Optimising driver behaviour for safe, green and energy efficient mobility – OptiMo

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Research Motivation

- The constantly increasing urban population, expected to reach **82% of the global total in 2050** according to the United Nations, along with the growth of associated vehicle numbers are intensifying the challenges of urban mobility.

- Congestion, emissions, energy use and road safety are only a few of these **challenges** to be addressed by city authorities and urban and transport planners.

- **Driving behaviour** is the most critical factor and the root of the problem in road safety, energy efficiency and the environmental pollution from road transportation.

- Despite urgent needs for improvement in the three areas, **there has not been a combined high-level driver behavior optimization** considering the critical transport pillars of traffic safety, energy efficiency and the environment simultaneously.
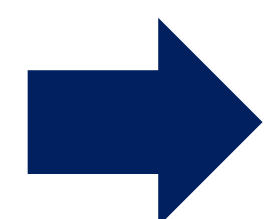
Objective

The **optimization** of driving behaviour for **combined**

energy efficient
green
safe
mobility
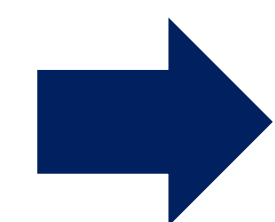
→ Meaningfully merging the **three transport pillars** with common metrics and reference frameworks
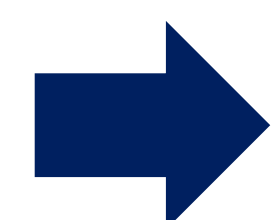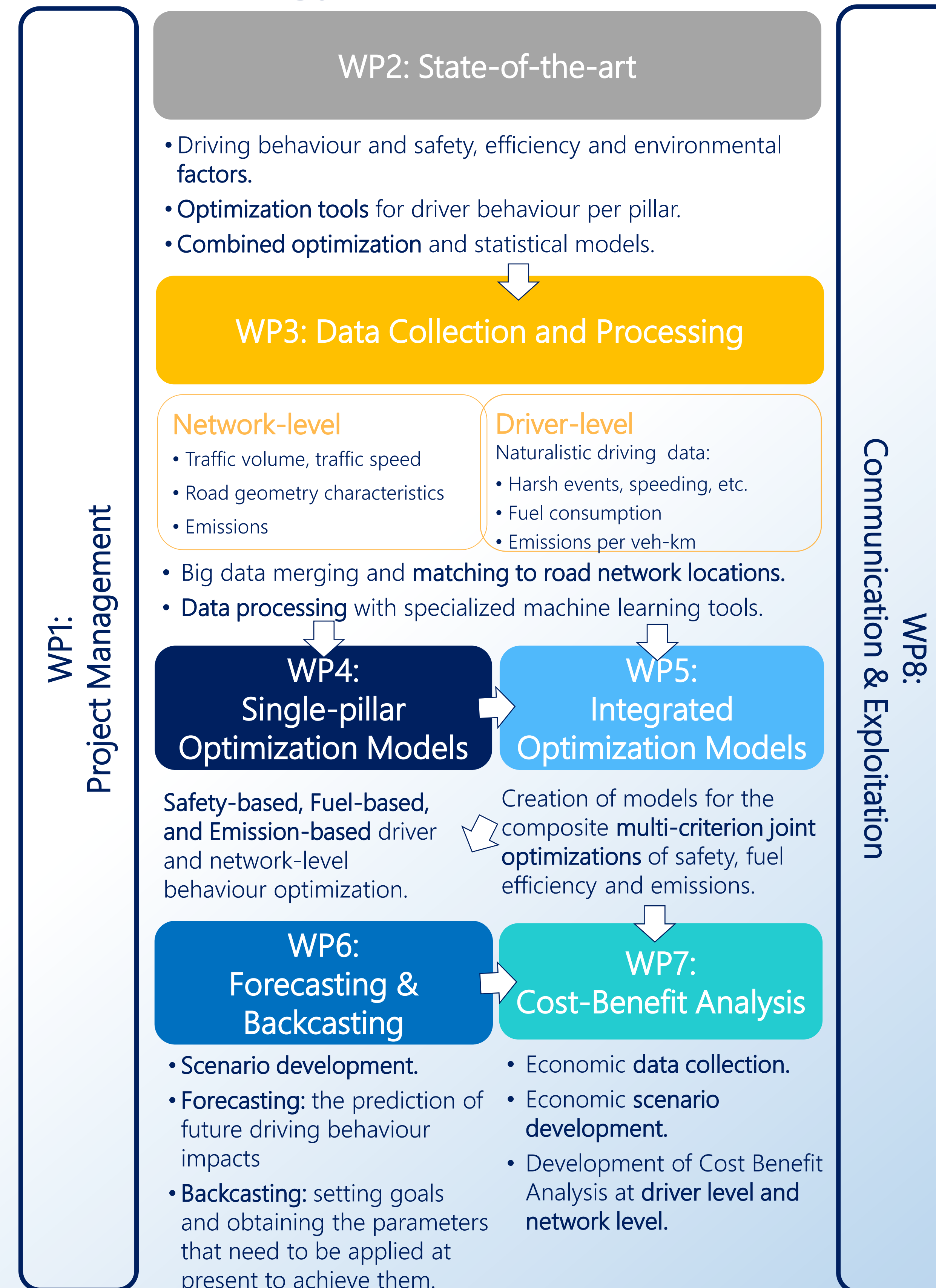
→ Achieve this optimization **without jeopardizing network traffic efficiency**

→ **Sensitivity and dose-response** of the impact of behavioural change to safety, energy, and emissions

Methodology

WP1: Project Management

WP2: State-of-the-art
- Driving behaviour and safety, efficiency and environmental **factors.**
- **Optimization tools** for driver behaviour per pillar.
- **Combined optimization** and statistical models.

WP3: Data Collection and Processing

Network-level
- Traffic volume, traffic speed
- Road geometry characteristics
- Emissions

Driver-level
Naturalistic driving data:
- Harsh events, speeding, etc.
- Fuel consumption
- Emissions per veh-km

- Big data merging and **matching to road network locations.**
- **Data processing** with specialized machine learning tools.

WP4: Single-pillar Optimization Models

Safety-based, Fuel-based, and Emission-based driver and network-level behaviour optimization.

WP5: Integrated Optimization Models

Creation of models for the composite **multi-criterion joint optimizations** of safety, fuel efficiency and emissions.

WP6: Forecasting & Backcasting
- Scenario development.
- **Forecasting:** the prediction of future driving behaviour impacts
- **Backcasting:** setting goals and obtaining the parameters that need to be applied at present to achieve them.

WP7: Cost-Benefit Analysis
- Economic **data collection.**
- Economic **scenario** development.
- Development of Cost Benefit Analysis at **driver level and network level.**

WP8: Communication & Exploitation

Scientific & Social Impact

Science
- The development of an **innovative optimization methodology**, which will merging the 3 transport pillars (safety, energy efficiency and environment) with common metrics and reference frameworks.
- The contribution of the data collection framework and integrated impact assessment to interoperable, scalable and replicable **digital innovative solutions**.
- The provision of the outcomes in terms of modelling, data fusion protocols and optimization tools as an **opensource platform**.

Society
- The **reduction** of road injuries and fatalities, fuel consumption and air pollution by optimizing driving behaviour.
- Effectively addressing the **EU Green Deal** and the **Vision Zero** targets.
- **Better life quality** for citizens, with emission-free air conditions, and with less congestion-induced stress.

Economy
- Contribution to the reduction of **external costs** from congestion, emissions, noise pollution, crash frequency and injury severity.
- **Greater economic development** for the transportation sector and all industrial sectors relying on urban logistics through the optimization of travel times and driving behaviour
- The exploration of new business prototype products and business processes to the market as well as potential startups related to OptiMo