CODE OF PRACTICE FOR AD-FUNCTIONS

Andreas Knapp
WHAT IS OUR GOAL?

Provide a comprehensive guideline with best practices for the development of AD functions:

**Code of Practice** for automated driving.

- Collect best practices on relevant topics.
- Describe a typical process for an automated driving function.
- Include hands-on checklists.
1,000 drivers 100 cars 10 European countries Piloting Automated Driving on European Roads.

**Methodology**
- Fleet

**Data**
- Piloting

**Evaluation**
- Code of Practice

**PREPARE**

**DRIVE**

**EVALUATE**

**DEPLOY** - Europe-wide Piloting Environment - User Studies - Business Studies

ITS World Congress 2018, Andreas Knapp
ABOUT THE PROJECT/WHO IS INVOLVED

• A subproject of L3 Pilot
• Duration: 2017 - 2021
• 34 partners from 12 countries
• Partners in the SP: Daimler, BMW, CRF, Ford, Jaguar Land Rover, Opel, PSA, Renault, Toyota, Autoliv, Aptiv, RWTH Aachen University (ika)
HISTORY OF THE COP

PReVENT: RESPONSE 3 „CoP ADAS“ 2008
AdaptIve: Response 4 „Legal aspects AD“ 2014
L3Pilot: „Code of Practice AD“ 2021
SCOPE OF THE COP-AD

According to SAE document J3016, “Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles”, revised 2018-06-15, see also http://standards.sae.org

Europe

Extent to selected non-EU regions
Extent to selected level 5 robot taxi applications
Extent to driving scenarios in urban / rural environment

Motorway & Parking

0 1 2 3 4 5
### CATEGORIES OF THE „CODE OF PRACTICE FRAMEWORK“

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Function description, system limits, test-/Scenario catalogue</td>
<td>Remote assistance, V2X, MRM etc.</td>
<td>Functional safety, Cyber security, SOTIF, Updates (e.g. over the air) etc.</td>
<td>Provide guidelines for HMI, Mode awareness/confusion, Controllability etc.</td>
<td>Traffic safety (mixed traffic), References to Ethics</td>
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</tbody>
</table>

CODE OF PRACTICE FRAMEWORK.

Development Phases

- Definition Phase
- Concept Selection
- Proof of Concept
- Design Phase
- Verification
- Validation & Sign off
- Post Start of Production Phase

Categories

- Requirements Specification
- System Specification
- Start of Production
# Example Illustration of COP-AD Matrix Structure

<table>
<thead>
<tr>
<th>Safe Guarding Automation</th>
<th>Definition Phase</th>
<th>Concept Selection</th>
<th>Proof of Concept</th>
<th>Design Phase</th>
<th>Verification</th>
<th>Validation &amp; Sign-off</th>
<th>Post Start of Production Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Overall</td>
<td>SOTIF</td>
<td>Overall</td>
<td>Data recording, data privacy requirements</td>
<td>Functional Safety validation</td>
<td>Field monitoring failures, threats, unintended behavior and updates</td>
<td></td>
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<tr>
<td></td>
<td>Definition of the functionality</td>
<td>Architecture selection</td>
<td>Validation strategy / concept validation</td>
<td>Consolidated safety requirements, system or vehicle architecture</td>
<td>Cyber security Penetration Test</td>
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<tr>
<td></td>
<td>Functional Safety Hazard analysis and risk assessment or hazard identification</td>
<td>Cyber Security Threat analysis</td>
<td>Functional Safety</td>
<td>Cyber security Security concept</td>
<td>SOTIF Vehicle testing</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cyber Security Threat analysis</td>
<td>SOTIF Hazard identification</td>
<td>Safety concept</td>
<td>Improved functionality</td>
<td></td>
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<td></td>
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</tbody>
</table>

**ITS World Congress 2018, Andreas Knapp**
### Further steps and results

<table>
<thead>
<tr>
<th>Event/Report</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>International Workshop on the Code of Practice (CoP)</strong></td>
<td>2019</td>
</tr>
<tr>
<td>Based on Report Draft of the Framework for the CoP</td>
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<tr>
<td><strong>Report D2.2 Drafts and results from pilot application of draft CoP</strong></td>
<td>2020</td>
</tr>
<tr>
<td>Presentation of results from pilot application</td>
<td></td>
</tr>
<tr>
<td><strong>Report D2.3 Code of practice for the development of automated driving functions</strong></td>
<td>2021</td>
</tr>
<tr>
<td>CoP final version for publication</td>
<td></td>
</tr>
</tbody>
</table>
THANK YOU

www.L3Pilot.eu

Andreas Knapp, Daimler AG
subproject leader Code of Practice, L3Pilot