



L3Pilot methodology

L3Pilot Final Event

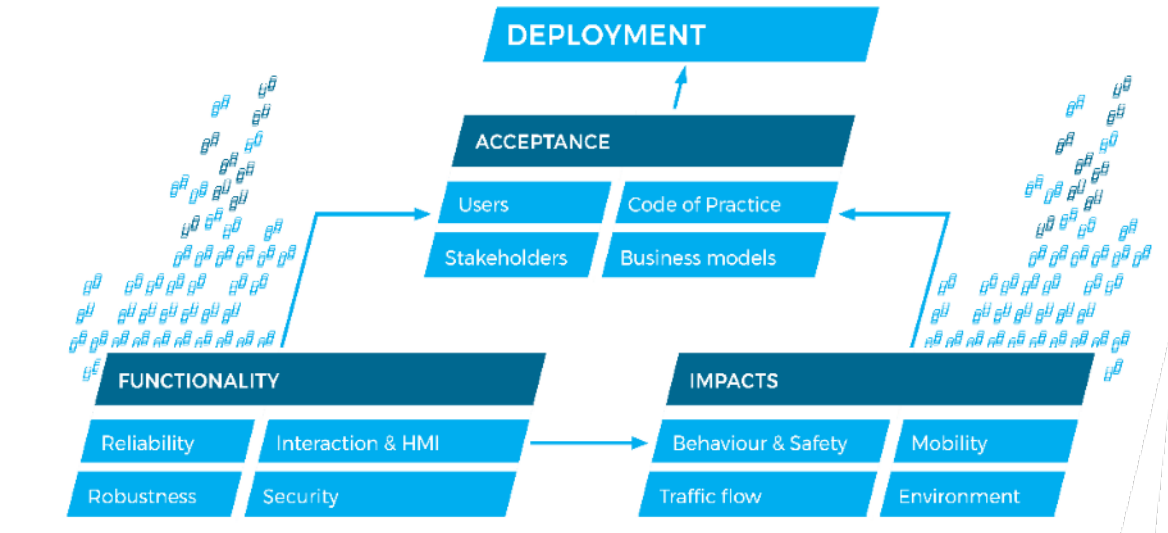
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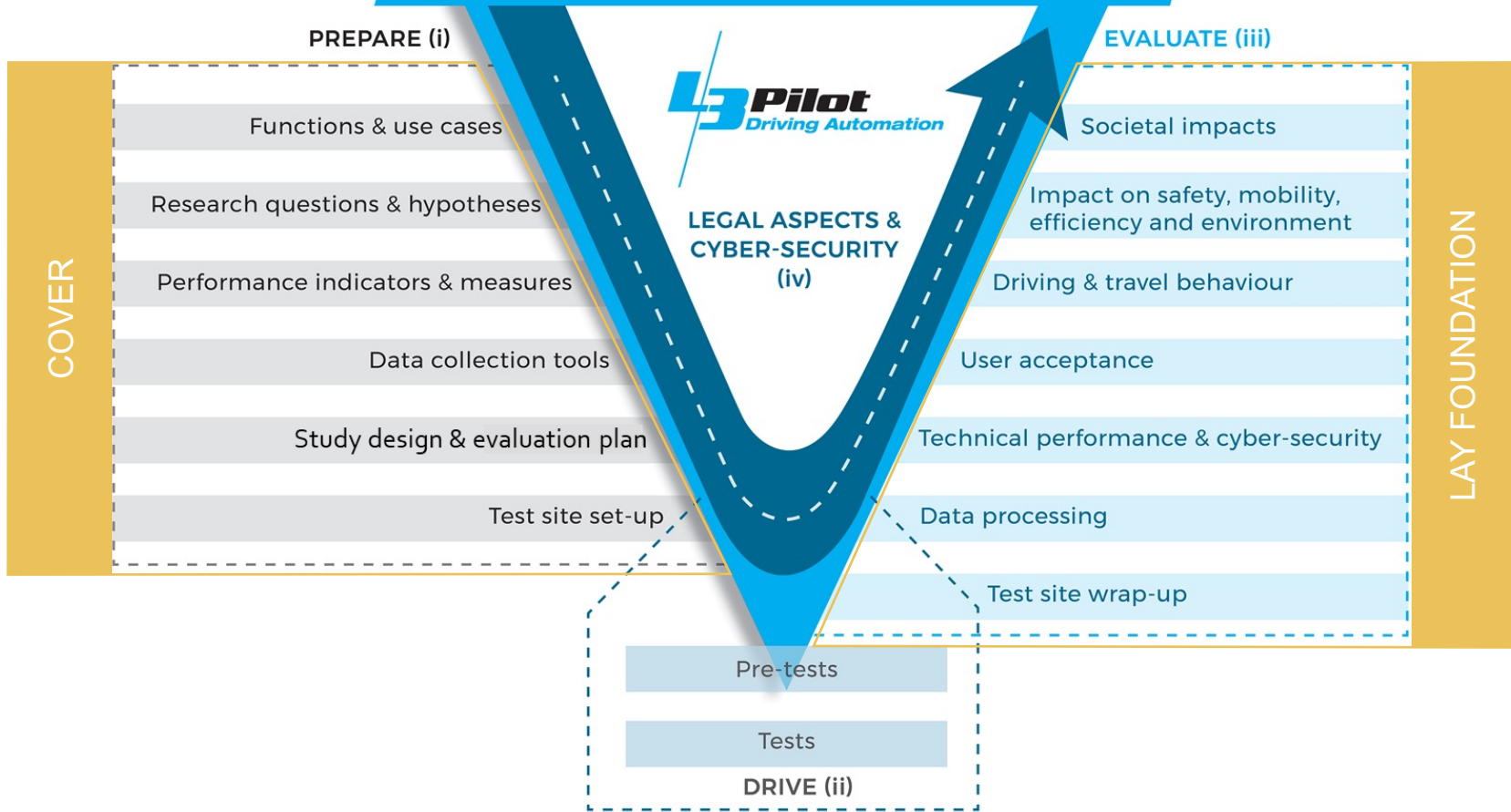
Objective

Methodology

Provide a **comprehensive methodology** for piloting, evaluating **and testing** automated driving functions



FESTA Implementation Plan adapted to L3PILOT



Research questions as the backbone



Theories



Descriptions of
AD functions



Research Questions

(3 levels):

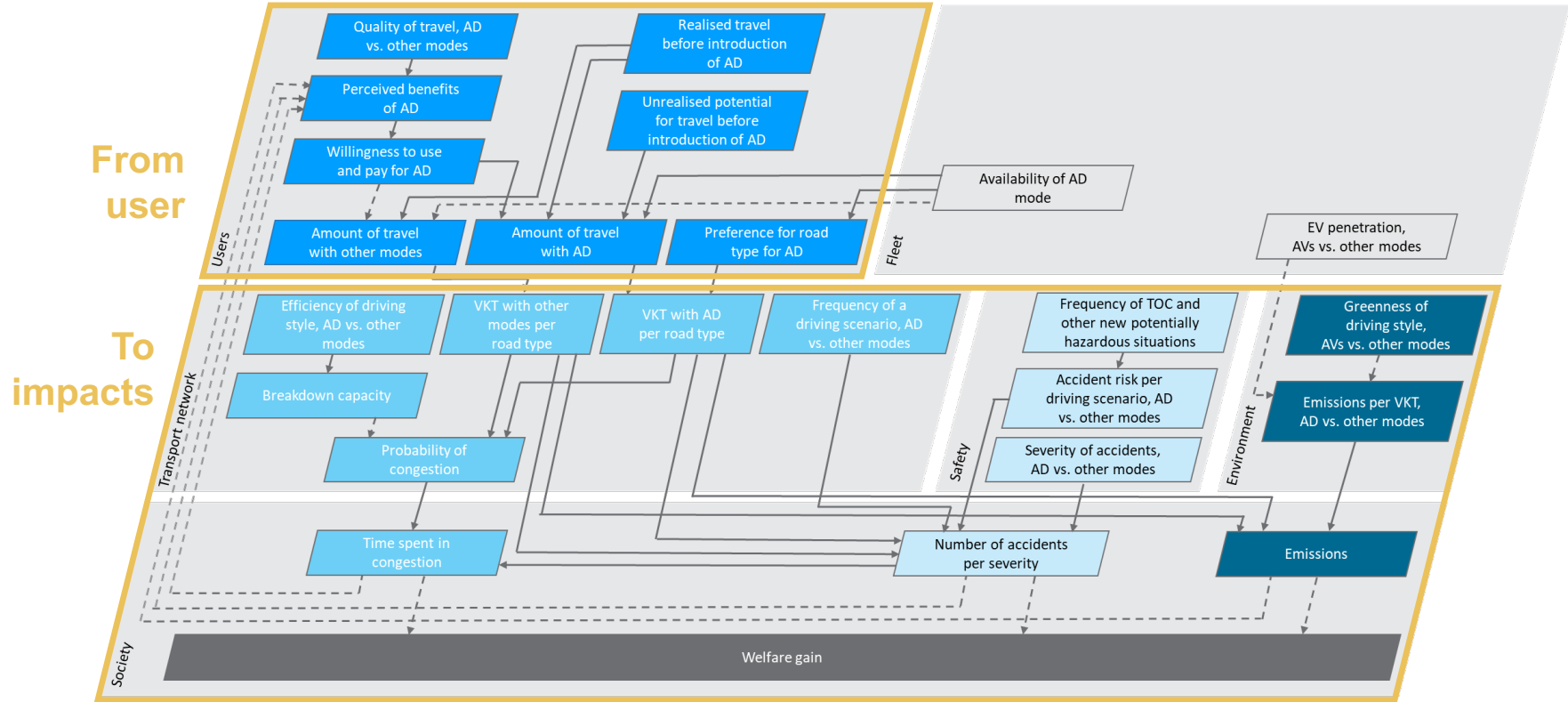
- **Technical & traffic evaluation:**
System performance,
ADF driving behaviour
- **User & acceptance evaluation**
- **Impact evaluation:**
Mobility, Safety, Efficiency,
Environment
- **Socio-economic evaluation**



Feasibility check

- Study design
- Data
- Methods

Causal diagram of evaluation topics



Evaluation concepts

- **Piloted functions:**

20 different ADFs used in the field tests at the 16 pilot sites for driving on motorway, in urban environment or for parking

- Used for technical & traffic and user & acceptance evaluation
- ADFs grouped in the analysis and indicators merged across pilot sites

- **Mature functions:**

Future ADFs in perspective, when they are in use on a larger scale, expecting further development for the ADFs from the ones tested in L3Pilot

- Used for impact assessment

Evaluation concepts

- **Driving scenario:**

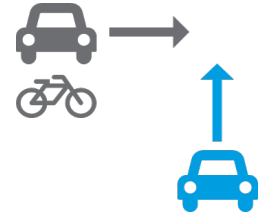
A short period of driving defined by its main driving task or triggered by an event

- For example, car following, lane change or approach to an obstacle in the lane

- **Traffic scenario:**

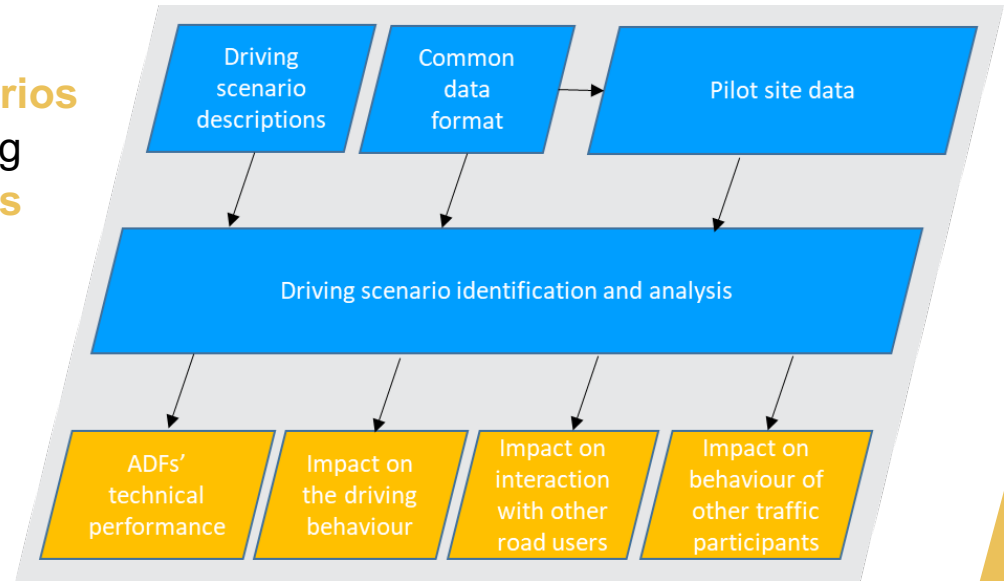
Scenarios with a broader horizon than the driving scenarios and cover a specific road section with certain traffic characteristics

- For example, 3 lane motorway with 110 km/h speed limit, 2000 vehicles/hour/lane and 10% of passenger cars driven by ADF



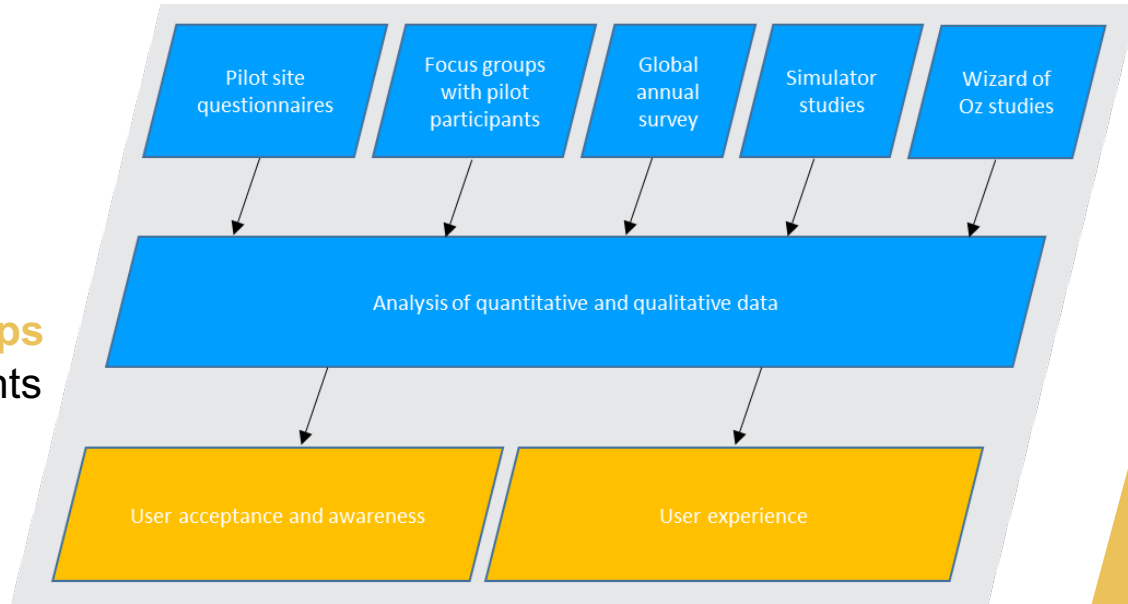
Method for technical and traffic evaluation

- To address the technical performance of ADFs and the difference between manually and ADF driven vehicles in traffic and how they interact with other road users
- Based on analysis of **driving scenarios** (free driving, lane change, etc.) using **vehicle data collected at pilot sites**
- Manual driving (SAE 0) vs. SAE 3 in ODD
- Analysis of data from multiple sites enabled by the L3Pilot **common data format**



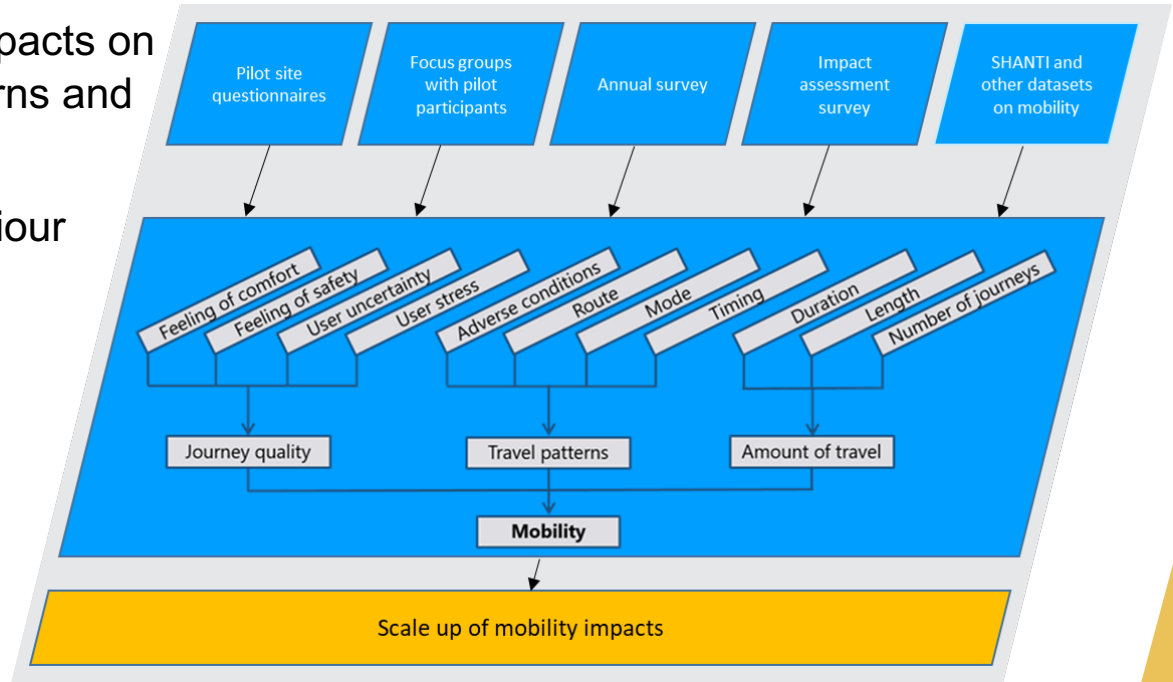
Methods for user & acceptance evaluation

- To address user acceptance, awareness and experience
- User's current situation vs. SAE 3
- Evaluation was based on multiple methods:
 - **Pilot site questionnaire** at all sites & **focus groups** with some pilot participants
 - **Global survey**
 - **Simulator** studies
 - **Wizard of Oz** studies



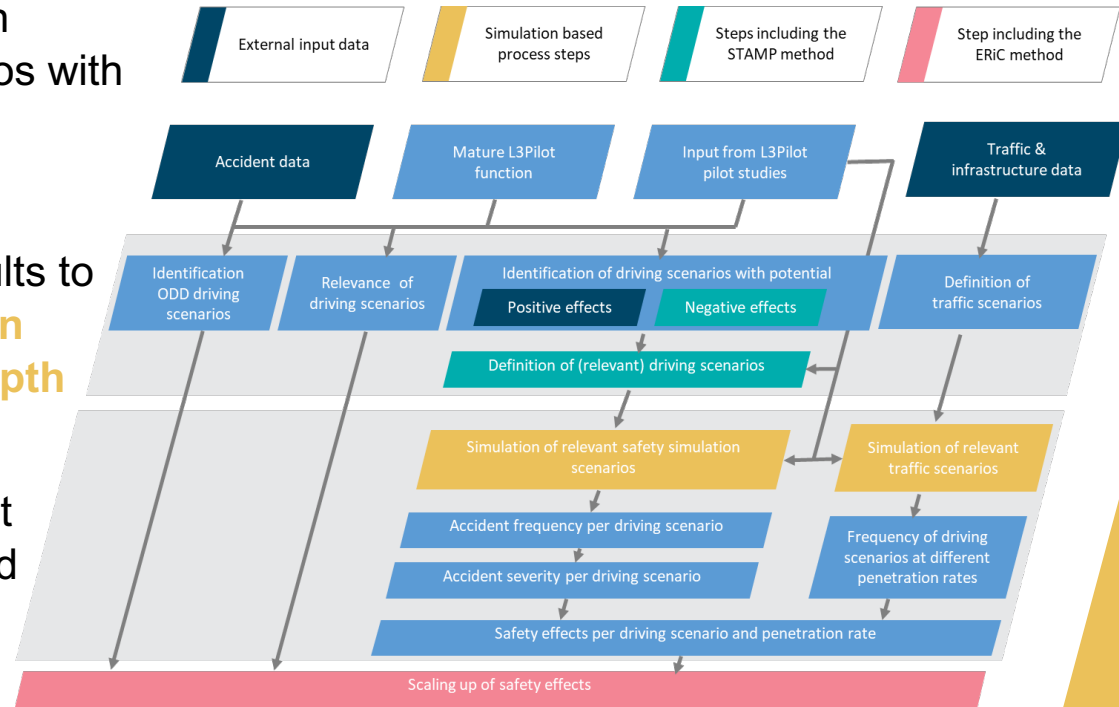
Method for mobility impact assessment

- To address the potential impacts on journey quality, travel patterns and amount of travel
- User's current travel behaviour vs. SAE 3
- Method was based on
 - Questionnaires
 - Surveys
 - Focus groups
 - European datasets



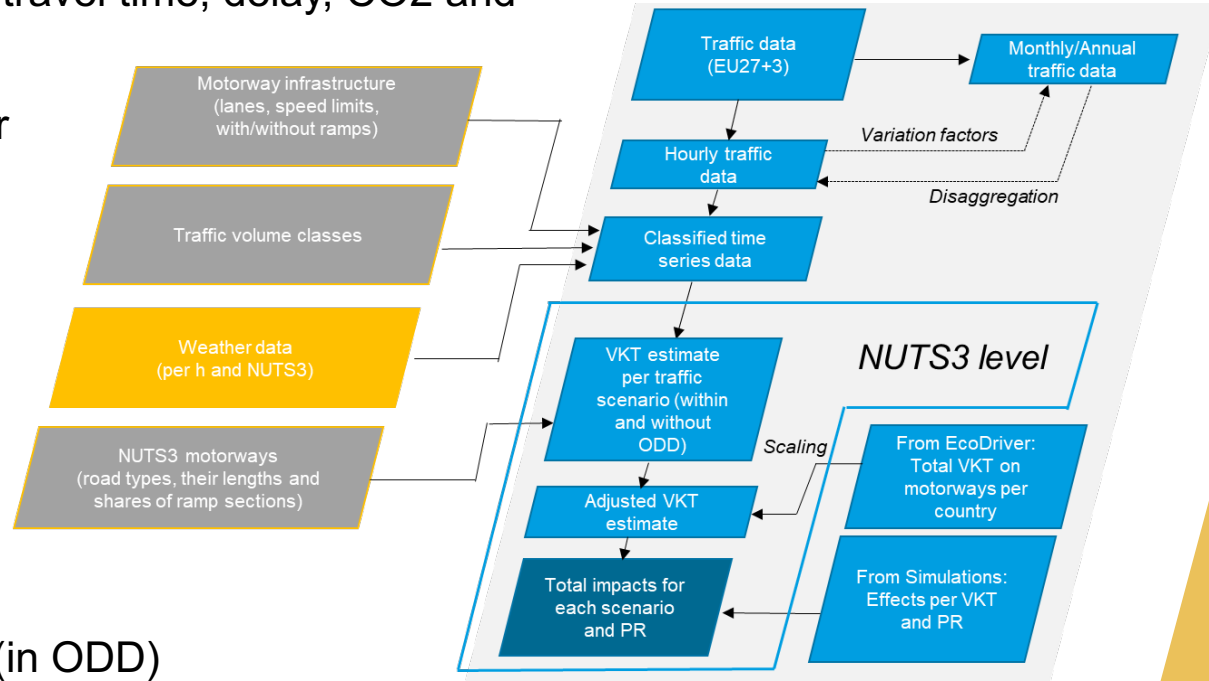
Method for safety impact assessment

- To estimate, first, the impact on accidents within single scenarios with **simulations**
 - Risk, severity, frequency
- Second, to scale up these results to European level using **European wide accident data and in-depth accident databases**
- Manual driving with and without active safety systems (AEB and FCW) vs. SAE 3 in ODD



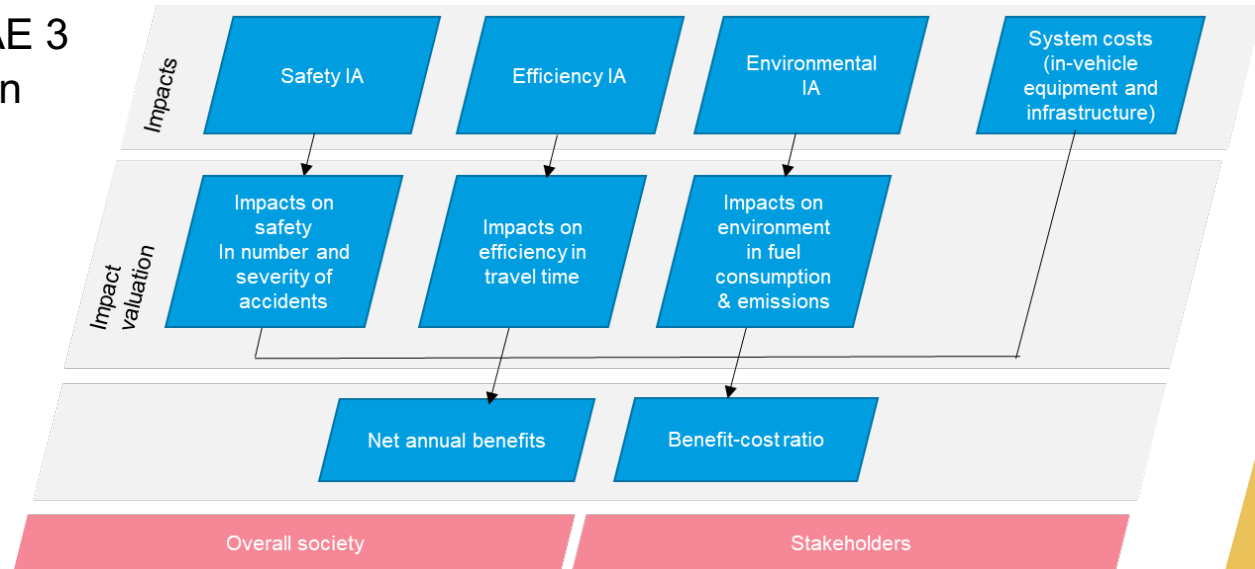
Method for efficiency & environmental impact assessment

- To estimate the impact on travel time, delay, CO2 and energy demand
- First, to estimate effect per vehicle-km driven within different traffic scenarios with **simulations**
- Second, to scale-up these results to European level with **European wide traffic, map and weather data**
- Manual driving vs. SAE 3 (in ODD)



Method for socio-economic impact assessment

- To estimate **the benefits** of ADFs **in monetary terms from society view point** and compare them with **the costs**
- Today's situation vs. SAE 3 with different penetration rates
- Method based on
 - **Input on impacts**
 - **Survey data**
 - **Project partners' knowledge on costs**



Foundation for successful evaluation

- Established **partnerships** between evaluation and pilots
- **Harmonised** approaches across pilot sites
- **Smooth data flow** from pilots via tools to all evaluation methods
- **Multidisciplinary** evaluation methodology
- Well-defined and tested **evaluation plan** for all research questions



Outcome Methodology

Submitted

Report D3.1 From research questions to logging requirements

Process for data collection

2018

Report D3.2 Experimental procedure

Detailed testing plan

2019

Report D3.3 Evaluation methods

Evaluation plan for automated driving impacts

2019

Report D3.4 Evaluation plan

Detailed evaluation procedures, lessons learned

2020

+ additional details and insights in
evaluation result reports (D7.x)



Thank you for your kind attention.

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