

# Impacts of automated driving

Älyliikenteen ja automaation ajankohtaiset

6.5.2026

Esko Lehtonen & Satu Innamaa

VTT Technical Research Centre of Finland Ltd.

**VTT**



## PUSH TOWARDS HIGHER AUTOMATION

- Robust and reliable automated driving
- Extended and defragmented ODDs
- Interoperability across countries and brands

**Hi-Drive**  
Designing Automation

## Project Facts

€60 MILLION BUDGET

€30 MILLION FUNDING

53 MONTHS from July 2021 to November 2025

53 PARTNERS among them OEMs, automotive suppliers, research institutes, associations, traffic engineering, deployment organisations and mobility clubs

13 COUNTRIES Belgium, France, Finland, Germany, Greece, Hungary, Italy, Netherlands, Norway, Spain, Sweden, Switzerland, United Kingdom

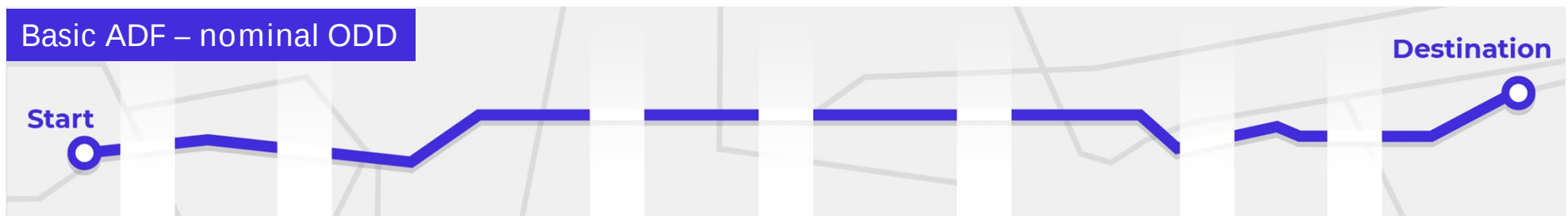


Supported by the European  
Council for Automotive R&D

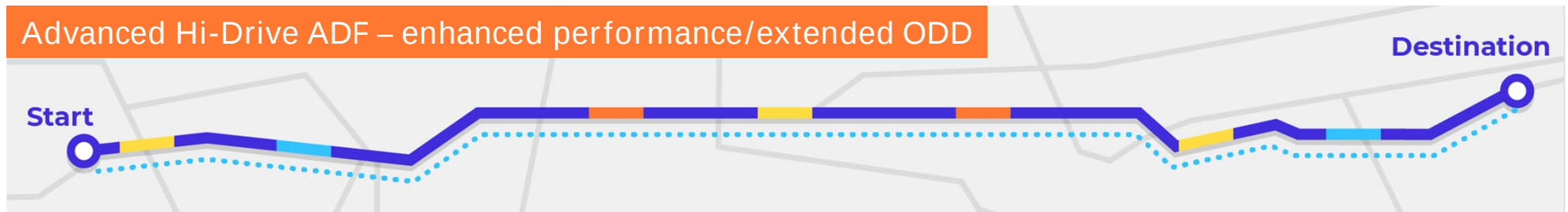
This project has received funding from the European Union's Horizon 2020  
research and innovation programme under grant agreement No 101006664



# Hi-Drive concept for automated driving



+ **Enabler** : Connectivity | High-precision positioning | Context learning via ML | Cybersecurity =



# Research questions

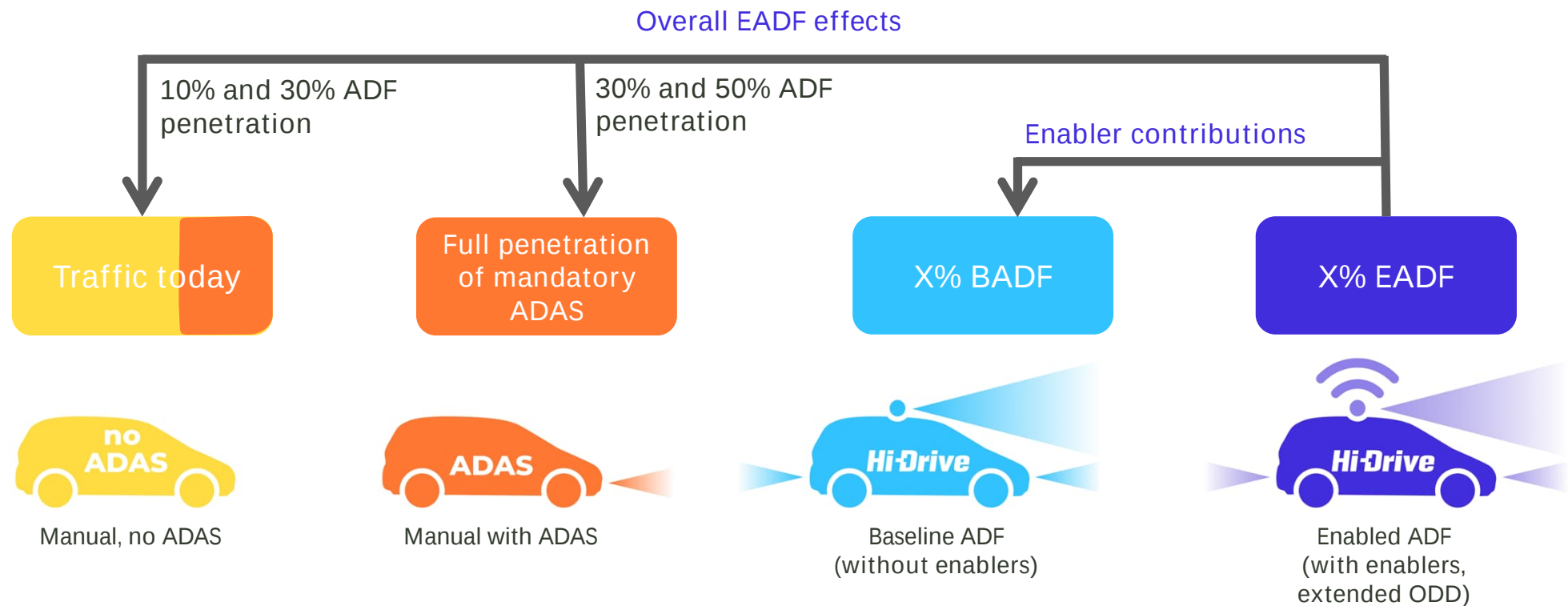
What is the impact of Automated Driving and its Enablers on...

- ▶ safety?
- ▶ energy demand?
- ▶ emissions?
- ▶ traffic efficiency?
- ▶ personal mobility?
- ▶ transport system?
- ▶ socioeconomics?

Focus on

- ▶ The impacts between Automated Driving and manually driven fleet
- ▶ Contribution of the Technology Enablers to these impacts

# Hi-Drive baselines and treatment



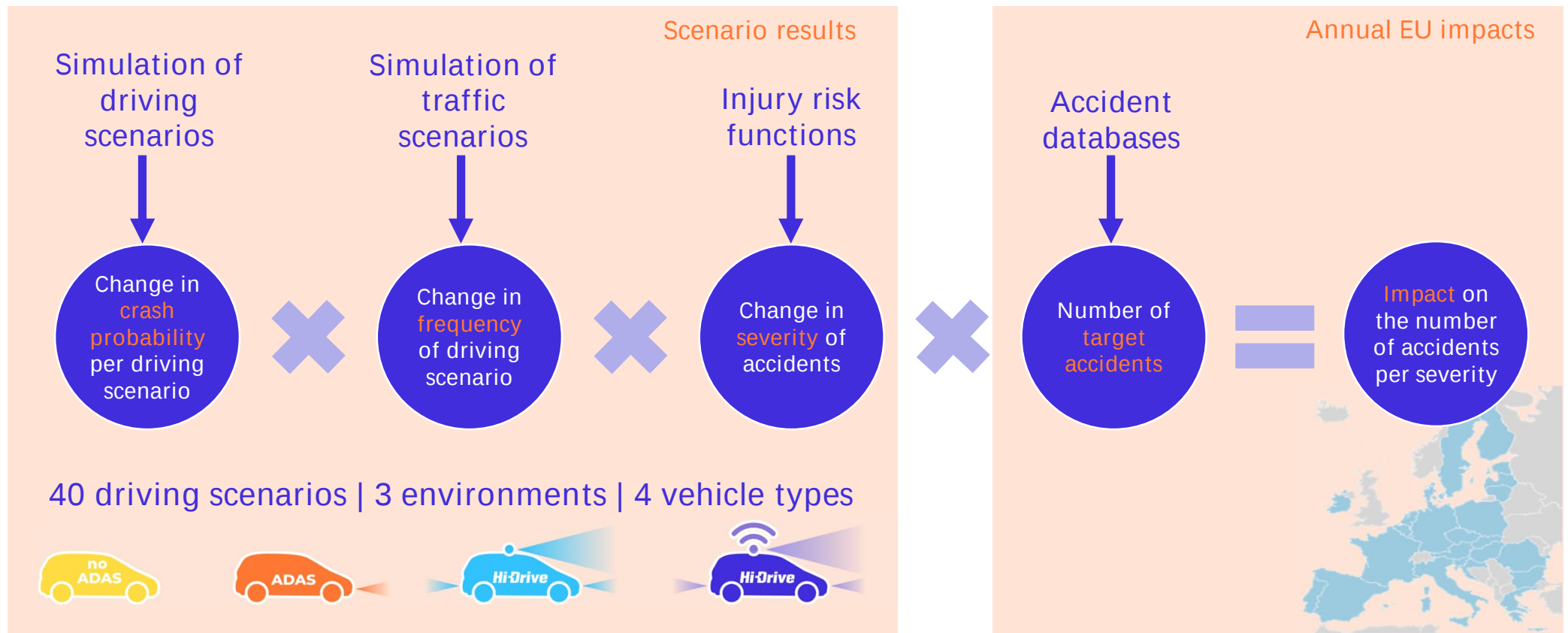
\*ADF = Automated Driving Function



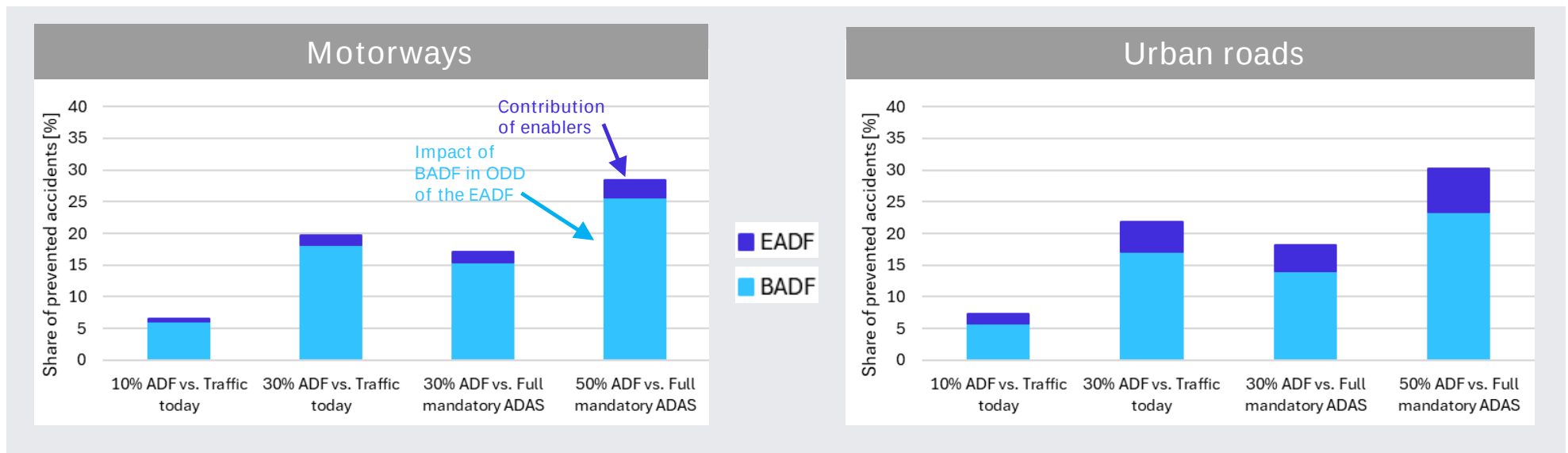
**1**

**SAFETY**

# Safety impact assessment methodology



## Scaled-up impact of EADF on prevented fatal accidents in EU



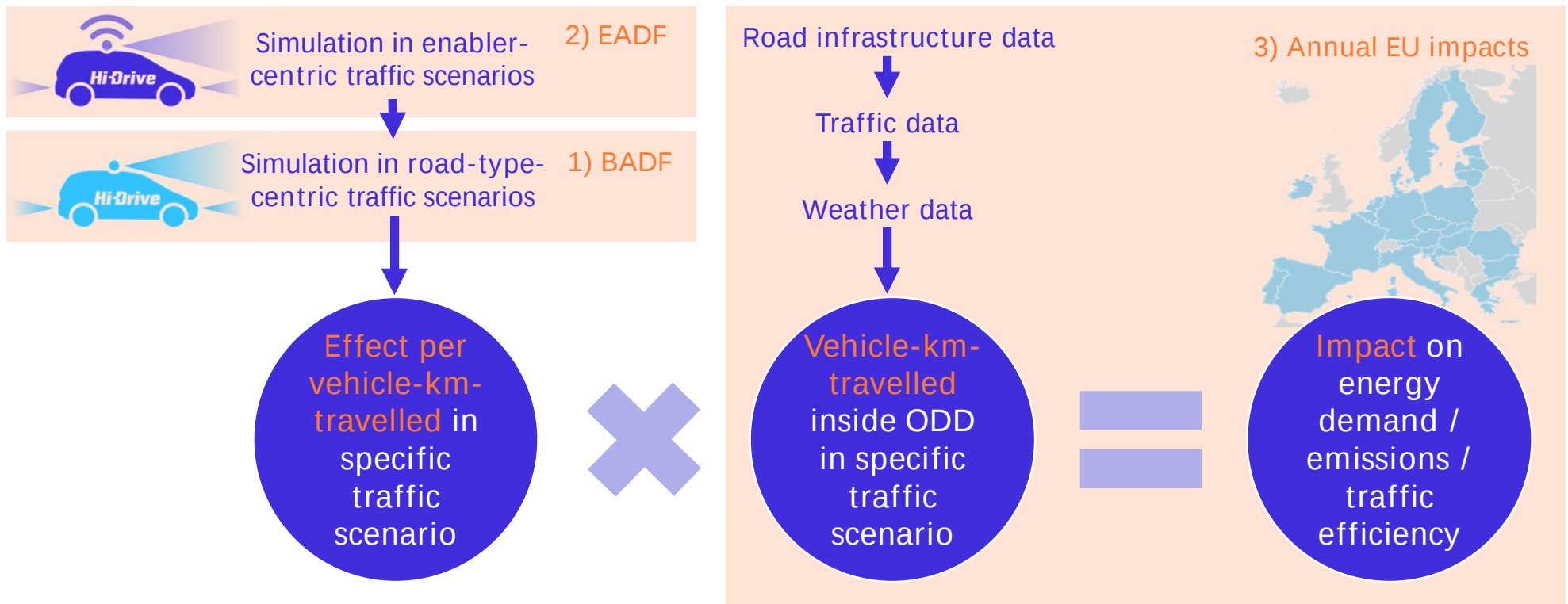
- Impacts on other severities are of similar size
- Minor addition to accidents due to MRM
- Additional benefits outside ODD due to better ADAS enabled by the sensors



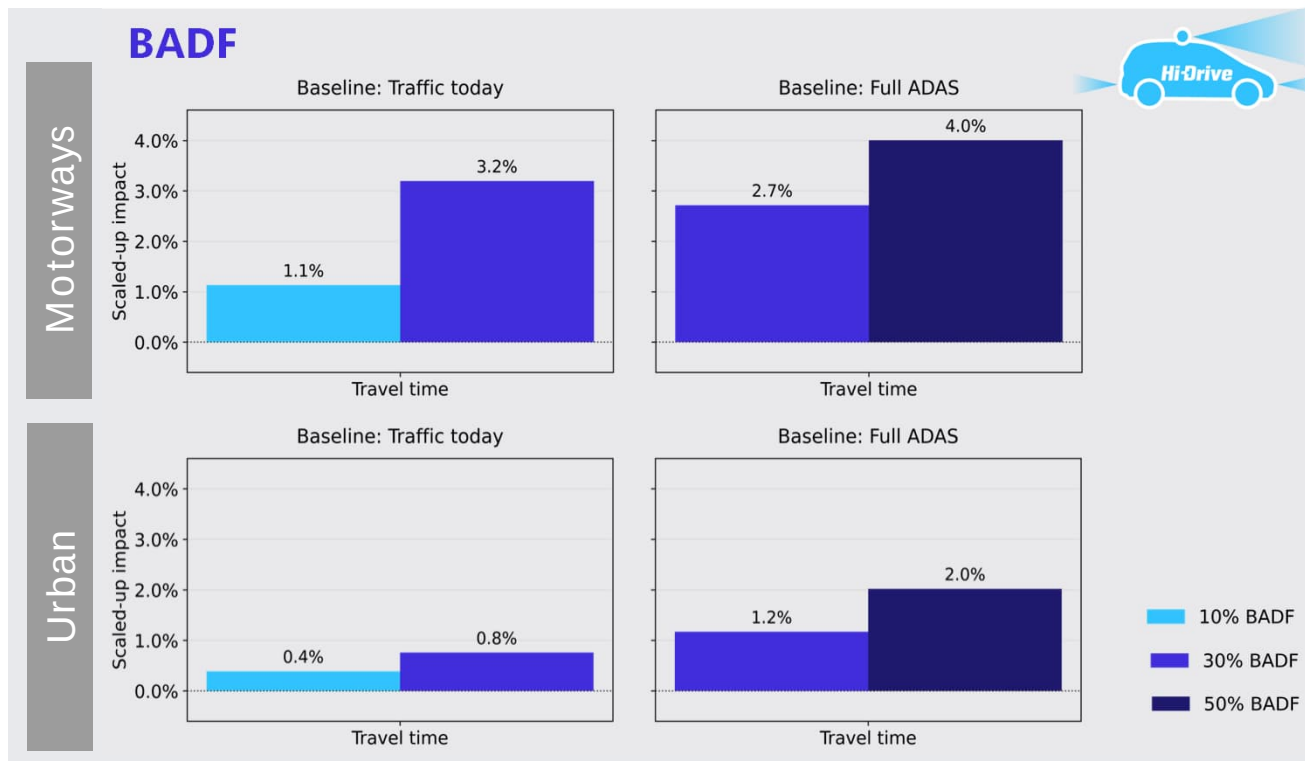
**2**

**EFFICIENCY &  
ENVIRONMENT**

# Efficiency & environmental impact assessment methodology



# Scaled-up impact on travel time increase in EU



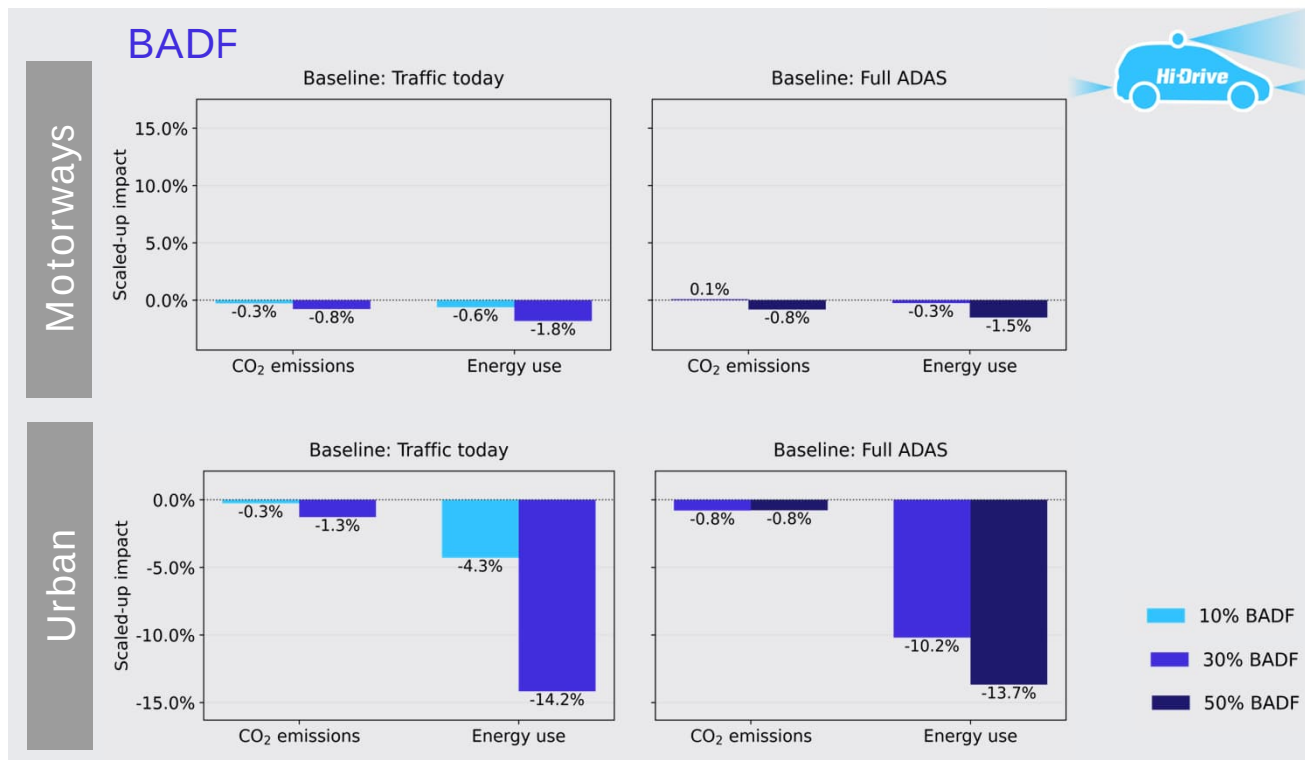
Annual EU impacts



- EADF impact in comparison with BADF
  - Enablers affect only locally
  - Similar magnitude of impacts at the EU-level



# Scaled-up impact on decrease in energy use and CO2 emissions in EU



Annual EU impacts



## ► EADF impact in comparison with BADF

- Motorways:  
Similar magnitude of impacts
- Urban areas:  
Slightly larger reduction for energy use, slightly smaller for CO<sub>2</sub>

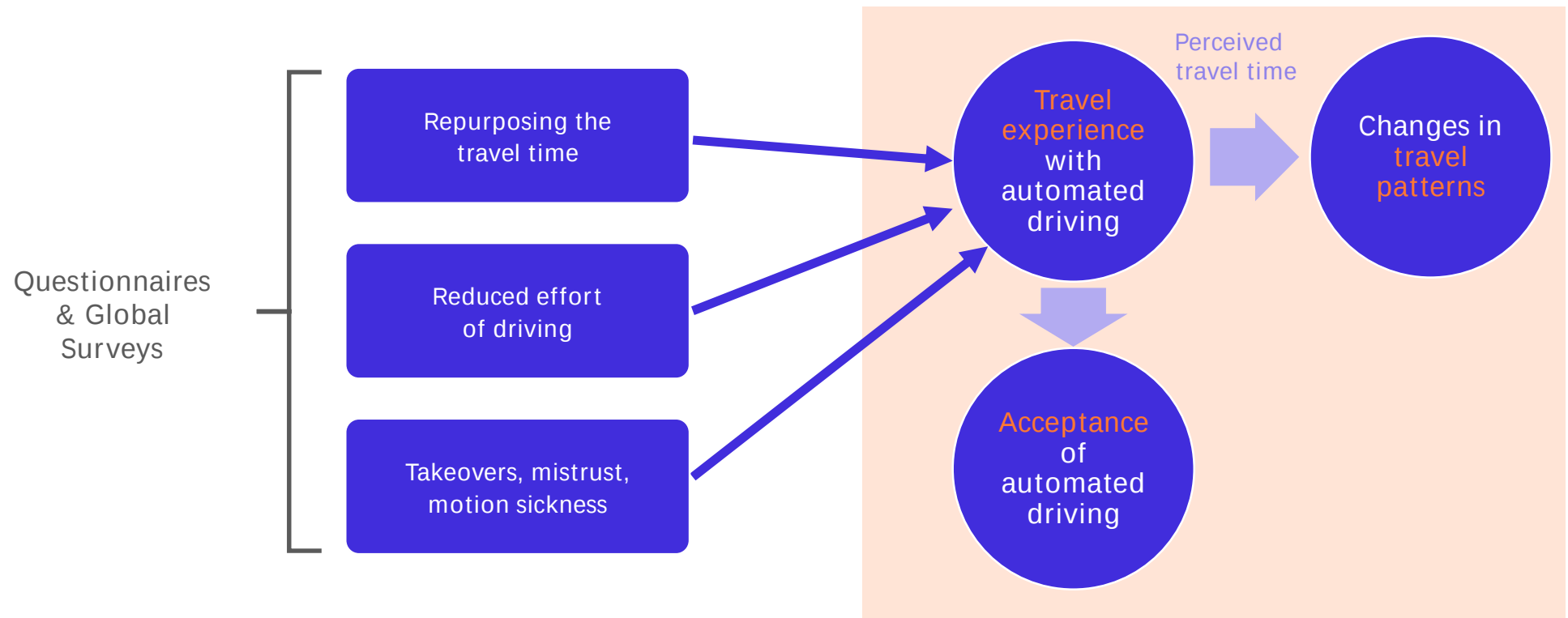




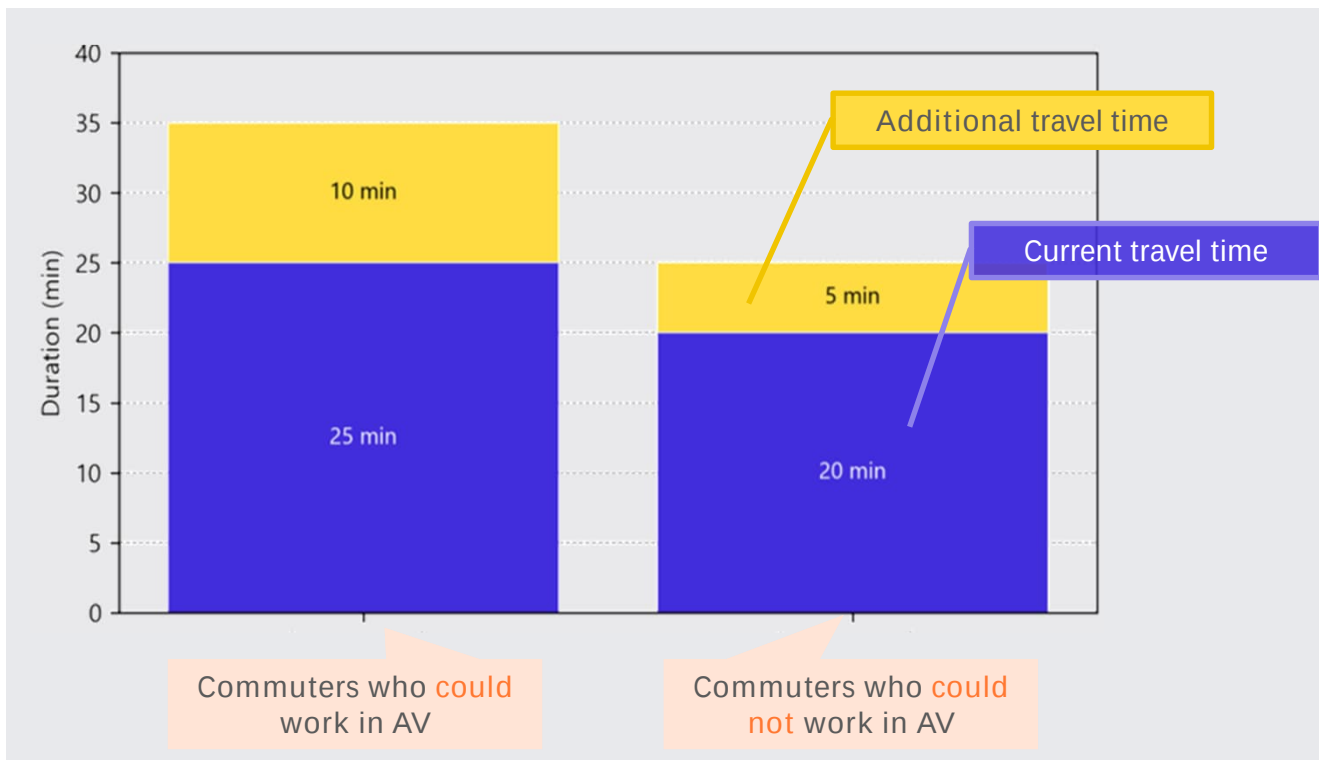
**3**

**PERSONAL  
MOBILITY**

# Mobility impact assessment methodology



## Ability to work while commuting may encourage to accept longer commutes (Global surveys)



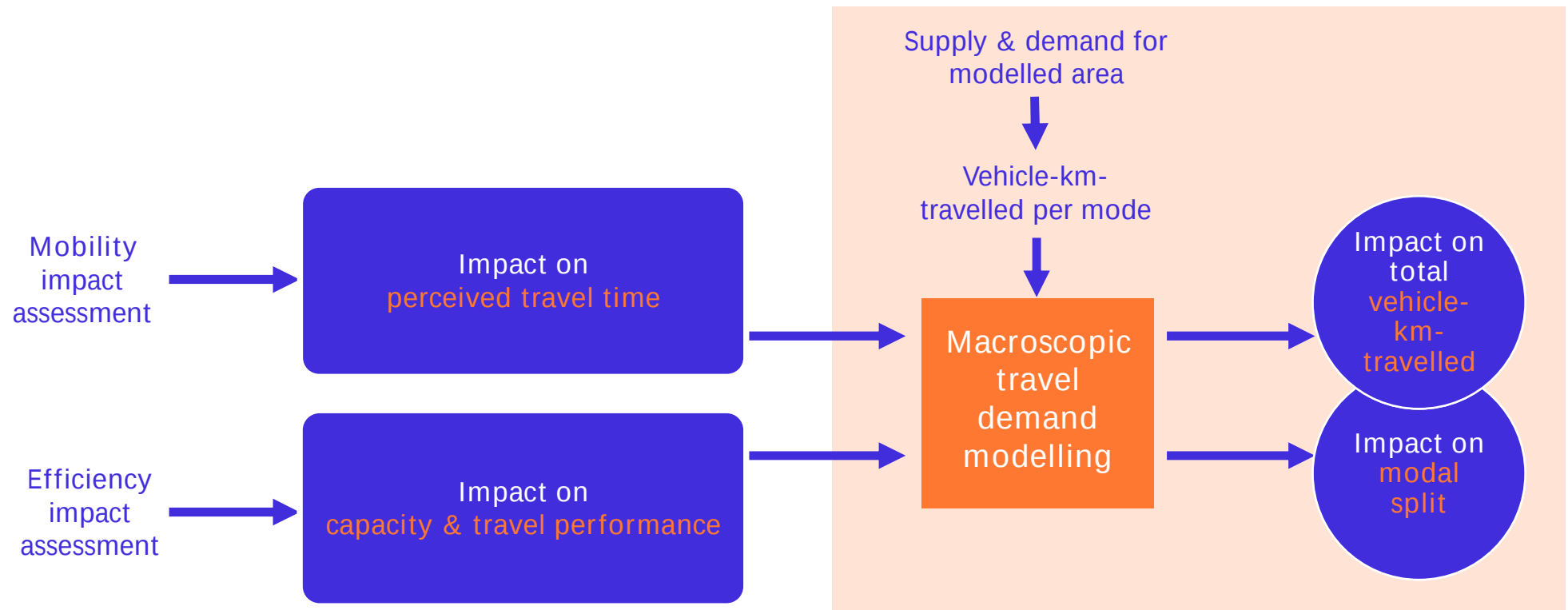
- Correction factor for perceived travel time  
AD vs Manual driving: 0.8



4

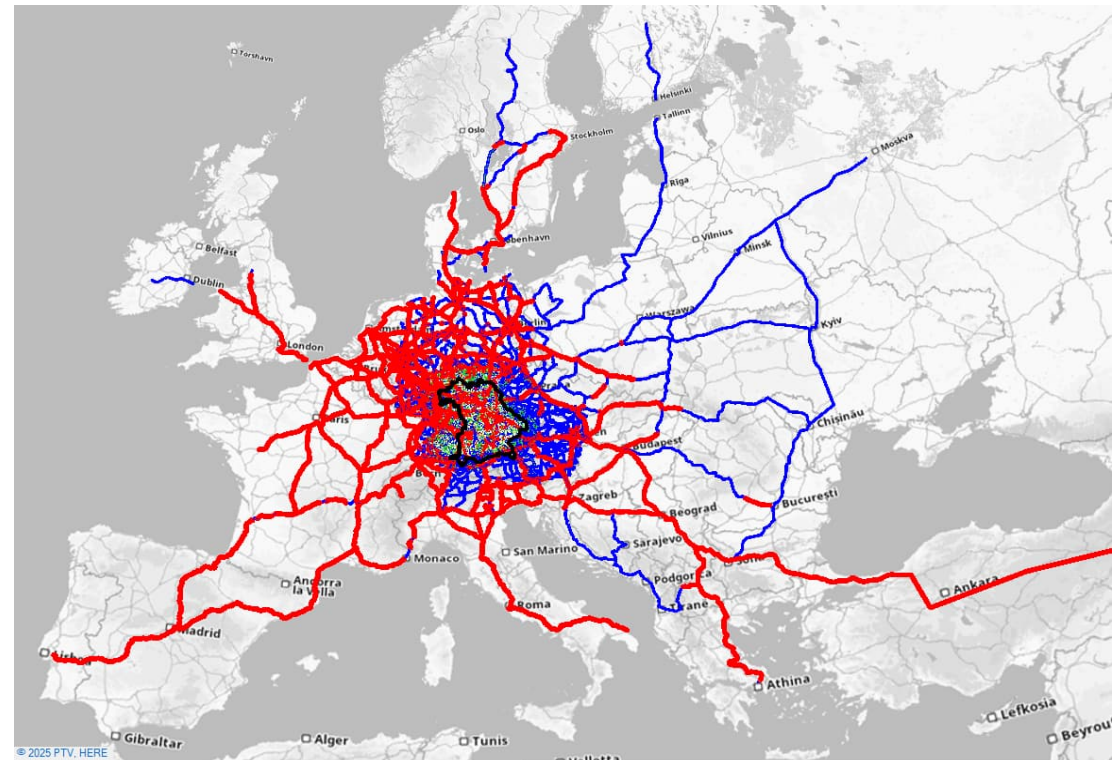
**TRANSPORT  
SYSTEM**

# Transport system impact assessment methodology



# Impacts on modal split and travel performance

- ▶ A reduction in perceived value of travel time and an increase in passenger-car units required for automated vehicles balanced their effects on modal split
  - Negligible impact on modal split
- ▶ Slight increase in vehicle-km travelled, larger outside ODD than inside it
- ▶ 5% increase in vehicle-hours travelled





# **CONCLUSIONS**

# Conclusions

- ▶ Summary of impacts
  - Substantial benefits with reduced number of accidents
  - Enhancement in travel quality
  - Substantial decrease in tractive energy use
  - Small decrease in CO<sub>2</sub> emissions
  - Small increase in travel time
  - Negligible impact on modal split
  - Rerouting to outside ODD with increase in vehicle-km and hours travelled
  - Profitable from society's point of view
- ▶ For limitations, see Hi-Drive Deliverables D7.3-4
- ▶ Most complex and extensive impact assessment for ADF with advancements in state of the art





THANK YOU FOR  
YOUR KIND ATTENTION.

Dr. Esko Lehtonen  
Senior Scientist, VTT  
[esko.lehtonen@vtt.fi](mailto:esko.lehtonen@vtt.fi)

[www.Hi-Drive.eu](http://www.Hi-Drive.eu) X (Twitter)@\_HiDrive\_ LinkedInCompany/Hi-Drive

**Hi-Drive**

This project has received funding from the European  
Union's Horizon 2020 research and innovation  
programme under grant agreement No 101006664.

