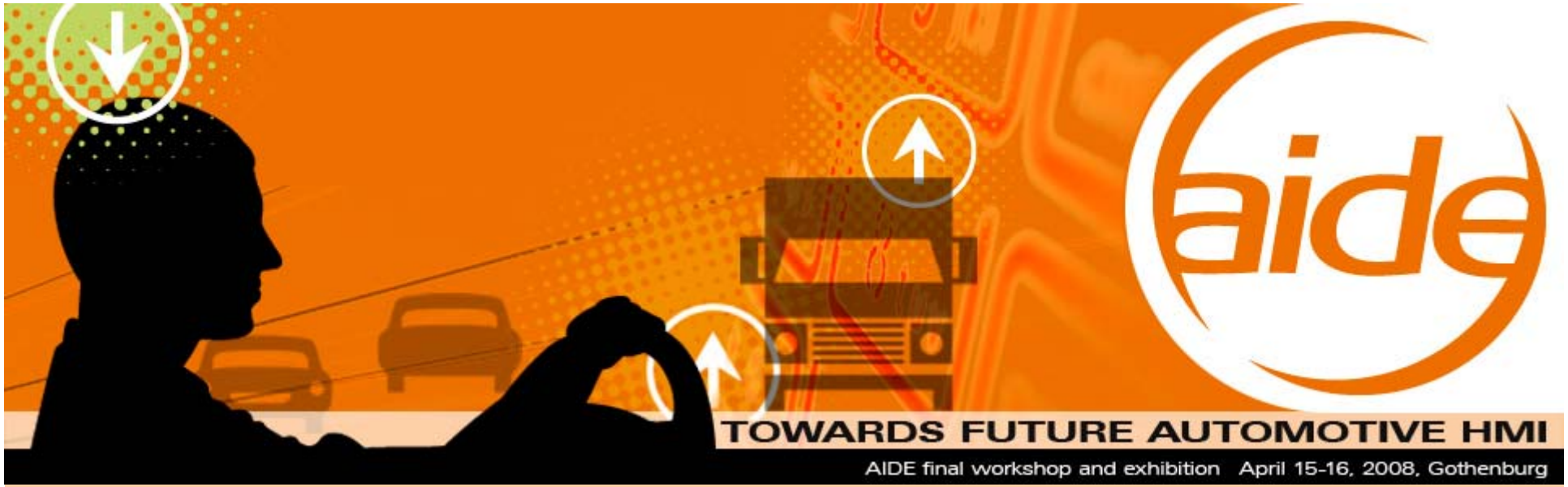


Behavioural Adaptation to Driver Assistance systems

Introduction on objectives and overview of experiments

Farida Saad

SP1 Research activities within the AIDE Project

- Studying short and long term behavioural adaptations to driver various driver support systems

- Defining the layout of a models of driver behaviour that support the design and development of integrated tools and interface

Main Objectives of BEDA

To Identify the main classes of problems for studying behavioural adaptation induced by different driver support systems

To highlight the issues to be considered prior to planning new studies within the AIDE project : literature review

To carry out studies for studying short and long term behavioural adaptation to various assistance systems

To identify the most relevant parameters and variables that affect driver behaviour for modelling purposes

Literature review on previous research studies

The diversity of behavioural changes studied and observed

The results obtained are sometimes contradictory, sometimes similar

Observed diversity may be due to

- The functional characteristics of the support systems studied
- The methods used, the type and number of variables selected for assessing the impact of the system, and finally the (implicit or explicit) model governing their choice

The importance of the situational context and the collective dimension of driving

- Influence of the overall traffic conditions and of the characteristics of the road infrastructure on the decision to use the support systems and on the magnitude of the behavioural changes observed when using them
- Use of the support system and interactions with other road users

The differential impact of driver support systems

- Personality traits, Driving style, …

Literature review on previous research studies

- Impact of various individual support systems such as Collision Avoidance System, Speed Limiters or Adaptive Cruise Control

- Studied either in a controlled context (driving simulator) and/or in the complexity of real driving situations

- Most of the research: Short or medium term studies

- Learning process: very few studies

Main issues : The circumstantial conditions

- The nature and extent of behavioural changes associated with the use of various driver support systems
- The conditions in which these changes take place
- The “reasons” why these changes occur
- The characteristics of the drivers more likely to present these behavioural changes
  - As a function of the type of support systems being studied (informative, prescriptive or intervening systems)
  - As a function of similar driving situations or tasks and/or of drivers’ common characteristics

Main Issues : The temporal conditions

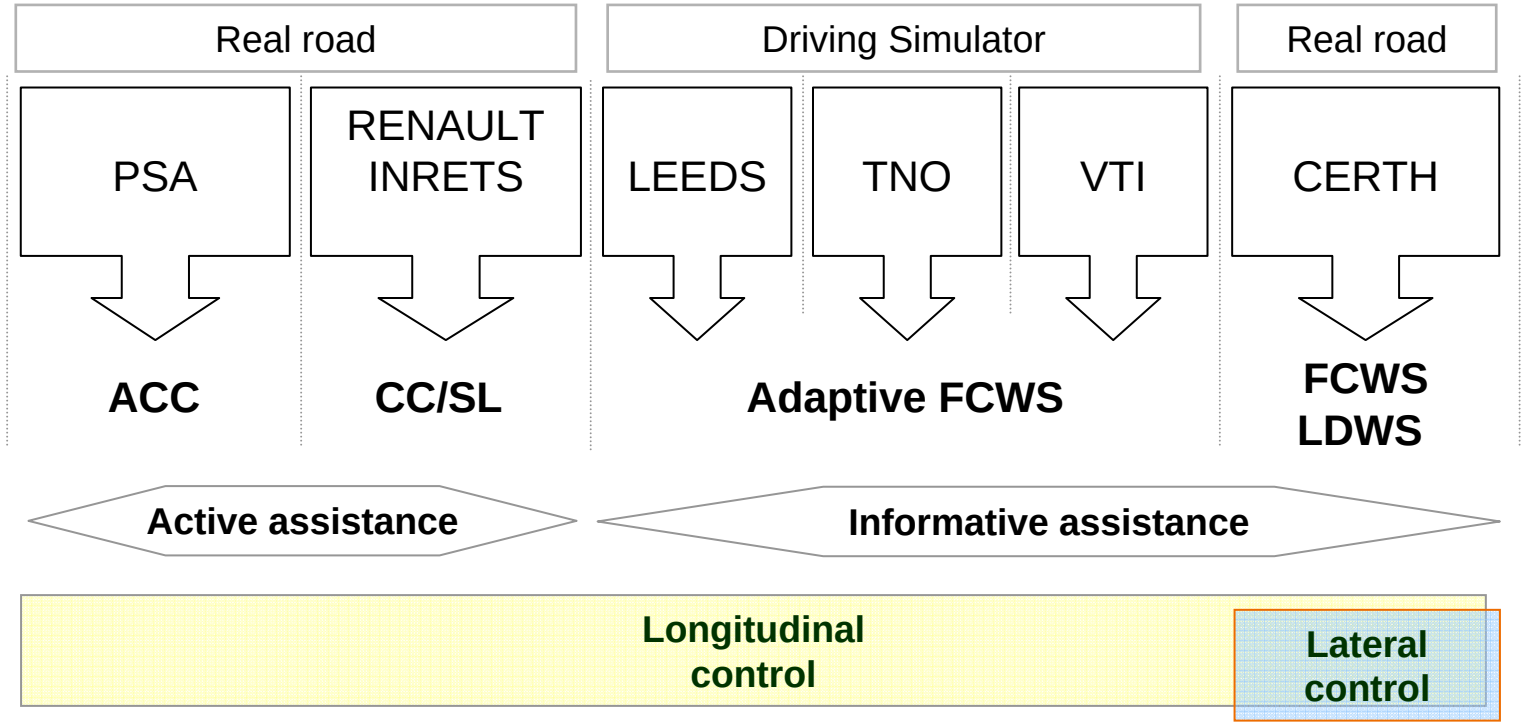
Learning and appropriation phase

- The driver discovers the system
- Learns how it operates,
- Identifies the precise limits of its competence and delimits its domains of utility

Integration phase

- The driver, through experience with the system(s), reorganises his/her activity by integrating the system in the management of the overall driving task
- **To assess the temporal span of the different phases**
- **To identify means for optimising the learning and integration processes**

Learning and short term studies : Systems studied



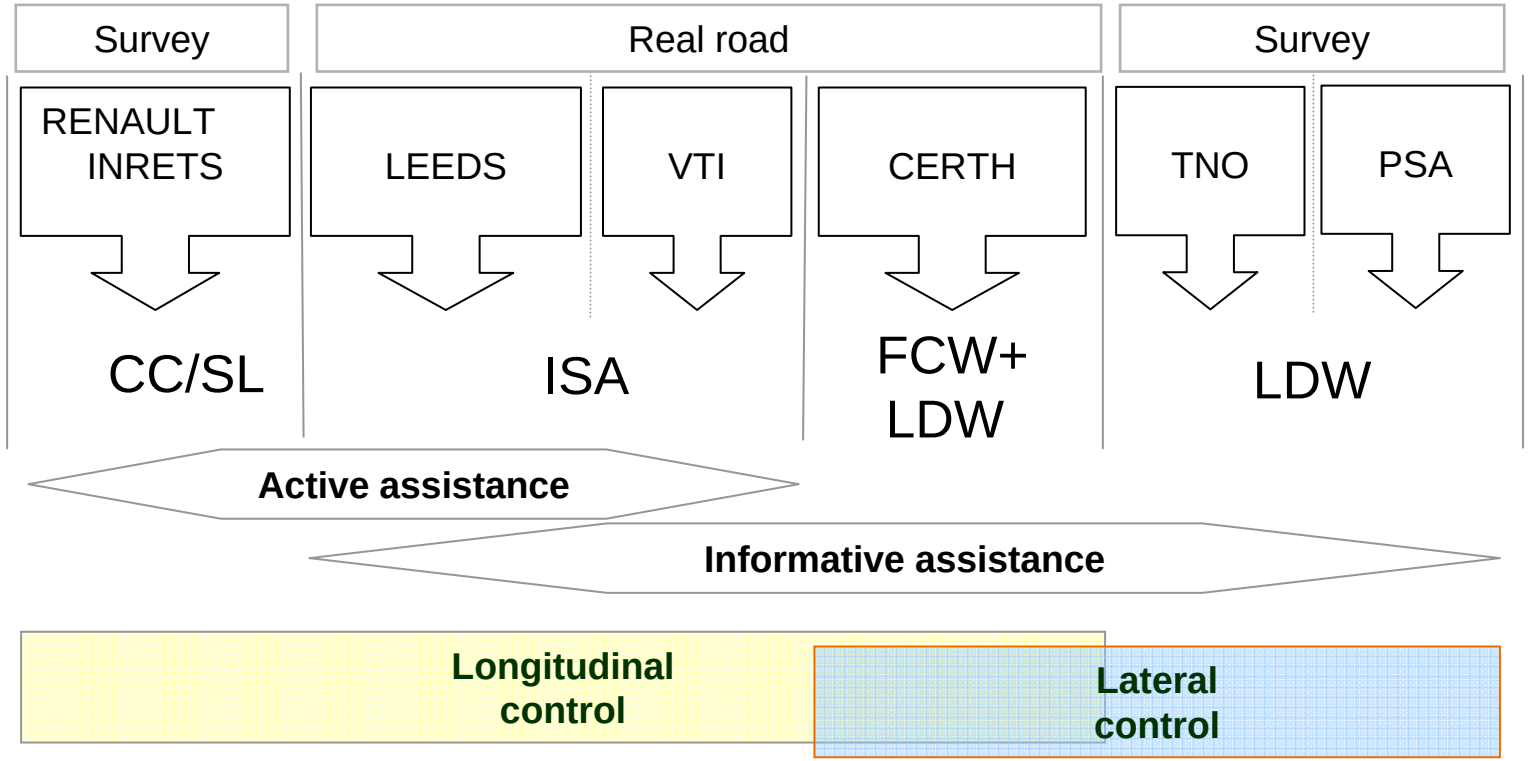
Learning and short term studies

Learning phase	HIT	LEEDS-TNO-VTI	PSA	INRETS-RENAULT
Identifying the main phases of the Learning process	X	X	X	X
Identifying and assessing short term behavioural changes	X	X	X	X
Contribution to the design		Design of adaptive system	Self-Explaining systems and/or support for learning	Self-Explaining systems and/or support for learning
Contribution to modelling	X	X	X	X
Studying drivermental modef of and trust in		X	X	

Learning and short term studies

- Advanced Drivers Assistance Systems (ADAS) dedicated to the main safety critical driving tasks:
  - Time-headway control,
  - Speed control
  - Lateral control
- The systems varied according to their **modes of intervention** (warning or direct intervention) and their **degree of adaptability** to the situational context or to the drivers' situation and characteristics.
- The studies also provide an opportunity for examining the effects of **combining several ADAS** during the driving process.
- The studies carried out have the required variety for dealing with the critical issue of Behavioural Adaptation.
- At the same time, the studies have sufficient similarities and complementarities to permit relevant comparisons of the results obtained and to provide sufficient evaluation data for use in the models developed in AIDE

Long term studies : Systems studied



Long term studies

Long term phase	HIT	LEEDS -VTI	PSA -TNO	INRETS-RENAULT
Identifying the main phases of the integration process	X	X	X	X
Identifying and assessing long term behavioural changes	X	X		
Contribution to the design			Design of adaptive function	Self-Explaining systems and/or support for learning
Contribution to modelling	X	X	X	X
Studying driver mental modef of and trust in	X	X	X	X

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