INTELLIGENT TRANSPORT: FROM “ASSISTING DRIVERS” TO “AUTOMATED VEHICLES”

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AGENDA

- INTRODUCTION

- ADVANCED DRIVER ASSISTANT SYSTEMS AND AUTOMATED DRIVING

- KEY CHALLENGES AND OBJECTIVES
INTRODUCTION
EUROPEAN ASSOCIATION OF AUTOMOTIVE SUPPLIERS

✓ Founded in 1959
✓ 110 corporate members of the world’s most prominent suppliers for car parts, systems and modules
✓ 25 national trade and European sector associations
✓ Representing more than 3000 companies
✓ 5 million employees
✓ 600 billion € sales
✓ Partner of the EU and the UN
INTELLIGENT TRANSPORT SYSTEM

- Intelligence - How?
**State of the Art**

- ACC (Adaptive Cruise Control)
- LDWS (Lane Departure Warning System)
- Traffic Sign Recognition
- Lane Change Assist
- Blind Spot Detection
- Automated Parking Rear Cross Traffic Alert
- AEBS (Automatic Emergency Braking System)
- Traffic Jam Assist
ADAS and Automated Driving
AUTOMATED DRIVING

• Why?

- Safety
- Efficiency
- Comfort
FROM ADAS TO AUTOMATED DRIVING

➢ Revolution or Evolution?
### Definitions

#### Summary of Levels of Driving Automation for On-Road Vehicles

This table summarizes SAE International’s levels of driving automation for on-road vehicles. Information Report J3016 provides full definitions for these levels and for the italicized terms used therein. The levels are descriptive rather than normative and technical rather than legal. Elements indicate minimum rather than maximum capabilities for each level. “System” refers to the driver assistance system, combination of driver assistance systems, or automated driving system, as appropriate.

The table also shows how SAE's levels definitively correspond to those developed by the Germany Federal Highway Research Institute (BASi) and approximately correspond to those described by the US National Highway Traffic Safety Administration (NHTSA) in its “Preliminary Statement of Policy Concerning Automated Vehicles” of May 30, 2013.

<table>
<thead>
<tr>
<th>Level</th>
<th>Name</th>
<th>Narrative definition</th>
<th>Execution of steering and acceleration/deceleration</th>
<th>Monitoring of driving environment</th>
<th>Fallback performance of dynamic driving task</th>
<th>System capability (driving modes)</th>
<th>BASI level</th>
<th>NHTSA level</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No Automation</td>
<td>the full-time performance by the human driver of all aspects of the dynamic driving task, even when enhanced by warning or intervention systems</td>
<td>Human driver</td>
<td>Human driver</td>
<td>Human driver</td>
<td>n/a</td>
<td>Driver only</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>Driver Assistance</td>
<td>the driving mode-specific execution by a driver assistance system of either steering or acceleration/deceleration using information about the driving environment and with the expectation that the human driver perform all remaining aspects of the dynamic driving task</td>
<td>Human driver and system</td>
<td>Human driver</td>
<td>Human driver</td>
<td>Some driving modes</td>
<td>Assisted</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Partial Automation</td>
<td>the driving mode-specific execution by one or more driver assistance systems of both steering and acceleration/deceleration using information about the driving environment and with the expectation that the human driver perform all remaining aspects of the dynamic driving task</td>
<td>System</td>
<td>Human driver</td>
<td>Human driver</td>
<td>Some driving modes</td>
<td>Partially automated</td>
<td>2</td>
</tr>
</tbody>
</table>

#### Automated driving system (“system”) monitors the driving environment

<table>
<thead>
<tr>
<th>Level</th>
<th>Name</th>
<th>Narrative definition</th>
<th>Execution of steering and acceleration/deceleration</th>
<th>Monitoring of driving environment</th>
<th>Fallback performance of dynamic driving task</th>
<th>System capability (driving modes)</th>
<th>BASI level</th>
<th>NHTSA level</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Conditional Automation</td>
<td>the driving mode-specific performance by an automated driving system of all aspects of the dynamic driving task with the expectation that the human driver will respond appropriately to a request to intervene</td>
<td>System</td>
<td>System</td>
<td>Human driver</td>
<td>Some driving modes</td>
<td>Highly automated</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>High Automation</td>
<td>the driving mode-specific performance by an automated driving system of all aspects of the dynamic driving task, even if a human driver does not respond appropriately to a request to intervene</td>
<td>System</td>
<td>System</td>
<td>System</td>
<td>Some driving modes</td>
<td>Fully automated</td>
<td>3/4</td>
</tr>
<tr>
<td>5</td>
<td>Full Automation</td>
<td>the full-time performance by an automated driving system of all aspects of the dynamic driving task under all roadway and environmental conditions that can be managed by a human driver</td>
<td>System</td>
<td>System</td>
<td>System</td>
<td>All driving modes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Figure 1. SAE Levels of Driving Automation for On-Road Vehicles [acc. Smith, B, W, Stanford Law School, (2013)]*
KEY CHALLENGES AND OBJECTIVES
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• What is a key challenge?
KEY CHALLENGES AND OBJECTIVES

Environmental perception and detection

Driver attendance and involvement

Common validation model and testing requirements

Road system, connectivity and digital infrastructure
KEY CHALLENGES AND OBJECTIVES

User acceptance

Demonstrating reliability, safety and robustness of technology

Regulatory framework
IMPLEMENTATION

„Key position for automotive supply industry and systems providers in Automated Driving“
Thank you!

Stefan Deix, R&I Director