SINGAPORE 2019

26th ITS World Congress
21–25 October

Smart Mobility, Empowering Cities

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Methodological challenges related to real-world automated driving pilots

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L3Pilot
Driving Automation
1,000
drivers
100
cars
10
countries

FOT vs. On-road pilot

- ***FOT*** *(Field Operational Test)* is "*to evaluate functions, under normal operating conditions in road traffic environments typically encountered by the participants using study design so as to identify real-world effects and benefits*"
- Large-scale tests with *ordinary drivers* using the system as part of their daily lives

- ***Pilot*** is "*to test novel practices or technologies*" where the main characteristic is "*to be implemented on a smaller scale than that of the ultimate objective*"
- Controlled tests with safety drivers of systems at an earlier technology readiness level (prototypes)
- Produces partly indicative estimates of impacts with assumptions about the eventual use of market-ready versions

Methodological challenges and solutions
Set-up of the experiments

Challenges:

- Testing is restricted by many factors
- It not possible to study the interactions and behaviour of ordinary drivers, using the vehicles during their daily routines

Solutions in L3Pilot:

- Feasibility of research questions checked against possibilities for data provision (sensors, logging, features of test rides) as well as the role and type of participants (drivers)
- Equipping vehicles with driving-school-style pedals, or ordinary driver in the passenger seat

Methodological challenges and solutions
Assessing the impacts on driving behaviour

Challenges:

- Non-mature prototype system may not fully offer a representative and realistic driving scenario
- Collected data may limited to certain test routes, within certain speed ranges, and in certain weather conditions
- Important to ensure that vehicle telemetry data is kept confidential also within project

Solutions in L3Pilot:

- Use of ‘mature’ ADF descriptions for impact assessment
- Sophisticated data sharing process designed to anonymize the data
- Common data format, methodology and analysis toolkit for all
- Merging of results from several pilot sites

Methodological challenges and solutions
Assessing of user experience and acceptance

Challenges:

- Exposure to prototype HMI and AD control systems, potentially resulting in unpleasant driving and interaction experiences
- Participants not able to use the systems in their daily lives
- Participants either being trained safety drivers or being recruited from the OEM workforce

Solutions in L3Pilot:

- Behaviour and opinions of those who have participated in the test rides arguably have some value, and may be more valid, than those who have had no such physical experience
- Some aspects excluded from U&A study
- Supplementing methods to fulfil some of the gaps in the field tests

Methodological challenges and solutions
Assessing of societal impacts

Challenges:

- Complexity of assessment
- Additional level of assessment, involving the assessment of any differences between piloted versions of prototypes, and their mature version
- Selection of a meaningful baseline
- Influence of the other trends affecting mobility and transport

Solutions in L3Pilot:

- Combining different best-practice solutions for different evaluation areas
- Mature functions are defined with OEMs
- Baseline selection based on available data and statistics
- Snap-shot approach for socio-economic assessment

Conclusion

- Started with methods developed and used for ADAS adapting and further developing them for SAE level 3 automation
- L3Pilot method relates to the full chain of assessment
- Evaluation process can be adapted to suit the needs of automated driving pilot projects - as long as some caveats related to the pilot nature of automated driving studies are acknowledged
- AD pilots provide important insights into the impacts of automated driving on their users, other road users and society
    - As these systems mature, large-scale field operational tests will be needed as (closer to) ex-post evaluation, to verify the assessed impacts

Acknowledgements

- Co-authors of this paper
  - Natasha Merat & Tyron Louw, University of Leeds
  - Barbara Metz, WIVW
  - Thomas Streubel, Chalmers University of Technology
  - Christian Rösener, ika

- L3Pilot project (www.l3pilot.eu)

  The research leading to these results has received funding from the European Commission Horizon 2020 program under the project L3Pilot, grant agreement number 723051. Responsibility for the information and views set out in this publication lies entirely with the authors. The authors would like to thank partners within L3Pilot for their cooperation and valuable contribution.


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