

**TRA2014 – Invited Session no. 33 (18090)**  
**"The first-large-scale naturalistic driving study in Europe"**  
**Thursday 17 April 2014; 14:00-15:30**

Naturalistic Driving (ND) is a research method/approach undertaken to provide insight into driver behaviour during everyday trips by recording details on the driver, the vehicle and the surroundings through unobtrusive data gathering equipment and without experimental control. While in the US the SHRP2 study is underway, in Europe the UDRIVE project has started the first European large scale ND study. In seven countries data on the behaviour of truck drivers, car drivers and riders of Powered Two-Wheelers are collected and analysed.

Naturalistic Driving studies used to have a strong focus on understanding behaviour and situations that may lead to incidents and accidents. The aim of this special session was to go beyond this focus. We discussed how ND studies can contribute to addressing societal needs, providing recommendations for not only safer but also for more sustainable transport and improved mobility. We aimed to answer three questions:

- What can we learn from ND studies, not only about for safety-related behaviour, but also about eco-driving and mobility?
- What are the differences between studying different types of road-uses, and what are the specific characteristics of ND studies of motor-riders?
- How can we exploit the results of ND studies?

Three presentations were given:

**Rob Eenink** (Head of Road Safety Research Department, SWOV Institute for Road Safety Research, [Rob.Eenink@SWOV.nl](mailto:Rob.Eenink@SWOV.nl)): "Background of Naturalistic Driving Studies, the experiences gained in the US and the lessons-learned that will be applied in the European UDRIVE study"

**Oliver Carsten** (Professor of Transport Safety, Institute for Transport Studies, University of Leeds, [o.m.j.carsten@its.leeds.ac.uk](mailto:o.m.j.carsten@its.leeds.ac.uk)): "What we can learn from ND studies, not only about for safety-related behaviour, but also about eco-driving and mobility"

**Martin Winkelbauer** (Senior Researcher KFV (Kuratorium für Verkehrssicherheit, [martin.winkelbauer@kf.v.at](mailto:martin.winkelbauer@kf.v.at)): "Studying different types of road-users, and the specific characteristics of ND studies of motor-riders"

The session was moderated by Yvonne Barnard (project manager ERTICO – ITS Europe, [y.barnard@mail.ertico.com](mailto:y.barnard@mail.ertico.com))

**Background of Naturalistic Driving Studies, the experiences gained in the US and the lessons-learned that will be applied in the European UDRIVE study**

The session started with an overview of the UDRIVE project by Rob Eenink. UDRIVE (eUropean naturalistic Driving and Riding for Infrastructure & Vehicle safety and Environment, [www.udrive.eu](http://www.udrive.eu)) is a four-year project in the 7th EU Framework Programme. It has 19 partners from 10 countries. The project aims to increase our understanding of road user behaviour and contribute to meeting the European road safety and environmental targets by conducting a large-scale Naturalistic Driving study in Europe. 120 cars, 50 trucks and 40 powered two-wheelers are being instrumented and will collect data for 21 months. UDRIVE will build one central database with collected ND data. After the project these data will become available for other researchers. Within UDRIVE, analysis will be performed of:

- Characteristics of everyday driving
- Crash causation factors and associated risks

- Inattention and distraction
- Car drivers interacting with pedestrians and cyclists
- Rider (PTW) behaviour
- Driving styles in relation to eco-driving

The results will be applied in 4 specific areas:

1. New and promising measures to make traffic safer and more sustainable
2. The potential of ND for monitoring performance indicators over time
3. Driver behaviour models for road transport simulation
4. Exploration of commercial applications of ND data

UDRIVE builds on the work performed in projects such as SHRP2, the large US naturalistic driving study. Experts from SHRP2 are also in UDRIVE's advisory board.

### **What we can learn from ND studies, not only about for safety-related behaviour, but also about eco-driving and mobility**

Oliver Carsten explained that in ND studies on safety, the focus has been almost exclusively on some very small episodes, i.e. on safety-critical events. He compared this with searching for a needle in a haystack. However, there is much more to be learned from ND data, not only in relation to incidents. In UDRIVE, we will also focus on topics such as everyday driving, driving style and eco-driving. For the first topic, some example research questions are:

- Who engages in risky behaviour?
- What driver characteristics influence speed choice?
- Are environmental factors influential on driver behaviour?

For the Eco-driving topic, all the continuous data will be investigated to uncover the potential role of eco-driving and disentangle the effect of infrastructure, congestion and personal driving style. The aim is to reveal the potential of interventions such as new policies and technological solutions.

### **Studying different types of road-users, and the specific characteristics of ND studies of motor-riders**

Martin Winkelbauer discussed ND studies of vehicle other than cars, such as bicycles, motorcycles and trucks. He presented many pictures of the vehicles included in these studies and the way in which they can be instrumented. In UDRIVE vehicles will be instrumented with 8 cameras for trucks and cars and 5 for powered two-wheelers (PTW).

Research questions for PTW in UDRIVE will require information about overall crash risk and share of crash record, exposure, speed, mobility, behaviour, and attitudes and motives. Safety Critical Events (SCE) need to be detected. We have to remember that PTW have one degree of freedom more than cars and trucks. Riders also have often other motives for riding, such as riding purely for leisure, than car drivers or professional truck drivers. Finally their fatality rate is high, often caused by accidents where other vehicles did not notice them and by single vehicle crashes.

For trucks, where exposure is much higher, elements like night time driving, fatigue and sleepiness, and (professional) secondary tasks play an important role. For investigating SCEs, we have to be aware that trucks have a different dynamic threshold and different crash patterns.

Martin concluded with the remark that ND for other vehicles than cars is difficult but definitively worth it.

## Discussion

The discussion with the audience focussed on the following topics:

- Thresholds for detecting safety critical events. The relation between SCEs and real accidents is not yet very clear and validated. We have to uncover patterns for behaviour and events in the data, such as triggers for road departure.
- What will happen when all cars are fully automated and driving autonomously? Will ND studies and data become obsolete in 20 years? The majority did not think that that would be the case soon, we still need information about how people deal with systems, how systems should behave in order to support drivers, and there will still be non-instrumented road-users, like pedestrians, who will interact with the automated vehicles.
- Data re-use. We did some brainstorming on for what purposes ND data could be useful. Examples are car and equipment manufacturers who want to know how drivers interact with their systems and in what situations help and support would be needed. Naturalistic data may provide the behavioural baseline of “normal driving”, which development of ADAS can build on. Road maintenance can benefit from knowledge about for example braking behaviour of heavy vehicles. Fleet owners may be interested in distraction and fatigue.
- In the everyday behaviour study in UDRIVE, we may also look at the environment and the landscape by using video images. UDRIVE is contracting a map provider to get information about the roads where participants drive/ride.
- SHRP2 collected data not only for safety critical incidents, but also for other purposes. Their data can be used and analysed by certified researchers. More information to be found at <http://udrive.eu/index.php/news/70-shrp-2-largest-nds-study-ever-prepares-data-sharing>
- For re-using data after the UDRIVE project, researchers can apply to access the data (raw data, but anonymized), and see the videos at the central data centre. Participants will be asked permission for re-use of their data for transport-related studies. A data protection concept has been developed.

Yvonne Barnard concluded with the next steps in UDRIVE. Currently vehicle adaptation and piloting are taking place and plans for analysis of data are being developed. Recruitment of drivers and riders will start soon and during the summer a start will be made with installation of the data acquisition systems in the participants' own vehicles. In the autumn we expect to have 210 instrumented vehicles on the European roads. Data will be collected for 21 months and analysis will be performed on a part of the data. After the project data will become available for further research.

The FOT-Net Data support action ([www.fot-net.eu](http://www.fot-net.eu)) will support UDRIVE in developing procedures for data sharing. The aims of this project, which started in January 2014, are:

- Support efficient sharing and re-use of FOT datasets
- Develop and promote a framework for sharing data
- Build a detailed catalogue of available data and tools
- Operate an international networking platform for FOT activities

**More information about UDRIVE: [www.udrive.eu](http://www.udrive.eu)**