

Measuring behaviour of train drivers in a safety-critical task

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Abstract

In the mid 90's of the last century the European train control system ERTMS (European Rail Traffic Management System) has been developed. ERTMS has grown into the international standard for train control.

The current train control system in the Netherlands (ATB) works properly, but gets out-dated and therefore it is decided to replace it with ERTMS. ERTMS must be built into both the rail infrastructure and the trains. Such a replacement process takes years to complete, in which train drivers will be confronted with both train control systems.

This is the background for carrying out a field test with ERTMS in 2014-2015 on the track Amsterdam-Utrecht. For this test many research questions have been formulated, including questions related to the effect of driving with ERTMS on the train driver. The key point in these questions is the impact on the (mental) workload of and the probability of errors by the train driver.

A consortium of Intergo, the Netherlands Aerospace Centre (NLR) and ErgoS Engineering has been dealing with these human factors research questions. For the answering, there has been made use of field research on the driving behaviour of the train driver, simulation research and more qualitative research methods such as questionnaires, workshops, literature research and expert judgement. The whole research has been conducted as a comparative research in which driving with ERTMS is compared with driving with ATB. Because the driving task of the train driver has a distinct visual component, eye tracking has been used in the simulation research.

Ecological validity of the research was of great importance, because the results will provide input for the decision making on the ERTMS implementation strategy. However, field research is unruly, especially if it is on a safety-critical task like driving a train.

The presentation addresses the chosen research methodology and the lessons learned for the practice of human factors field research.