A first glance at Driver Alert Control in FOT-data.

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I. INTRODUCTION

Driver Alert Control (DAC) is a technology designed to alert tired and distracted drivers. The function monitors the car's progress between the lane markers and warns the driver if his or her driving pattern changes. The aim of this study is to assess DAC warning events when the system is used in real world traffic.

II. METHODS

FOT-data [1] was collected in Volvo cars both in treatment mode, i.e. with DAC HMI enabled, and in baseline mode with the DAC signal recorded but with the HMI disabled. In a sample of 402,254 km, the DAC availability was 88% of the distance driven at speeds >65 km/h which is the activation speed for DAC. In treatment mode, the drivers chose to have the system activated in 100% of the time. In both treatment and baseline driving mode, altogether 125 DAC warning events were indentified for a DAC-event database. In this database, information on driver behaviors and actions annotated from videos were combined with car sensor data. For example, the DAC-signal screens the driver according to the car's progress between the lane markers in a 5-graded scale where 1 corresponds to a warning and 5 to normal driving. Recovery time was defined as time needed to return to normal driving. Hence, an event timeline was created that captured both vehicle- and driver actions before, during and after the warning-event. The data was then summarized and analyzed to evaluate the DAC functionality.

III. RESULTS

At the time of the 125 DAC warning events in both treatment and baseline mode, 96% were related to driver distraction or tiredness; in 56% the driver was distracted, in 20% tired and in another 20% both tired and distracted. In 4%, the warning was associated with the road and driving performance. Examining recovery time for all relevant warnings, 39% of drivers in treatment mode and 31% in baseline mode recovered within 2 minutes.

IV. DISCUSSION AND CONCLUSIONS

Driver Alert Control functionality was found promising when examining the usage, availability and the relevance of warning events. In 96%, the warning was related to driver distraction and/or tiredness. A minor difference was found between treatment- and baseline mode in driver response to the warning. This pose a challenge in DAC HMI design. FOT-data were found valuable in investigating the warning events of an active safety system, although video data annotation proved to be demanding. Especially the development of validated methods for annotation of tired and distracted drivers in video data is an essential topic for future studies.

V. REFERENCES

[1] http://www.eurofot-ip.eu/

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