



# Characterizing driver capability for transition from automated to manual driving

## Problem description

Automated vehicles has attracted considerable attention from public recently. Combined longitudinal and lateral control systems, e.g. Adaptive Cruise Control and Lane Keeping Systems, can automate most of the driving tasks in highways. While many efforts have been devoted to the development of automation technologies, driver still plays an important role in operating vehicles in automated driving systems up to Level 4 of Automation, particularly when transitions from automated to manual driving are needed. One of the main challenges is then to ensure that the transition from automation to human driver is realized safely. This will need to identify whether the driver can handle the current driving tasks and those during the transition safely. However, the driver capability has not been understood sufficiently and it is challenging to identify whether the driving context currently controlled by automated systems and its short-term evolution is safely controllable by human drivers.

## Objectives & Assignment

The objective of this study is to construct a method to describe the capability of human drivers. A safe operation bound will be defined to describe the driver capability as a subset of vehicle states and a dynamic model will be built to predict the future evolution of the vehicle. The method combines the safe bound and prediction model to assess the feasibility of transition from automated and human driving.

The assignment includes:

- Review of the state-of-the-art with respect to human capability in driving;
- Design of the conceptual model framework for driver capability;
- Development of the safe operation bound and dynamic model;
- Collect data from driving simulator experiments and/or naturalistic driving;
- Validation of the method using experimental or empirical driving data;
- Propose recommendations for design of transitions between automated and human driving.

## Supervisor

Supervisor: Dr. Meng Wang, Department of Transport & Planning

## External support

TBD (Possibly experts from TNO or SWOV)

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