Final Report Summary - ADAPTATION (Drivers' behavioural adaptation over the time in response to ADAS use)

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Project objectives

Understanding Drivers' adaptation processes in response to Advanced Driver Assistance Systems (ADAS) and identifying recommendations for ADAS design and safe use are two major challenges ADAPTATION ITN has chosen to face. For that, ADAPTATION ITN gathers ten well-recognised European organisations (universities, research institutes and industrial partners) working on drivers' behaviour research and Advanced Driver Assistance Systems (ADAS) design.

The aim of the project was to boost the career perspectives of young researchers by allowing them to conduct doctoral or postdoctoral research projects within the framework of a European research network. The research programme integrates, under a joint theoretical framework and a joint longitudinal methodological design, a set of individual projects dealing with the various aspects of the adaptation process, including not only observable behavioural changes, but also changes in energetic, cognitive and motivational processes.

In addition to training-through research, personalized training actions were implemented during the ITN lifetime in order to accelerate acquisition of skills in Human Factors applied to ADAS design, favour multi-disciplinary approaches, to strengthen abilities to disseminate research results and to widen the career prospect with complementary skill on team and project management.

ESR and ER appointments

An essential element of ADAPTATION was the appointment of highly skilled early-stage researchers (ESR) and experienced researchers (ER) to take part in the research, training and transfer of knowledge programmes of the network. During the lifetime of the project, 10 ESR and 2 ER have been recruited within the consortium for respectively 36 and 24 months, through two recruitment campaigns.

The ESR and ER recruitment was a success. ADAPTATION fellows are high-skilled and motivated researchers. They have an education background mainly in Human Sciences including Ergonomics, Human Factors, Neurosciences and Psychology. The research staff includes also two ESR coming from automotive engineering and Computer sciences. The quality of the exchanges and cooperation within the network were very good among ESR and between ESR, ER and senior researchers.

Training programme

Six training events were organized during the lifetime of the project to meet the three objectives of ADAPTATION training programme:

• an ADAS showcase demonstration tour
• a seminar on “Human factors issues related to ADAS use by accessing and evaluating recent scientific results”.
• a seminar on “Development of research career in Europe”
• a lecture on “How to improve writing skills”
• a seminar on “Project and Team management”
• a seminar on “Knowledge management and innovation”

Three team learnings were held in order to implement co-operative exchanges between ESR with different backgrounds for developing their interdisciplinary skills. The objectives were to discuss theoretical concepts, to share knowledge concerning research instruments and tools, to clarify doubts about methodological aspects and to foster joint
Each training event was assessed by the attendees in order to improve the quality of the next activities and to adapt if necessary the training program in terms of contents and/or didactics. The different training events were positively evaluated by attendees. They fulfilled the ESR's expectations.

Main scientific results achieved

1. Identification of the role of practice in order to attenuate or overcome initial age-related difficulties and to reduce workload related to the use of ADAS
2. Identification of the potential of ADAS to support older drivers with mild cognitive or physical impairments
3. Identification of key motivation factors in order to understand ADAS use and impacts on driver behaviour
4. Elaboration and validation of new methods for assessing mental models and situation awareness in the context of using ADAS
5. Evaluation of the effects of inappropriate driver's mental model of Adaptive cruise control (ACC) on misuses of ACC
6. Interest to combine behavioural and electrophysiological measurements to assess the effectiveness of forward collision warning systems
7. Identification of drivers' behavioural strategies in response to mobile phone use while driving
8. Design and evaluation of Workload-adaptive cruise control prototype
9. A new approach for distraction and inattention prevention by combining Behaviour-Based Safety with Advanced Driver Assistance Systems
10. Identification of the risks of behavioural adaptation of unequipped vehicle drivers facing equipped vehicle drivers such as platoons
11. Design of an intuitive interface, a metalanguage and an interoperability framework for modelling scenarios on driving simulators
12. Design and implementation of a database for behavioural data storage and analysis

Dissemination actions

Two special sessions have been organized during the 5th edition of the International Conference on Traffic and Transport Psychology that be held in Groningen, the Netherlands on 29-31 August 2012. One session concerns Effect of ADAS use on information processing processes and the second session, Behavioural adaptation of drivers in response to ADAS use.

A symposium on Drivers' Behavioural Adaptation to Information and Assistance Systems conclude the project. The symposium took place in Vienna, Austria on 21-22 November 2013 and was a success. Members of the network presented insights obtained within ADAPTATION ITN and related them to a broader context of applied human factors research. The presentations were rich in variety and included the results of high quality research. The symposium was attended by nearly 40 participants.

Details on the research findings generated within the ADAPTATION ITN can be found in the book Driver Adaptation to Information and Assistance Systems, published End 2013 by the IET (363pp, ISBN: 978-1-84919-639-0). The book, which is organised into 17 chapters, presents the main achievements both at the level of each doctoral or post-doctoral research project and at the level of the network by offering a comprehensive picture of the project outcomes considering the role of system characteristics, the differences between driver populations and the user support strategies for deployment of ADAS. Three types of recommendations based on the results and experience gained within the ADAPTATION are given: future research prospects concerning drivers’ behavioural adaptation to ADAS, methodological recommendations to address the challenges related to this research and operational suggestions towards improved design and deployment of ADAS.

Results were presented at various international conferences. 10 peer-reviewed papers have been already published. Numerous results are currently submitted or in preparation for publication (~7 papers).

Related information

### Result In Brief
- Optimising advanced driver assistance systems

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Subjects

Education and Training - Scientific Research

Last updated on 2015-05-06
Information source: SESAM
Retrieved on 2016-01-07

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