Methodology for evaluating automated driving in Europe

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Research question selection

Theories of impact areas

Descriptions of AD functions

RESEARCH QUESTIONS (3 levels) for all evaluation and impact areas:

• Technical & traffic evaluation: System performance, Driving behaviour
• User & acceptance evaluation
• Impact evaluation: Mobility, Safety, Efficiency, Environment
• Socio-economic evaluation

Feasibility in terms of:
• study design
• data logging
• evaluation methods
Experimental procedure set-up

Experimental procedures: Approaches, participants, study design (incl. baseline)

• Aim: Sufficient commonalities to be able to make harmonised evaluation

Step 1: Description of alternatives
• Alternatives
• Pros & cons
• Minimum requirements

Step 2: Pilot site consultation
• Support on how to implement the methodology into practice
• Awareness of optimal solution vs. Best practical solution for a pilot study
Method for technical and traffic evaluation

Driving with ADF → Time series data logs → Common data format → Enriched data set incl. driving scenarios / events → Indicators per scenario / event → Merge of indicators across pilot sites → Answer to RQs → Input for impact assessment

Selected partner

Piloting

Evaluation
Method for user & acceptance evaluation

- **Pilot site questionnaires**, completed by participants testing the ADFs
  - Users' impressions on e.g. acceptance, safety and comfort
- **Annual survey**, large-scale international study
  - Acceptance of ADFs and monitor changes over time
- **Video- and vehicle-based data**
  - Frequency of interactions with the ADF, drivers’ posture, their engagement with non-driving related tasks, and their resumption of control from automation
- **Interviews and focus groups** to assess drivers’ views of ADFs
  - Situations that cannot be observed or explained by the other methods employed
Method for mobility impact assessment

- Trips today in EU (number, duration, distance)
  - Trips that may be affected (definition)
  - Potential impacts (qualitative assessment)

Approach:
- Baseline
- Near and future scenarios
- Amount of travel
- Travel patterns
- Trip quality

Data Sources:
- National travel surveys
- TeleFOT & euroFOT travel data
- ODD descriptions
- Questionnaire/Survey results
- Focus groups

Research Questions:

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Methodology
Method for safety impact assessment

- External input data
- Simulation based process steps
- Steps including the STAMP method
- Step including the ERIC method

Input data
- Accident data
- Mature L3Pilot function
- Input from L3Pilot pilot studies
- Traffic & infrastructure data

Scenario definition
- Identification of ODD driving scenarios
- Relevance of driving scenarios per country
- Identification of driving scenarios with potential positive effects
- Definition of (relevant) driving scenarios
- Definition of traffic scenarios (country specific)

Effect determination
- Simulation of relevant driving scenarios
- Safety effects per driving scenario
- Accident severity per driving scenario
- Safety effects per driving scenario and penetration rate
- Simulation of relevant traffic scenarios
- Frequency of driving scenarios at different penetration rates

Scaling up of safety effects
Method for efficiency & environmental impact assessment

- **Direct impacts**
  - T&T evaluation
  - Mature ADFs
    - Penetration rates, fleet composition
    - Changes in driving behaviour / vehicle operations
- **Indirect impacts**
  - Safety IA
    - Changes due to impact on incident-induced congestion
  - Mobility IA
    - Changes due to impacts on mobility behaviour
  - Traffic simulation
    - Emissions simulation
  - Other assessment
  - Estimated changes in travel time and emissions per traffic scenario

- Scaling up of efficiency and environmental impacts to EU28
Method for socio-economic impact assessment

- **Safety IA**: Impacts on safety, in number and severity of accidents
- **Efficiency IA**: Impacts on efficiency in travel time
- **Environmental IA**: Impacts on environment in fuel consumption & emissions
- **System costs (in-vehicle equipment and infrastructure)**

**Impact valuation**

- **Net annual benefits**
- **Benefit-cost ratio**

**Overall society** vs **Stakeholders**
Foundation for successful evaluation

- Harmonised approaches across pilot sites, established partnerships between evaluation and pilots
- Smooth data flow from pilots via tools to all evaluation methods
- Multidisciplinary evaluation methodology
- Well-defined and tested evaluation plan for all research questions
More information on L3Pilot methodology

Deliverables

• D3.1 From research questions to logging needs (2018)
• D3.2 Experimental procedures (2019)
• D3.3 Evaluation methods (2019)
• D3.4 Evaluation plan (expected 2020)

Available for download at https://l3pilot.eu/download/
Thank you for your kind attention.

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