euroFOT: LARGE SCALE FIELD OPERATIONAL TESTS

IMPACT ASSESSMENT

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ABSTRACT

This paper discusses the approach for impact assessment that will be applied in the euroFOT project. The euroFOT project aims to investigate the impacts of advanced driver assistance systems (ADAS) and to encourage the deployment of these. Started within the seventh framework programme the euroFOT project will establish a comprehensive, technical and socio/ economic assessment program for evaluating the impact of ADAS on safety, environment and user-acceptance in real environment. The approach is based on the FESTA handbook, which provides guidelines for the conduction of field operational tests (FOTs). The handbook is adapted according to the specific requirements of the euroFOT project. The impacts on traffic efficiency, safety, environment as well as user acceptance and driver behaviour of the systems installed in the vehicles are studied.

Topic: ITS deployment challenges
Subtopic: Field Operational Tests
Keyword: FOT, impact assessment, FESTA

INTRODUCTION

euroFOT intends to analyze the efficiency of ADAS in real environment with normal drivers and for a period of time that enables the collection and processing of data in a statistically sound way. Extensive field operational tests will be used to assess the impact of ADAS in real traffic, in order to determine in which ways the effectiveness of ADAS regarding traffic efficiency, safety, and environment can be improved. Altogether 1500 test vehicles from different manufactures and different ADAS take part in the FOT. The results of the evaluation will offer valuable information for the short and long-term impact of ADAS. The project duration is 40 months.

euroFOT will investigate systems that are already present in the market or sufficiently mature to represent a commercial application. Based on the recommendations on existing roadmaps and on the availability of well developed systems, the following group of 9 systems has been selected for euroFOT:

1. Longitudinal systems: Adaptive Cruise Control (ACC), Forward Collision Warning (FCW) and Speed Limiter (SL)
2. Lateral systems: Lane Departure Warning (LDW), Impairment Warning (IW) and Blind Spot Information System (BLIS)

3. Advanced applications: Curve Speed Warning (CSW), Fuel Efficiency Advisory (FEA) and Safe Human-Machine Interaction (SafeHMI)

These functions will be tested in different vehicles from different European OEMs using different data acquisition systems.

This paper presents primarily the sub-project “Methodology and experimental procedures” and “Evaluation, impact assessment, socio-economic cost-benefit-analysis” and here especially the approach for the impact assessment. The project also includes an analysis of the user acceptance and user-related-aspects and a socio-economic cost-benefit-analysis, which will be mainly based on the results of the impact assessment.

Before the start of the field operational test project, the FESTA project [3][4] developed a methodology for performing a FOT, including the impact assessment. These guidelines will be used as a basis, see Fig. 1. They have to be modified and extended according to the requirements of euroFOT. The structure of the data analysis plan is based on FESTA, but in each of the single steps of the data analysis (data processing, performance indicators calculation, etc.) choices have to be made to tailor the FESTA method to the needs of euroFOT. This paper will discuss these choices and present the impact assessment methodology that will be followed.

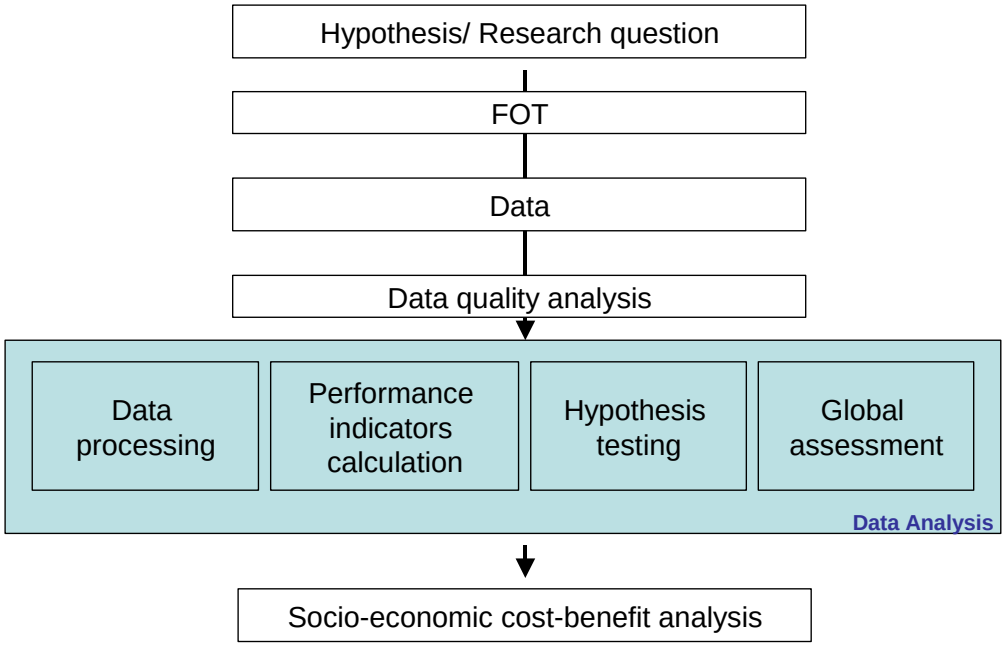

Fig. 1: FOT methodology with focus on data analysis

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The methodology of euroFOT is covered in the sub-project “Methodology and experimental procedures” and will use FESTA as a starting point. Other methods available, such as the ones used in eIMPACT [2] and AIDE [1], will also be considered. First, hypotheses and research questions are specified by the consortium partners for each of the systems. In order to answer the research questions (and confirm the hypotheses or not), data are collected and clustered into specific events (e.g. overtaking manoeuvres, lane changes etc.), situational variables (e.g. weather condition, number of lanes, road type etc.) and performance indicators (e.g. turning indicator signal, maximum acceleration, average speed etc.). The raw data from the data loggers within the vehicles needs to pass a data quality check and data

processing by means of software tools. Based on the indicators that are calculated the assessment of the hypotheses can be conducted. Finally a global assessment will be achieved by using simulation models, which enables analysis of higher penetration rates and network level effects.

The impact assessment covers the impacts on safety, traffic efficiency and environment.

- **Impacts on safety:** Within the safety assessment subtask, traffic safety effects, e.g. estimation of expected accident risk reduction, will be investigated, so that the reduction of crashes, fatalities and injuries by using the systems can be estimated. This information will be used for the socio-economic cost-benefit-analysis.
- **Impacts on traffic efficiency:** The direct and indirect (through reduction of accident related congestion) traffic effects of the systems, e.g. travel time, speed, reduction of congestion, will be studied. Effects for higher penetration rates can be analysed using micro-simulation based on the data from the FOT and the specification of the functions.
- **Impacts on environment:** This subtask will determine the effect of the functions on fuel efficiency and emissions.

The results of the FOT represent only a small sample of the overall traffic in Europe. For this reason, simulations of scenarios with higher penetration rates will be carried out for scaling up locally determined effects. Micro-simulation as well as further models will be applied to estimate direct and indirect traffic and environmental impacts.

CONCLUSION

Within the euroFOT project the impact of advanced driver assistance systems will be analyzed using 1500 vehicles equipped with different functions in an FOT. The data will be collected and afterwards evaluated. The evaluation task covers the impact assessment, the user acceptance and usability as well as a socio-economic cost-benefit-analysis. Regarding the impact assessment the impacts on safety, traffic efficiency and environment are considered. Subsequently, a global assessment will be performed using micro-simulation and other models to scale up the impacts of the function to higher penetration rates. Finally a socio-economic cost-benefit-analysis will be conducted.

Currently the consortium is working on the methodology by specifying hypotheses, performance indicators etc. and by describing the process that will be followed in a data analysis plan. The challenge will be to manage an enormous amount of data, which is available for several combinations of systems, and to derive meaningful conclusions. The final paper will offer more insights into the data handling process.

REFERENCES

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Final assessment of methods and specification of the AIDE evaluation methodology

[2] eIMPACT Deliverable D10
Final report

[3] FESTA Deliverable D2.4
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[4] FESTA Handbook