

# 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



Data



Fleet



Piloting



Evaluation



Code of Practice



PREPARE

DRIVE

EVALUATE

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



Traffic Jam



Motorway



Parking

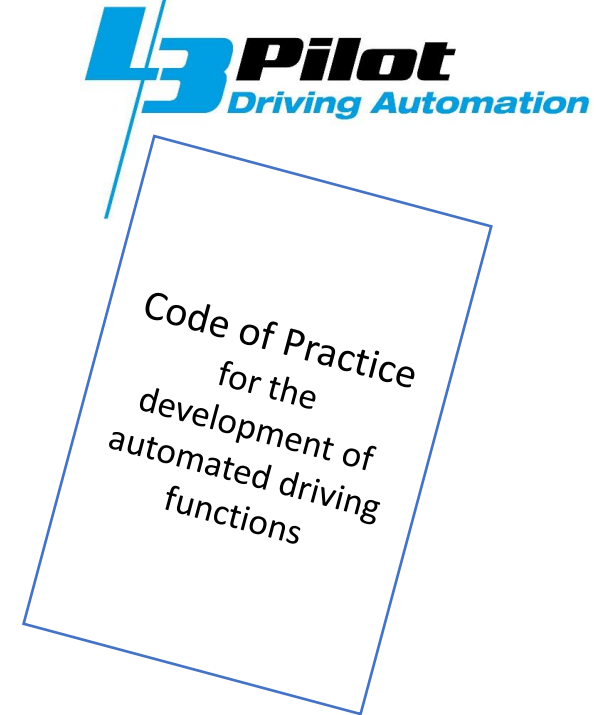
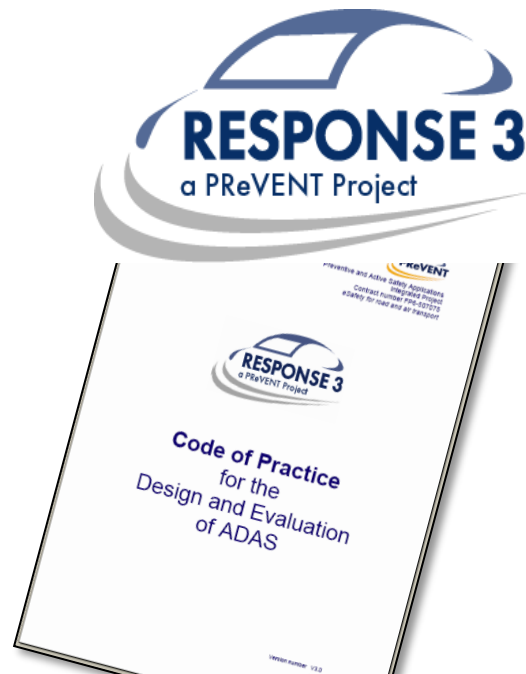


Urban

# 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 Universtiy (ika)

# HISTORY OF THE COP



PREVENT:  
RESPONSE 3 „CoP ADAS

2008 2014

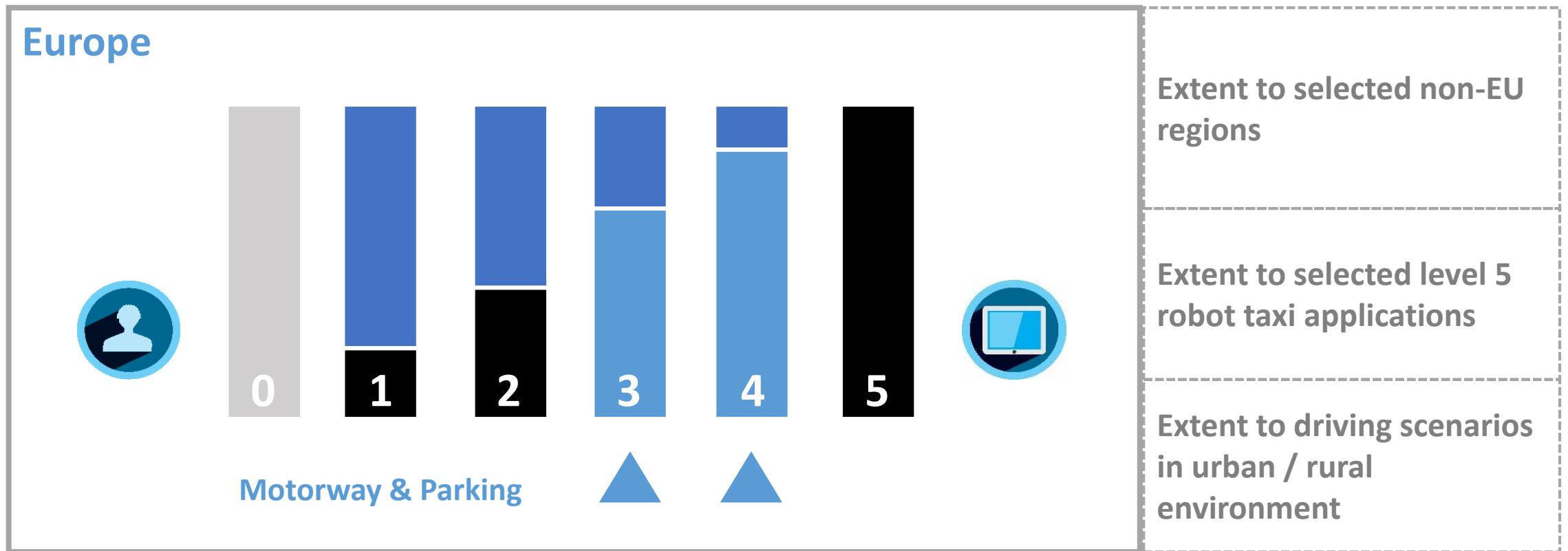
AdaptiVe:  
Response 4 „Legal aspects AD“

2017 2017

L3Pilot:  
„Code of Practice AD“






2021

# SCOPE OF THE COP-AD



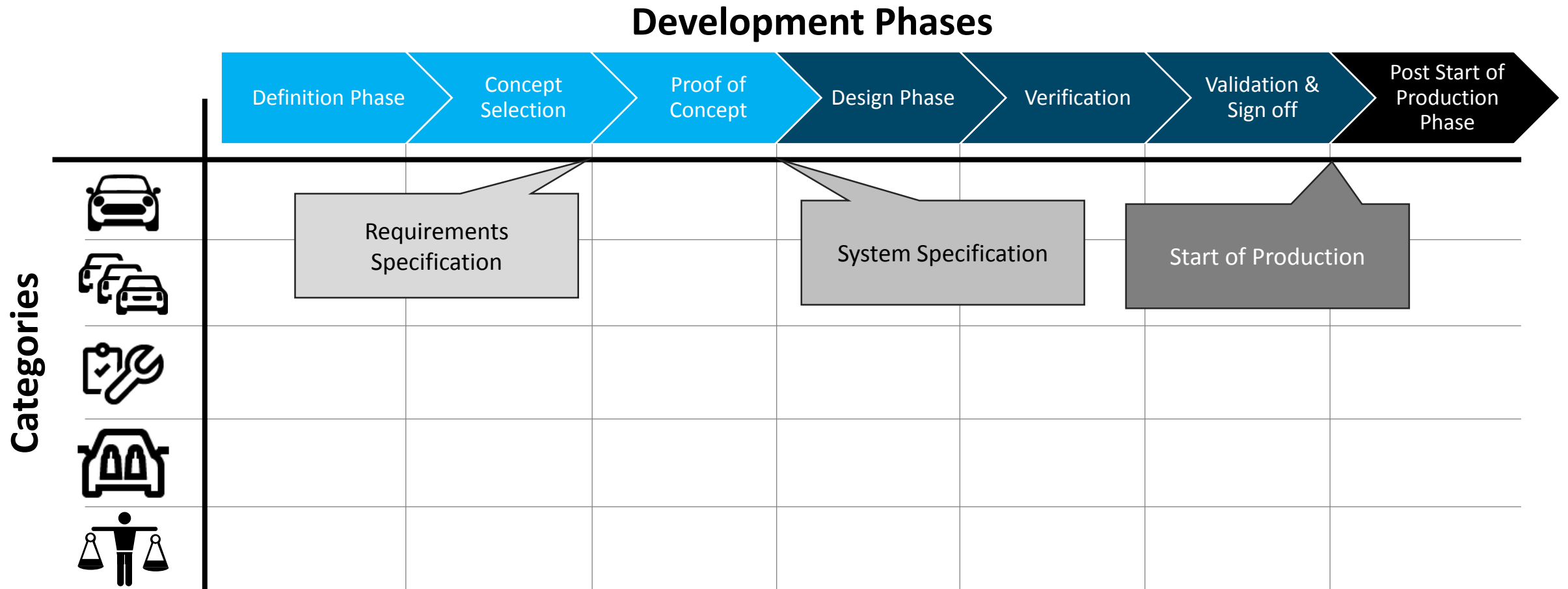
According to SAE document J3016, "Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles", revised 2018-06-15, see also <http://standards.sae.org>

# CATEGORIES OF THE „CODE OF PRACTICE FRAMEWORK“<sup>1</sup>

<b>Operational Design Domain Vehicle Level</b>	<b>Operational Design Domain Traffic System Level</b>	<b>Safe Guarding Automation</b>	<b>Human-Machine Interaction</b>	<b>Behavioral Design</b>
				
<p>Function description, system limits, test- /Scenario catalogue</p>	<p>Remote assistance, V2X, MRM etc.</p>	<p>Functional safety, Cyber security, SOTIF, Updates (e.g. over the air) etc.</p>	<p>Provide guidelines for HMI, Mode awareness/ confusion, Controllability etc.</p>	<p>Traffic safety (mixed traffic), References to Ethics</p>

1: according to Code of Practice Framework, L3Pilot internal Deliverable D2.1, 2018 by S. Wolter, A. Knapp, V. Jütten, M. Chen, F. Bonarens, U. Eberle, O. Schädler,

# CODE OF PRACTICE FRAMEWORK.





# EXAMPLE ILLUSTRATION OF COP-AD MATRIX STRUCTURE

	Definition Phase	Concept Selection	Proof of Concept	Design Phase	Verification	Validation & Sign-off	Post Start of Production Phase
<b>Safe Guarding Automation</b>	<ul style="list-style-type: none"> <li>• <b>Overall</b> Definition of the functionality</li> <li>• <b>Functional Safety</b> Hazard analysis and risk assessment or hazard identification</li> <li>• <b>Cyber Security</b> Threat analysis</li> <li>• <b>SOTIF</b> Hazard identification</li> </ul>	<ul style="list-style-type: none"> <li>• <b>SOTIF</b> Architecture selection</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Overall</b> Validation strategy / concept validation</li> <li>• <b>Functional Safety</b> Consolidated safety requirements, system or vehicle architecture</li> <li>• <b>Cyber security</b> Security concept</li> <li>• <b>SOTIF</b> Improved functionality</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Overall</b> Data recording, data privacy requirements</li> </ul>		<ul style="list-style-type: none"> <li>• <b>Functional Safety</b> Safety validation</li> <li>• <b>Cyber security</b> Penetration Test</li> <li>• <b>SOTIF</b> Vehicle testing</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Field monitoring</b> Failures, threats, unintended behavior and updates</li> </ul>

## Further steps and results

### **International Workshop on the Code of Practice (CoP)**

Based on Report Draft of the Framework for the CoP

2019

### **Report D2.2 Drafts and results from pilot application of draft CoP**

Presentation of results from pilot application

2020

### **Report D2.3 Code of practice for the development of automated driving functions**

CoP final version for publication

2021

# THANK YOU

[www.L3Pilot.eu](http://www.L3Pilot.eu)

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

