Towards a Code of Practice for Automated Driving

Virtual, 9 -10 September
Objectives

Provide a comprehensive guideline with best practices for the development of automated driving functions: **Code of Practice** for automated driving (CoP AD)

- Collect best practices on relevant topics for developers
- Describe a typical process for an automated driving function
- Include hands-on checklists
- Include safety aspects and methods to confirm a safe operation of automated driving functions
Code of Practice History

PReVENT:
RESPONSE 3 „CoP ADAS“
2008

AdaptIVe:
Response 4 „Legal aspects AD“
2014
2017

L3Pilot:
„Code of Practice AD“
2017
2021
Milestones so far

D2.1 Code of Practice framework (2018)
  • Scope of CoP AD
  • Topics and categories
  • Development phases

D2.2 Draft and results from pilot application of draft CoP (2020)
  • Draft CoP with 163 items
  • Based on thorough, iterative improvement process
  • Results from pilot application
CoP AD Development Process

• Distribution of survey to L3Pilot stakeholders
  • Collection of requirements for topics and processes
• Final topic selection based on pre-defined criteria
  • Structuring of topics via categories
• Definition of CoP AD scope and development phases
  • Matching development phases and topics
• Literature review
• Phrasing of draft items
  • Iterative improvement
Scope of CoP AD

Europe

Extent to selected non-EU regions

Extent to selected level 4/5 robot taxi applications

Extent to driving scenarios in urban / rural environment

Motorway & Parking
## CoP AD Categories

### Overall Guidelines and Recommendations
- **Minimum Risk Manoeuvre, Documentation, Existing Standards**

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ODD Vehicle Level</strong></td>
<td>Function Description, System Limits, Scenarios, Testing etc.</td>
</tr>
<tr>
<td><strong>ODD Traffic System &amp; Behavioural Design</strong></td>
<td>Automated Driving Risks, Mixed Traffic Simulation Approach, Ethics, etc.</td>
</tr>
<tr>
<td><strong>Safeguarding Automation</strong></td>
<td>Functional Safety, Cybersecurity, SOTIF, Updates etc.</td>
</tr>
<tr>
<td><strong>Human-Vehicle Integration</strong></td>
<td>Provide Guidelines for HMI, Mode Awareness/Confusion, Controllability etc.</td>
</tr>
</tbody>
</table>
## CoP AD Categories with Topics

<table>
<thead>
<tr>
<th>Category</th>
<th>Topics</th>
</tr>
</thead>
</table>
| Overall Guidelines and Recommendations| • Minimal Risk Manoeuvre  
• Documentation  
• Existing Standards |
| ODD Vehicle Level                     | • Requirements  
• Scenarios and Limitations  
• Performance Criteria and Customer Expectations  
• Architecture  
• Testing (incl. Simulation) |
| ODD Traffic System & Behavioural Design| • Automated Driving Risks and Coverage of Interaction with Mixed Traffic  
• V2X Interaction  
• Traffic Simulation  
• Ethics & other Traffic related Aspects |
| Safeguarding Automation               | • Functional Safety  
• Cybersecurity  
• Implementation of Updates  
• Safety of the intended Functionality (SOTIF)  
• Data Recording, Privacy and Protection |
| Human-Vehicle Integration             | • Guidelines for HVI  
• Mode Awareness, Trust & Misuse  
• Driver Monitoring  
• Controllability & Customer Clinics  
• Driver Training & Variability of Users |
# CoP AD Question Template

<table>
<thead>
<tr>
<th>Question X-Y-Z</th>
<th>Relevant Phase(s)</th>
<th>DF</th>
<th>CO</th>
<th>DS</th>
<th>VV</th>
<th>PS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main question</td>
<td>• Sub-Question 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(  ) Yes / (  ) No</td>
<td>• Sub-Question 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Sub-Question 3</td>
<td></td>
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</tr>
</tbody>
</table>

## Development Phases

- Definition Phase
- Concept Selection Phase
- Design Phase
- Validation & Verification Phase
- Post Start o. Production Phase
How to use the CoP AD

• Implementation of CoP AD is up to the companies:
  • Address the question directly in a dedicated process
  • Include the questions in already existing development processes
• Focus is not on solutions how to handle issues, but on things not to forget when developing automated driving functions
• Relevant questions shall be addressed according to the development phases
• Application might be eased using tools based on CoP AD document
# CoP AD Question Example

<table>
<thead>
<tr>
<th>Question 4-2-9</th>
<th>Relevant Phase(s)</th>
</tr>
</thead>
</table>
| Is the communication to the driver, of the driver's responsibilities in each defined automated driving mode(s) investigated and confirmed? | • Is a method implemented to clearly inform the user of his responsibilities and of vehicle capabilities and possibly of the result of not acting within these capabilities?  
• Is the communication to the driver, of the ADF’s capabilities in each defined automated driving mode(s) investigated and confirmed?  
• Is there clear information in the user's manual, about the ADF's boundaries, and has this been confirmed?  
• Is additional training material to communicate the ADF’s boundaries and the user's responsibilities considered?  
• Is a process defined on how the user will be informed about any new potential functionality of the ADF based on software updates? |
| ( ) Yes / ( ) No |
Outlook

• Gather feedback on D2.2 Draft and results from pilot application of draft CoP
• Incorporate feedback into final CoP AD
• **D2.3 Code of Practice for the development of automated driving functions (2021)**
• Dissemination activities
• Provide support for easy application of CoP AD
Thank you for your kind attention.

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