HAVEit

Highly automated vehicles for intelligent transport

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The future of driving.

Deliverable D33.1
Scenario Modeling
and Transition Testing

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Executive Summary

Deliverable D33.1 "Scenario Modeling and Transition Testing" is an intermediate report on the human factor activities during the first year of the horizontal subproject "Joint System" within the European FP7 Integrated Project HAVEit. Highly automated vehicle systems have a lot of potential for increasing comfort and safety and decreasing energy consumption by mitigating overload and underload situations or by using preview information about the road characteristics and the driving situation. However, the experience with highly automated vehicles in other domains like aviation shows that there can be side effects, especially regarding the interaction between automation and operator. In HAVEit, risks and chances of highly automated systems are balanced by an iterative approach of prototyping and tests starting with an initial specification, a clear definition of the use cases, especially regarding the automation transitions, by an instantiation of use cases into testable scenarios, by designing the interaction together with experts and users, by implementing these systems with rapid prototyping and by testing concepts and prototypes in simulators and test vehicles. The deliverable D33.1 describes the first round of this spiral approach of developing, testing and refining with a first design that was already tested with external subjects in a motion based simulator.

After a short introduction, chapter 2 extends and fuses the different use cases described in the previous deliverables into one use case catalogue which is divided into normal, system limit and system failure use cases. This use case catalogue will be continuously extended and refined in the course of the project and can be used as a check list in the demonstrator subprojects (vertical subprojects) of HAVEit. Based on these use cases, an initial selection into testable scenarios that are already implemented in the "SILAB" driving simulator environment, is described below.

Chapter 3 sketches a first transition and interface design that was developed in the rapid prototyping environment SMPLab, based on the workshops with the partners from the vertical subprojects. This chapter can be regarded as a preview to the upcoming deliverable D33.2 "Preliminary concept of optimum task repartition".

Chapter 4 provides a short review of the human factors for the automation background. The setup of the simulator experiment is described in which 16 subjects drove a 50 minute course on a two-lane motorway with scenario elements like car following, lane change, loss of the lead vehicle, wild animals crossing the road, road work and a malfunction of the steering system.

Chapter 5 gives an extended description of the results. These were quite promising, but also show the necessity for further caution and intense human factors work. The drivers had some doubts about the perceived usefulness due to the fact that they still had to constantly monitor the system. However, they had little problems in handling the system and accepted it quite well.

Chapter 6 entails a summary and a brief outlook. Overall, after the first year of the project, the iterative process of specifying, designing, implementing and testing highly automated concepts and prototypes is steady and was demonstrated successfully with the first highly automated systems. This development and test cycle together with the concept and prototypes will be continuously improved and extended throughout the project.

Further iterations of the development process will be described in the future deliverables D33.2 "Preliminary concept of task repartition" and D33.3 "Simulator testing".