ELISA – Initial Analyses of Impacts of the eHighway System on Traffic Flow

M.Sc. Danny Wauri, Prof. Dr.-Ing. Manfred Boltze
Institute of Transport Planning and Traffic Engineering, Technische Universität Darmstadt
wauri@verkehr.tu-darmstadt.de

Research Questions

ELISA aims to evaluate the eHighway system implemented in a realistic road and traffic operation environment using economic, technical, ecological as well as legal criteria.

Besides gaining experience with the electric infrastructure and monitoring the handling of eHighway trucks in forwarding companies, it is a major goal of ELISA to analyse the integration of this new infrastructure into real-live road and traffic operations.

A major focus will be on traffic flow and driving behaviour analysis.

• Various road user groups will be considered with their specific reactions on the eHighway system.

• Impacts of changes in driving behaviour and regular traffic flow will be analysed.

• Changes which result from the eHighway system during road maintenance services and in incident situations will be investigated.

Moreover, a microscopic simulation model of the traffic flow will be developed, which also allows to derive emission reduction potentials under different vehicle market penetration scenarios.

Methodology

ELISA developed a fundamental evaluation concept concerning aspects of traffic engineering, economic, legal and ecological aspects as well as the respective actor-specific acceptance of the eHighway system.

The comprehensive data collection will be enabled by a permanent, automated recording during the ELISA field trial and will allow conclusions for the evaluation criteria, e.g. regarding the impacts of the eHighway system on traffic flow.

Comprehensive datasets were collected to evaluate traffic flow conditions before the eHighway system was established. These data are used for comparison during and after the eHighway construction. An example is shown at figure 2.

Several hypotheses were formulated including general aspects of driving behaviour, e.g. the legibility of the traffic signs and the eHighway-specific driving behaviour during lane changing or while allowing other road users to merge when they enter the highway.

These hypotheses shall be proved during the ELISA field trial by further analysis of data captured from infrastructure, vehicles, interviews, video analysis and advanced microscopic traffic simulation.

Results

Environmental data and specific data on road user behaviour have to be merged with the traffic flow data to determine interdependencies between those aspects.

As data on acceptance and driving behaviour of specific road user groups cannot be captured from the automated data recording system, other survey methods need to be applied.

To prepare for such surveys, potential impacts of the eHighway system on acceptance and driving behaviour of specific road user groups were determined considering traffic flow under regular operation, in case of road maintenance services and in case of different types of incidents (figure 3).

To assess possible changes in specific driving behaviour caused by the eHighway, an initial microscopic simulation model was set up based on the current traffic situation.

Further detailed traffic flow analysis will be done in the ELISA project during the eHighway operation from 2019 to 2022.