

VERIFICATION  
VALIDATION  
METHODS

Final Event 21 / 22 November 2023

## Session 3

# The Role of the ODD in the Safety Case

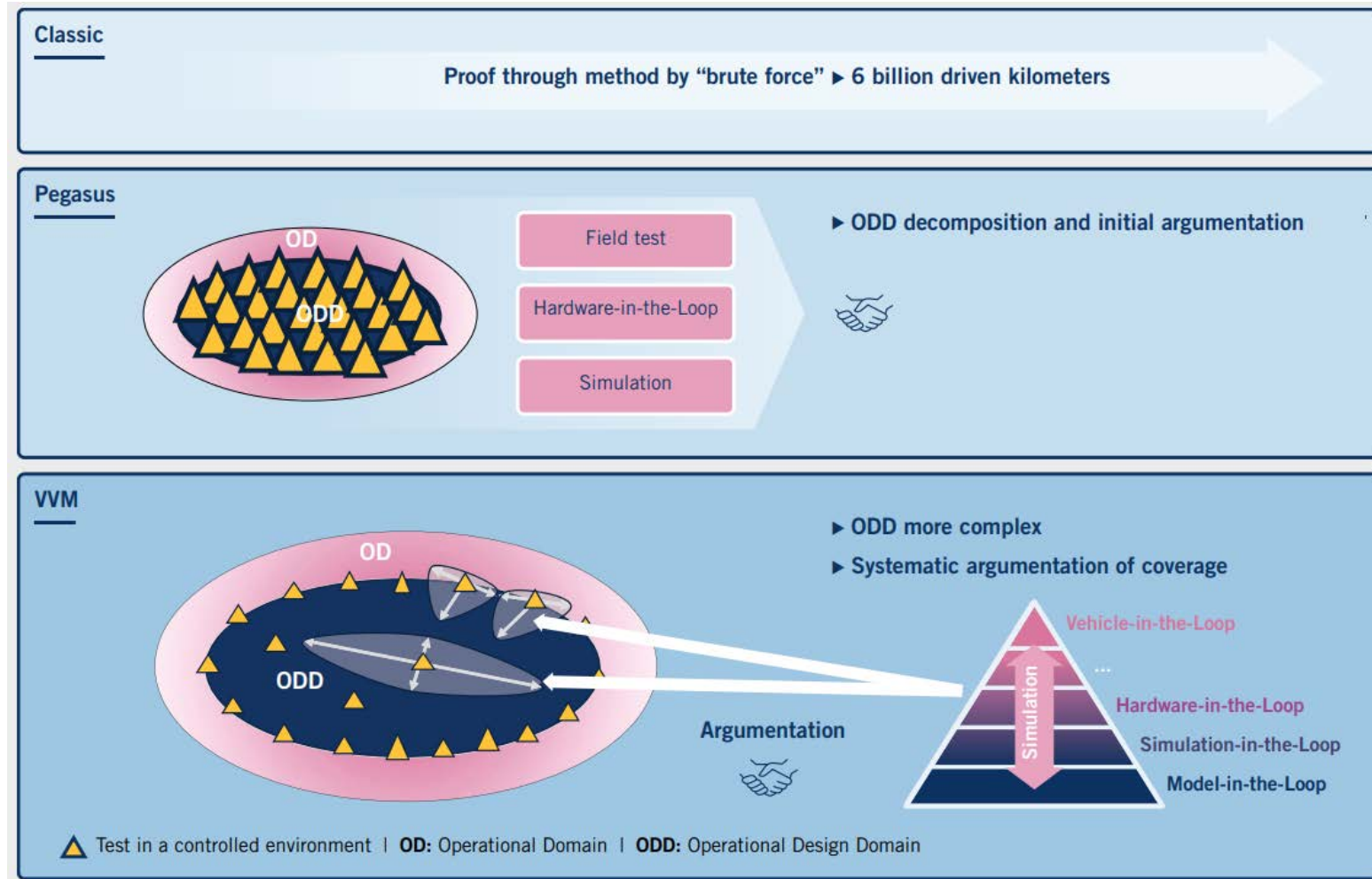
Ulrich Eberle, Opel Automobile / Stellantis

Supported by:



on the basis of a decision  
by the German Bundestag

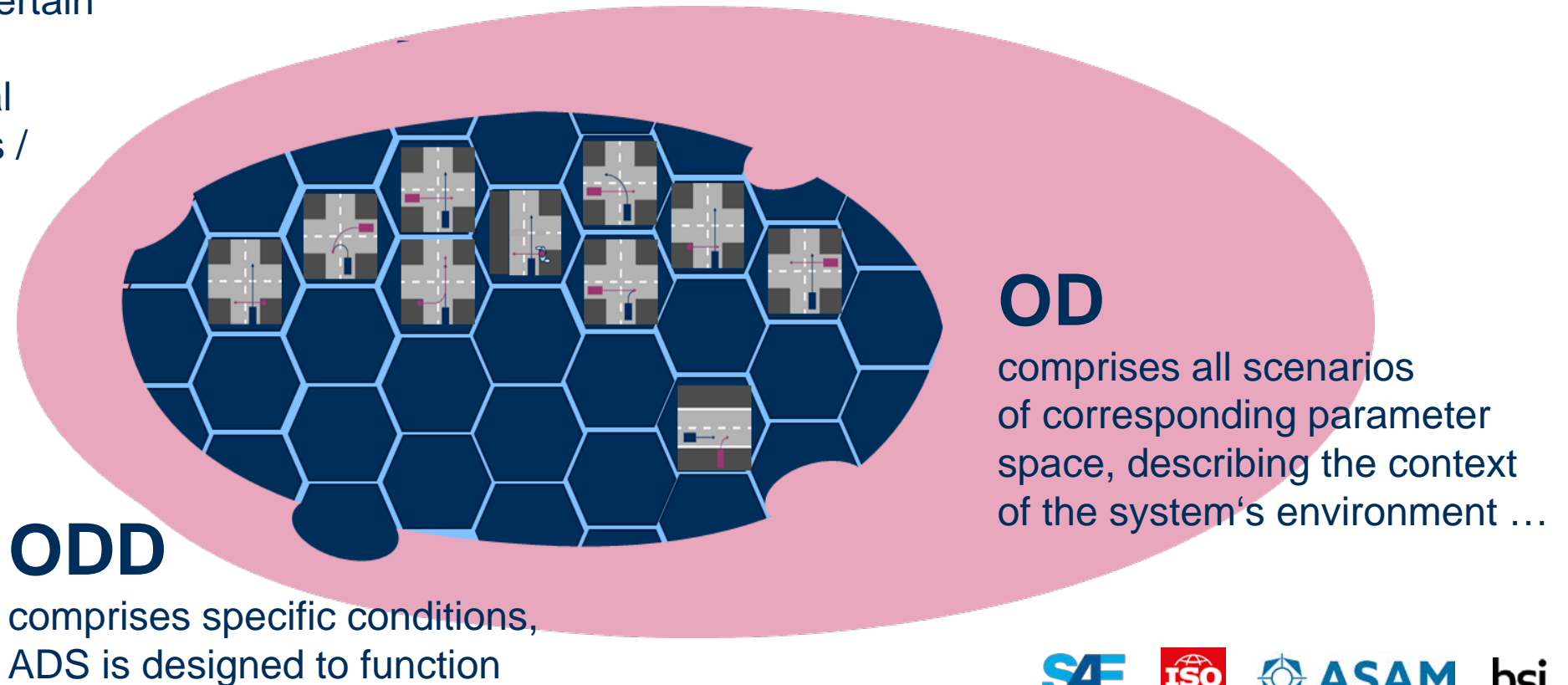
# From Classic Approaches to PEGASUS and VVM ...



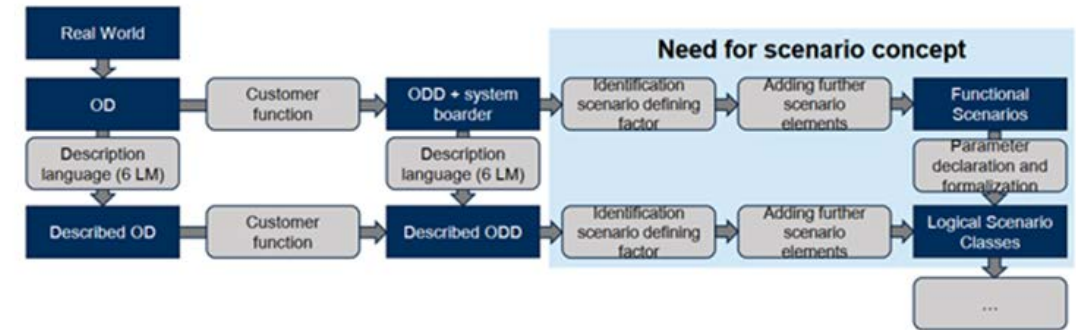
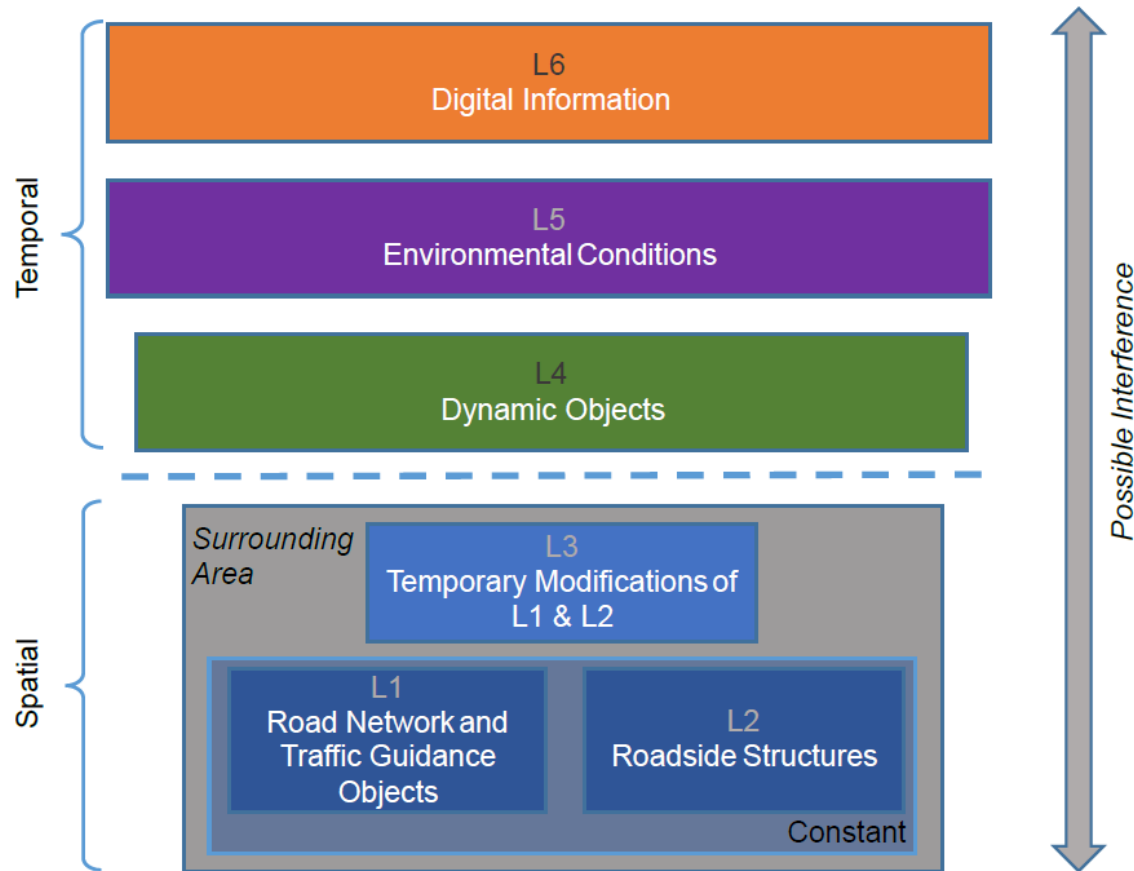
# A World Called Operational Domain

The **set of logical CORE scenarios** is defined as a set of logical scenarios that have certain properties:  
minimum set of logical scenarios, that covers / represent the ODD, free of overlap with the underlying BASE scenarios, ...

► The Operational Domain OD can be the Full World or a Subset



# Six Layers to Structure Them All



Structure is needed to understand the world and decompose complex challenges

E.g., using Ontology-based approaches, such as A.U.T.O. and/or OMEGA data format



<https://github.com/lu-w/auto/>



[https://github.com/ika-rwth-aachen/omega\\_format](https://github.com/ika-rwth-aachen/omega_format)

M. Scholtes et al., "6-Layer Model for a Structured Description and Categorization of Urban Traffic and Environment," in IEEE Access, doi: 10.1109/ACCESS.2021.3072739

L. Westhofen, C. Neurohr, M. Butz, M. Scholtes and M. Schuldes, "Using Ontologies for the Formalization and Recognition of Criticality for Automated Driving," in IEEE Open Journal of Intelligent Transportation Systems, vol. 3, pp. 519-538, 2022, doi: 10.1109/OJITS.2022.3187247

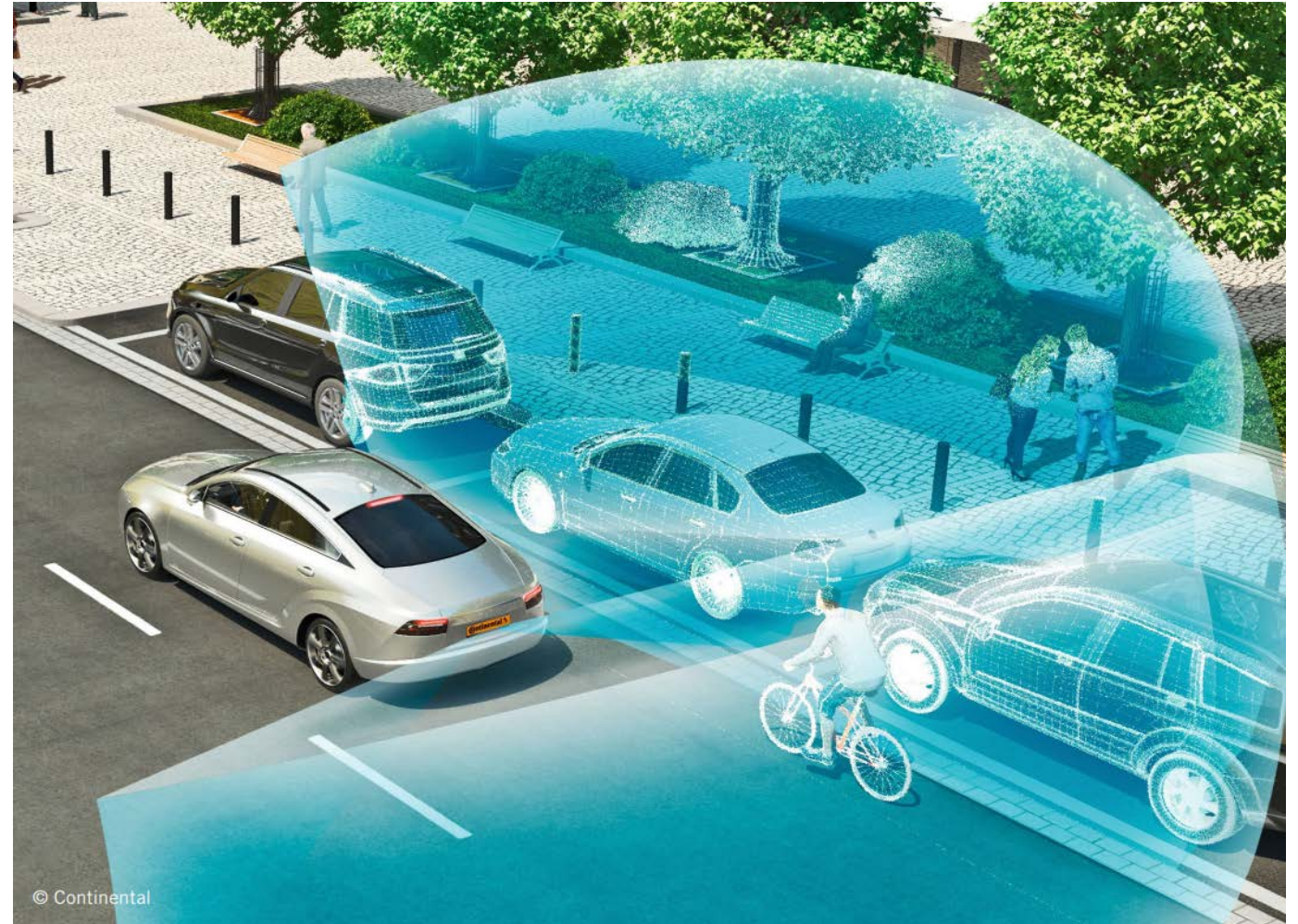
From  
**PEGASUS**  
Highway Chauffeur  
functional description

to

Exemplary PEGASUS VVM  
„Customer Function“

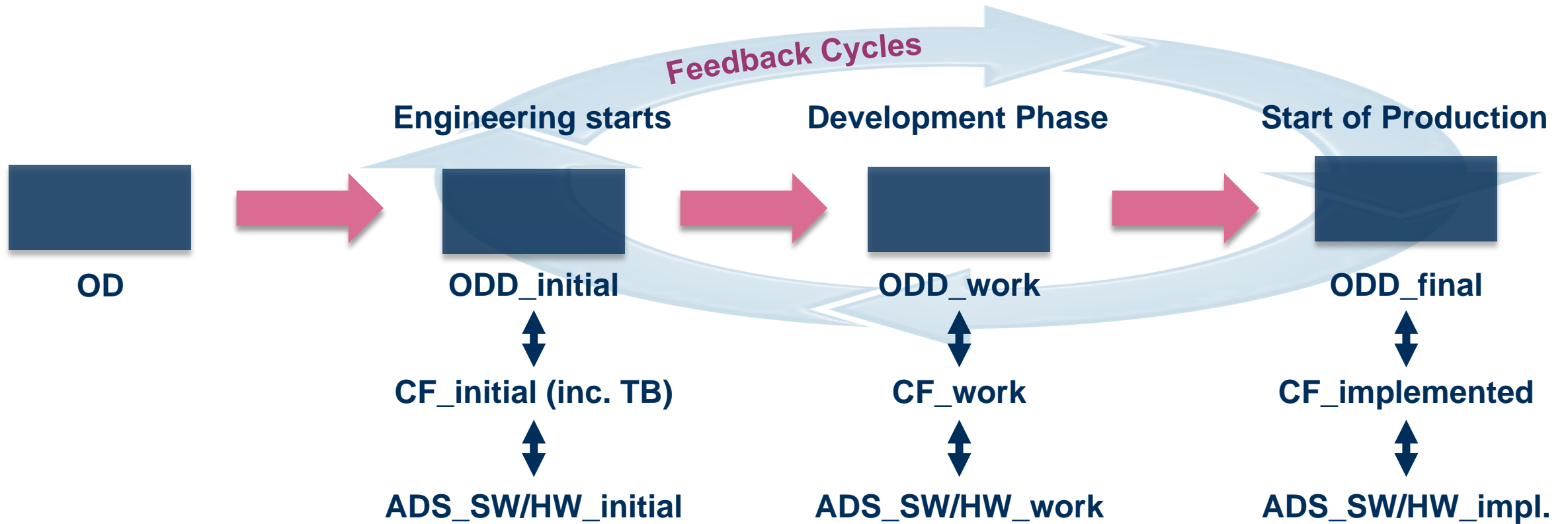


Customer Function is  
the Actor coping with the World's  
Challenges



# Refining Our Worlds

A "Target Behavior" TB of the ADS needs to be defined from prior knowledge (to be refined)  
Development-related Requirements on safety and comfort are defined by OEM  
"Customer Function" CF includes a Target Behaviour



# Session moderator and speakers



**Ulrich Eberle**

Senior Project Lead Advanced  
Technology & Project Manager Innovation  
Opel / Stellantis | Session Chairman



**Helmut Schittenhelm**

Manager safety performance,  
driver assistance and safety systems  
Mercedes-Benz | VVM Overall methodology



**Tino Brade**

Research engineer system, validation,  
prediction and planning for autonomous systems  
Bosch | Validation for ADS



**Siddhartha Khastgir**

Head of V&V connected and autonomous vehicles,  
project leads, heading standard activities  
WMG Warwick | ODD coverage



**Matthias Löhning**

Manager driving dynamics and assistance,  
project lead ISO 34505 and V&V expert ISO TS 5083  
BMW | Status standardization

# Thank you!

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A project developed by the VDA Leitinitiative  
autonomous and connected driving

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