

**MASTER'S THESIS** Development of an Evaluation Method for Driver Vehicle Interaction

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# EVALUATING THE DRIVER VEHICLE INTERACTION EXPERIENCE

POPULAR SCIENCE SUMMARY **Maria Gustafsson, Anna Tornvall**

The complexity of in-vehicle systems, such as touch-screens and buttons, is increasing. Thus, systems that provide a good interaction experience for drivers are needed. This is accomplished by evaluating the systems continuously during the design process.

The technology used within the vehicle industry is developing rapidly as new features are constantly introduced. Still, it does not matter how well the technology works if the interaction between the driver and the vehicle is faulty. Consequently, we are facing new challenges in the interaction between the driver and the vehicle, and it is more important than ever to design good user interfaces. The key to do this is to optimize the design process and to continuously evaluate prototypes.

Scania CV AB is one of the world-leading providers of transport solutions. For the truck and bus industry it is especially important with well-designed systems that enable an intuitive interaction since the drivers spend long hours or even live in the vehicle. During recent years Scania has been working a lot with the driver vehicle interaction and are often testing prototypes on drivers. However, this is time consuming and costly. They are now interested in a way to evaluate the interaction by the use of experts.

This was accomplished by developing a set of nine evaluation methods, adapted for Scania. The evaluations should be conducted by a group of experts with knowledge within the area of interaction experience as well as the system to be evaluated.

The reason for combining methods is that the driver vehicle interaction is complex and includes numerous important aspects to be considered. Many aspects, such as errors and understanding of functions, can be evaluated by the use of a checklist. This is an effective way to gather both qualitative and quantitative data. Moreover, methods such as Systematic Human Error Reduction and Prediction Approach and Cognitive Walkthrough are recommended. Still, it is difficult to evaluate all aspects without testing with drivers. The reason is that experts cannot experience the same thing as the real end users, i.e. the drivers. It is especially difficult to evaluate the pleasure of using the system and

aspects concerning different personal attributes. Thus, expert evaluations should always be combined with tests with drivers.

In order to make a valid evaluation the context-of-use is important. Today the context is within the cab of the truck or bus, which is affected by the driver, the equipment available, the tasks and the environment. It is important to underline the unique dual task environment that occurs when the driver is interacting with in-vehicle systems while driving. This is a matter of safety. Moreover, the drivers face different challenges depending on the area of application. For example, a city bus driver needs to interact with customers while driving under difficult circumstances in a city, while construction truck drivers are exposed to disturbing vibrations and noise. However, the context will likely differ in the future due to developing technology. This means that the evaluation methods must constantly be adapted to suit the specific context.

The context does not only affect the evaluation methods but also the selection of prototypes. Some aspects are more important to evaluate while driving and therefore require evaluations in a driving simulator or virtual reality, while other aspects can be evaluated by the use of simpler prototypes. An advantage of expert evaluations is that they can be carried out during the entire design process.

