From FOT to NDS
Recent developments in UDRIVE
The first large-scale European Naturalistic Driving Study

Guillaume SAINT PIERRE
From FOT …

Generally focus on evaluation of systems or functions

UE funded several FOT among which

- SeMiFOT (Sweden-Michigan Field Operational Test)
- euroFOT (8 systems tested)
- Many other smaller projects
- Adaptive Cruise Control
- Forward Collision Warning
- Speed Control System
- Blind Spot Information System
- Lane departure warning / Lane assist / Impairment warning
- Curve Speed Warning
- Fuel Efficiency Adviser
- Safe Human/Machine Interface

- 1000 vehicles
- 9 car manufacturer
- 8 functions
- 1 year observation
To NDS …

Gain experience from FOT & methodology projects.
   • Lessons applied to UDRIVE

Naturalistic Driving Studies tend to focus on crash-explanatory factors

Data collected in both types of studies can be used for many alternative purposes, such as analysis of Environment, Efficiency and Mobility impacts.
5 thematics

- Crash causation and risk
- Normal driving/everyday driving
- Distraction and inattention
- Vulnerable road users
- Driving style and eco-driving
## Facts

<table>
<thead>
<tr>
<th>Project name</th>
<th>“European naturalistic Driving and Riding for Infrastructure &amp; Vehicle safety and Environment”</th>
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<tbody>
<tr>
<td>Project type:</td>
<td>Collaborative project – Large-scale integrating project</td>
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<tr>
<td>Program:</td>
<td>7th EU Framework Programme</td>
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<tr>
<td>Project Coordinator:</td>
<td>Rob Eenink, SWOV</td>
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<td>Consortium:</td>
<td>19 project partners</td>
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<td>Start date:</td>
<td>1 October 2012</td>
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<tr>
<td>End date:</td>
<td>30 September 2016</td>
</tr>
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<td>Budget:</td>
<td>€ 10.617 mio.</td>
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<tr>
<td>EU funding:</td>
<td>€ 8 mio.</td>
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*Logos of project partners*
Europe-Wide Operations

Data collection will take place in seven EU Member States.

United Kingdom
Characteristics:
Operations in two distinct UK regions representing large and small urban areas and rural areas; relatively high congestion

France
Characteristics:
Mixture of urban roads, rural roads and highways; varied traffic conditions

Spain
Characteristics:
Middle-sized city traffic, many interactions between different types of road users; extra-urban ring-road with intersections low traffic density

The Netherlands
Characteristics:
European-wide short and long haul truck driver observation, both highway usage and local distribution

Germany
Characteristics:
Middle-sized city; mixture of urban roads and highway traffic

Poland
Characteristics:
City traffic as well as sub-urban and rural traffic; road infrastructure under-developed with many construction sites

Austria
Characteristics:
City traffic, good road infrastructure, with extensive urban highway network

The choice of operation sites was motivated by aiming at having a good spread over countries with different characteristics in terms of road safety records, road user behaviour, road infrastructure, the presence of vulnerable road users, climate, traffic density, etc.
The Data Acquisition System (DAS)

8 cameras:
- Forward cameras
- Feet camera
- Face camera
- Driver’s action camera
- Passenger compartment camera
- Right blind spot camera

<table>
<thead>
<tr>
<th>Camera Type</th>
<th>Field of View</th>
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<tbody>
<tr>
<td>Forward cameras</td>
<td>110°</td>
</tr>
<tr>
<td>Feet camera</td>
<td>78°</td>
</tr>
<tr>
<td>Face camera</td>
<td>78°</td>
</tr>
<tr>
<td>Driver’s action camera</td>
<td>90°</td>
</tr>
<tr>
<td>Passenger compartment camera</td>
<td>78°</td>
</tr>
<tr>
<td>Right blind spot camera</td>
<td>78°</td>
</tr>
</tbody>
</table>
**Fleet / Data collection**

<table>
<thead>
<tr>
<th>Type of vehicle</th>
<th>Country</th>
<th>Fleet size (number of DAS)</th>
<th>Number of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car</td>
<td>France</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Germany</td>
<td>30</td>
<td>50</td>
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<tr>
<td></td>
<td>Poland</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>UK</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>Powered Two-wheelers</td>
<td>Austria</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Spain</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Truck</td>
<td>Netherlands</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

- DAS is technically validated, currently being piloted
- Data collection start this autumn
Some issues for a large NDS

Issue 1: Data processing

Still a challenge to deal with massive heterogeneous data

Preprocessing & enrichment & harmonization
  • to be made by experienced teams

Video manual annotation still needed

UDRIVE:
  • Centralized database
  • Harmonized pretreatment
  • 4 video annotation and analysis sites
Issue 2: Statistical data analysis

New skills needed To fully utilize information contained in data

Harmonization of definitions across europe
  • Events, triggers, surrogate measures

UDRIVE:
  • New analyses methods
  • Common software toolset developed
  • Allow for cross-country comparisons
  • Investigates:
    • Environmental friendly behavior
    • Vulnerable road users
**Issue 3: road risk vs safety related events**

- The relation between SREs and real accidents is not yet very clear and validated.
- How to search for safety-related and surrogate events in a large NDS dataset?
- Which safety-related events should we consider to be surrogates?

**UDRIVE**

- Harmonization & data sharing
- Common SRE definitions
- Manual video coding
- 21 months / data logger (210)
Issue 4: Using data

Recent ND studies on safety
- focus on some very small episodes, i.e. on safety-critical events.
- searching for a needle in a haystack

Much more to be learned from ND data

Examples of RQ from UDRIVE:
- Who engages in risky behaviour?
- What driver characteristics influence speed choice?
- Are environmental factors influential on driver behaviour?
Issue 5: re-using data

Car and equipment manufacturers
- How drivers interact with systems
- Identify gaps in the driving assistances

NDS may provide the behavioral baseline of “normal driving”
- Development of ADAS

Road maintenance can benefit from knowledge
- Braking behavior of heavy vehicles
- Fuel efficient roads characteristics.

Fleet owners may be interested in distraction and fatigue.

UDRIVE:
- Common corpus of data available for further studies
- Inspire & share definitions across NDS studies
Summary

UDRIVE takes into account previous experiences

• Data sharing
• Common definitions & methodology
• Common software
• Comparisons across countries
• Exploitation of all the data, not only for safety issues

Data collection start soon!
Thank you for your attention

With the help of:
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R. Eenink, Y. Barnard, M Baumann, X. Augros, F. Utesh, UDRIVE: the European naturalistic driving study, proceedings of the 5th Transport Research Arena 2014, Paris
