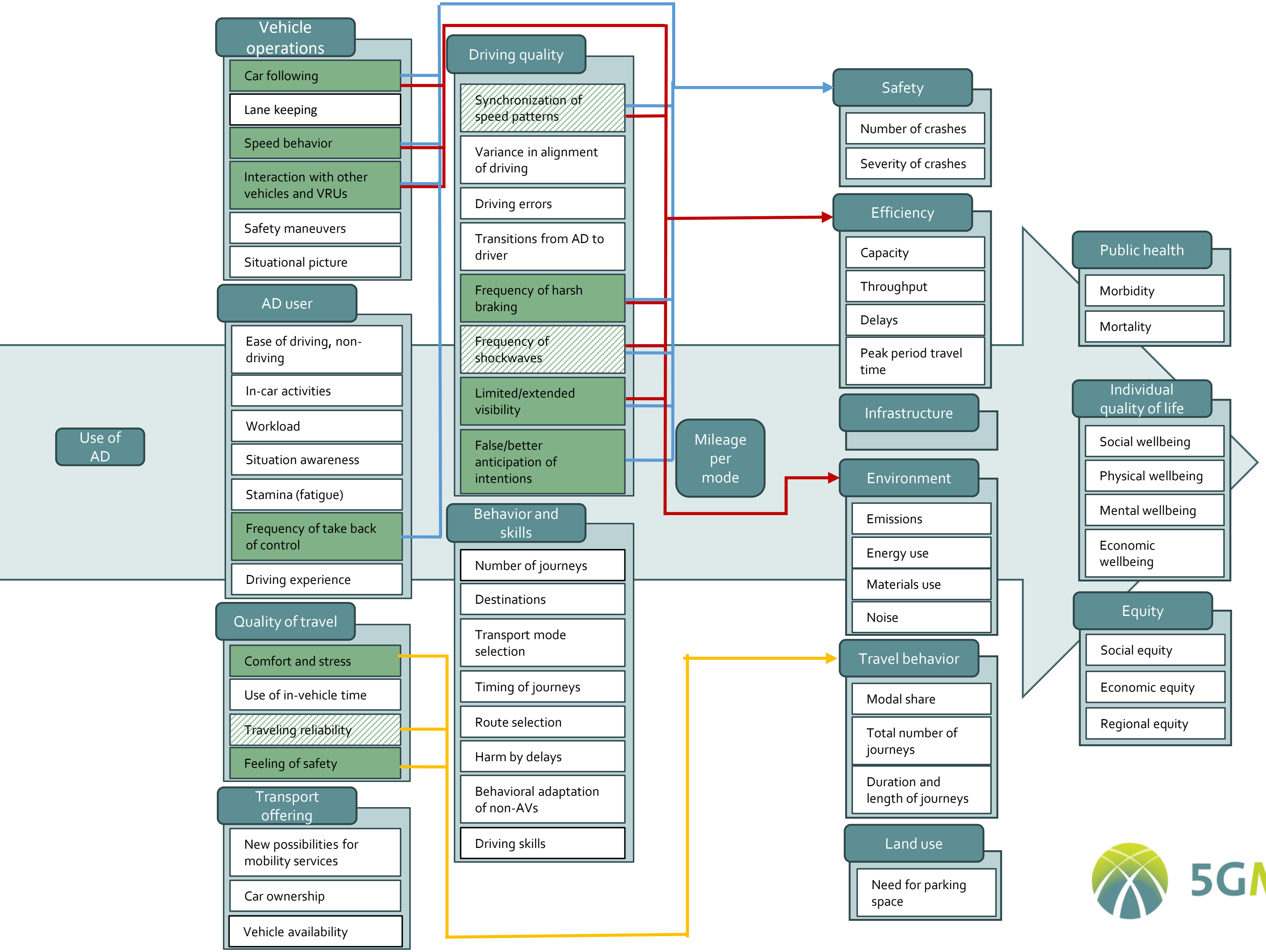
Quality of Life Impact Assessment - Methodology

- Builds on the **impact assessment framework** for Automated Driving by the Trilateral ART WG
- **Baseline** in the assessment: Connected automated driving with connectivity issues in terms of session or service continuity
- Focus on identification of the **most important impact mechanisms** where 5G is expected to have an effect for each evaluation area and use case
- Expert assessment of the potential impacts, supported by any available evidence

Lane merge & overtaking



Acknowledgement
Elaborated from the impact pathways and KPIs in *Innamaa S, Smith S, Barnard Y, Rainville L, Rakoff H, Horiguchi R & Gellerman H (2018). Trilateral Impact Assessment Framework for Automation in Road Transportation. Public version 2.0.*

Results - Quality of life impacts

- The **most important impact mechanisms** related to 5G enabled CAM in cross-border context:
  - Speed behaviour,
  - Interaction with other vehicles and VRUs,
  - Frequency of harsh braking and
  - Travelling reliability.
- Small improvements for traffic safety and efficiency are possible.
- The user scenario with **most impacts on QoL** is likely to be Lane merge and Automated overtaking.
- Impacts **on a societal level** are likely negligible, due to the specific nature of the cross-border user scenarios.
- **On a local level**, travellers and sites may experience benefits.

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Cost-benefit analysis - Methodology

- **Break-even analysis** aims to identify the point where the attributable benefits, resulting from deployment, equal the costs
- Based on the information and assumptions determined in the **5G-MOBIX deployment study**
- **Four infrastructure investment scenarios** were considered, regarding the rollout of different 5G bands (700MHz and 3500MHz) across different years (2023 or 2025).
- **Five European CBCs covered**: Spain – Portugal (ES-PT), Greece – Turkey (GR-TR), Germany – Netherlands (DE-NL), Finland – Norway (FI-NO), Spain – France (ES-FR)
- The **externalities** considered were
  - Fatalities,
  - Serious Accidents, Slight Accidents,
  - CO_2 Emissions,
  - Delays and
  - Well-to-tank.

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Illustrative example for the investment Scenario A and ES-PT Corridor

- Investment in 700MHz in 2023

Scenario A: Total External Costs 2023-2030, ES-PT Corridor (2022 constant prices)						
External Cost of Transport	Fatalities	Serious Accidents External Cost	Slight Accidents External Cost	CO2e External Cost	Delay External Cost	WTT Emissions External Cost
External Cost in million euros	37 m EUR	409 m EUR	N/A	53 m EUR	45 m EUR	17 m EUR
Reduction in externalities to break-even	0.44%	0.44%	0.44%	0.44%	0.44%	0.44%

Results - Break-even analysis

- The reduction in externality levels (e.g. reduction in CO_2 emissions, accidents) to offset the investment costs seem achievable for Spain-Portugal, Germany-The Netherlands and Spain-France cross-border corridors. The levels for the externalities range between 0.44% and 1.99%.
- Due to the low traffic volumes at the Finland-Norway corridor, break-even is very unlikely to be achieved.
- Investments at the Greece-Turkey corridor are not likely to be offset by the benefits included in this analysis, but benefits to trade and logistics might be expected and those could offset the costs.

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Conclusions

- 5G is expected to **affect automated driving in cross-border context** through the following impact mechanisms: Speed behaviour, Interaction with other vehicles and VRUs, Frequency of harsh braking and travelling reliability.
- The user scenario with most effects is likely to be **Lane merge and Automated overtaking.**
- The results of the break-even analysis show that for all corridors, except the low-traffic FI-NO CBC, there is a good indication that CAM use-case deployment, across the four other CBCs considered could allow **offsetting the infrastructure costs** considered.
- These results are **indicative**, due to numerous assumptions and estimations that had to be done for the assessments, the limited scope of the user scenarios and lack of empirical data.

Thank you!

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