Webinar Introduction to FESTA

Performance indicators, study design, sensors and measures

Examples from UDRIVE (first European NDS)

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The FESTA-V methodology

Impact Assessment and Socio-Economic Cost-Benefit Analysis
Performance indicators

• Performance indicators are quantitative or qualitative indicators
• Derived from one or several measures, agreed on beforehand
• Expressed as a percentage, index, rate or other value

Risk analysis
• Tailgating
• Speeding
• Driver distraction
• Lane change
• Overtaking manoeuvre

Eco-driving
• Degree of congestion
• High engine speed
• Close following
• Free flow situation
• High fuel consumption
# Performance indicators

<table>
<thead>
<tr>
<th>Performance Indicator</th>
<th>Needed Measures</th>
<th>Algorithm (sort of)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speeding</td>
<td>- Speed</td>
<td>IF Speed &gt; Speed limit THEN speeding = TRUE</td>
</tr>
<tr>
<td></td>
<td>- Speed limit</td>
<td></td>
</tr>
<tr>
<td>Tailgating</td>
<td>- Distance to front vehicle</td>
<td>IF TTC &lt; 1 s FOR MORE THAN 10 s THEN tailgating = TRUE</td>
</tr>
<tr>
<td></td>
<td>- Speed front vehicle</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Speed</td>
<td></td>
</tr>
<tr>
<td>Amount of high engine speed (%)</td>
<td>- Speed</td>
<td>Signal processing of the velocity in combination with the engine speed</td>
</tr>
<tr>
<td></td>
<td>- Engine speed</td>
<td></td>
</tr>
<tr>
<td>Amount of braking energy (%)</td>
<td>- Longitudinal acceleration</td>
<td>Signal processing of the velocity in combination with the engine speed</td>
</tr>
<tr>
<td></td>
<td>- Lateral acceleration</td>
<td></td>
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</tbody>
</table>
Study design

• Develop study design in order to be able to test hypotheses
  • (A hypothesis is a specific statement which can be tested with statistical means)

• Experimental design:
  • Within-subjects
  • Between-subjects
  • Longitudinal
  • Baseline

• Threats to validity and interfering effects:
  • History, unplanned events
  • Maturation, experience
  • Selection, bias
  • Drop-out
Study design – NDS example

What drivers are needed?
- Age
- Gender
- Driving experience
- Exposure on road type

What questionnaires are needed?
- Sensation seeking
- Locus of control
- Driving style

What vehicles are needed?
- Type (car, truck, Powered Two Wheelers)
- Number of vehicles needed
- Fuel type
- Size (small, medium, premium)
Sensors

- GPS/GSM antenna
- Microphone
- ON/OFF video recording
- MobileEye
- IR Spot
- Automotive Computer
- CAN/3D acc. and connectors adapter
- Cameras
Measures

**CAN data**
- Brake pedal
- Acceleration pedal
- Steering wheel
- Turn signal
- HMI usage

**Map data**
- Road type
- Legal speed limit
- Slope
- Is bridge / tunnel
- Is intersection
- Is one-way-street

**Video annotation**
- SCE verification
- Driver ID
- Secondary tasks

**Questionnaires**
- Demographic data
- Sensation seeking
- Locus of control
- Driver activity

**DAS data**
- Speed
- GPS
- Lat/long acceleration
- Yaw, gyroscope, compass

**Microphone**
- Volume only

**Cameras**
- Wide forward view
- Face cam
- Activity cam
- Cabin cam
- Feed cam
- Blind spot (Truck only)

**Smart camera**
- Lane position
- Position of other road users
- Distance to other road users
Thank you!