



# Validation of Level 3 Advanced Driver Assistance Using Reliability Analysis Strategies

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Mercedes-Benz  
The best or nothing.



DIGITAL VALIDATION as a key element to validate and verify the new level of automated driving system

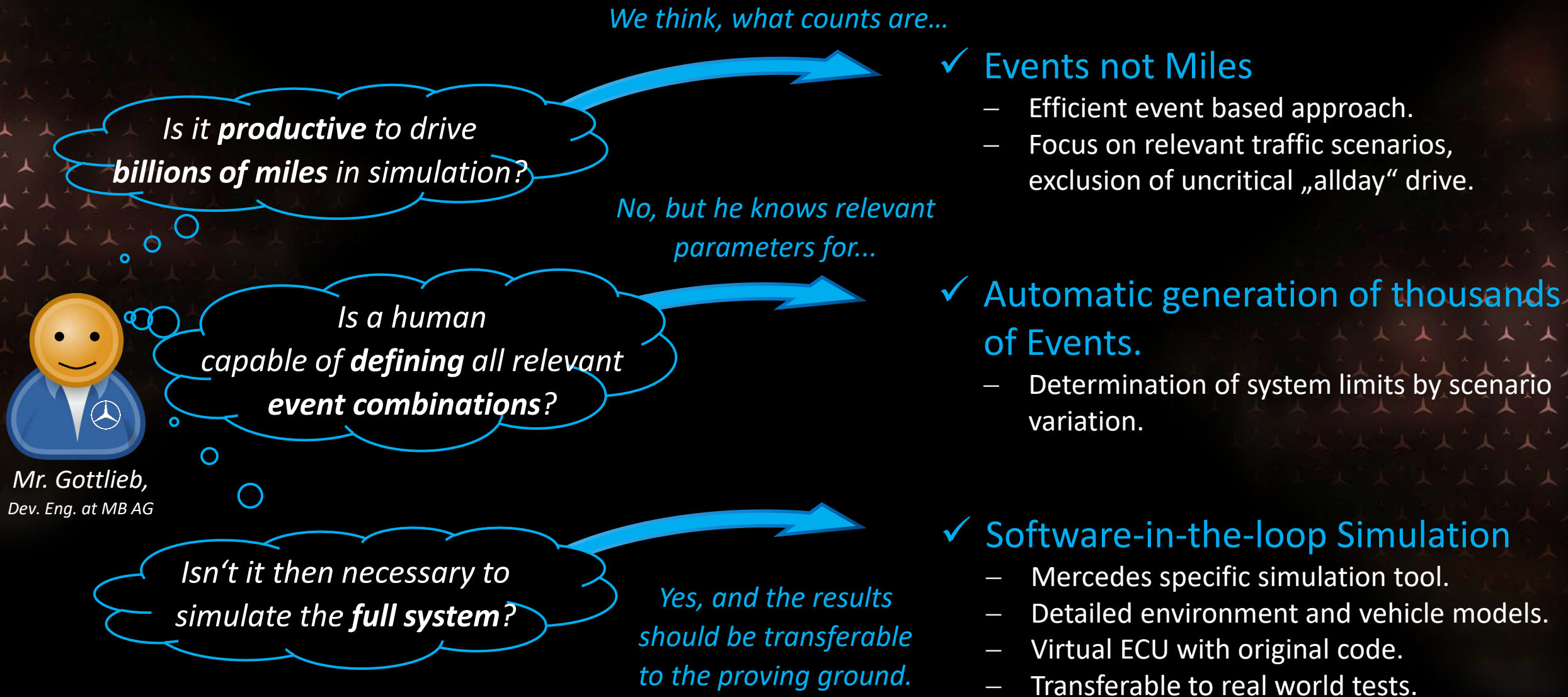
## Event based digital validation\*

- large number of functions, complexity and scenarios
- save environment
- time frame
- variety of traffic scenarios and their probability of occurrence enables a risk assessment for the respective scenario/use case.

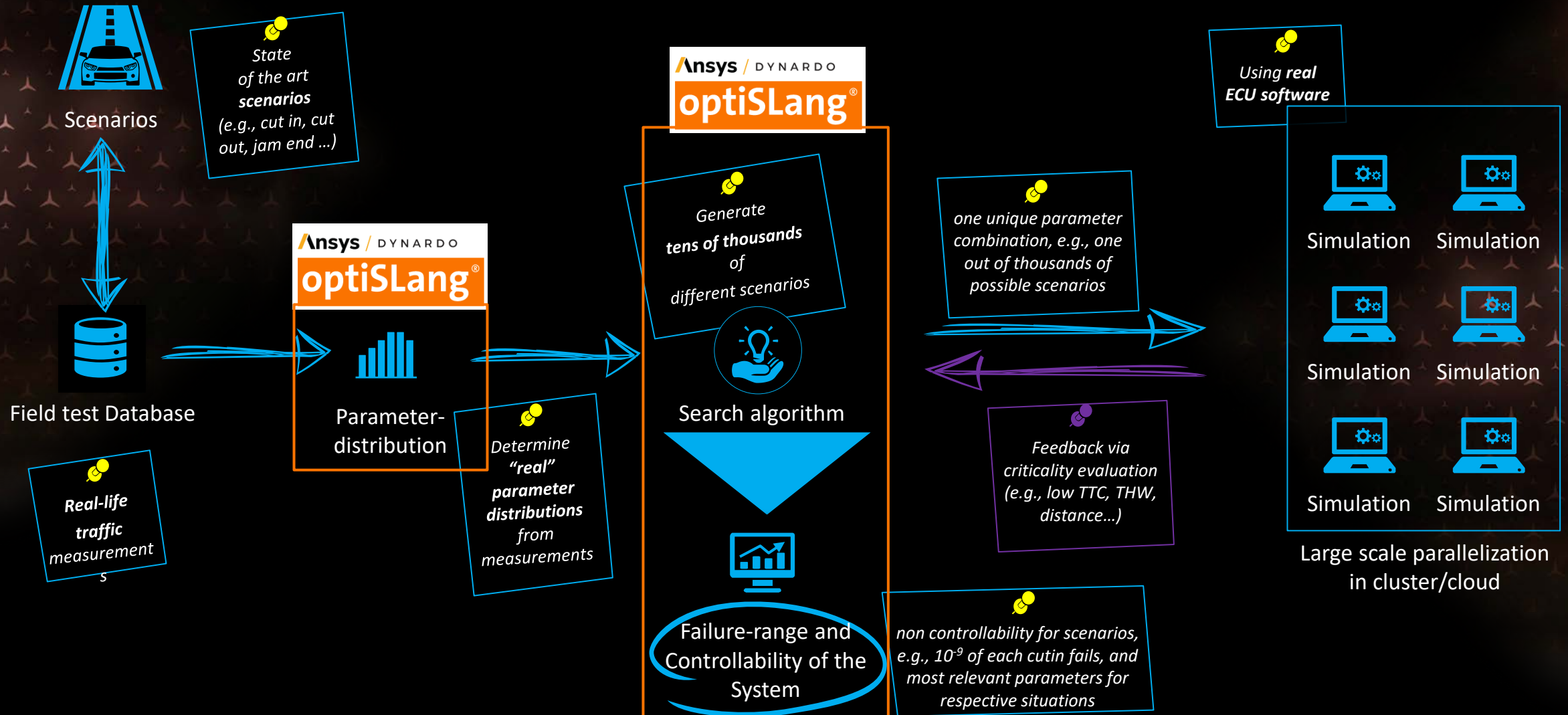
Without this intelligent simulation concept it would be hard to approve our next level of automated driving.

\* "M. Rasch, P. T. Ubben, T. Most, V. Bayer, R. Niemeier (2019), *Safety Assessment and Uncertainty Quantification of Automated Driver Assistance Systems using Stochastic Analysis Methods*, NAFEMS World Congress 2019, Canada"

# Simulation Approach for AD Level 3 @ Mercedes



# Workflow Reliability Analysis – Goal: Find most probable critical scenarios



# Digital Validation of the DRIVE PILOT

## Large Scale Simulation

- 10 Mio. simulations in 1 week
- Ø 80k simulations per h
- >10 logical traffic scenarios



## ALKS & TÜV

- meets UNECE-R157 „ALKS“ regulation
- performance comparison of critical scenarios with careful human driver
- validated and accepted simulation environment

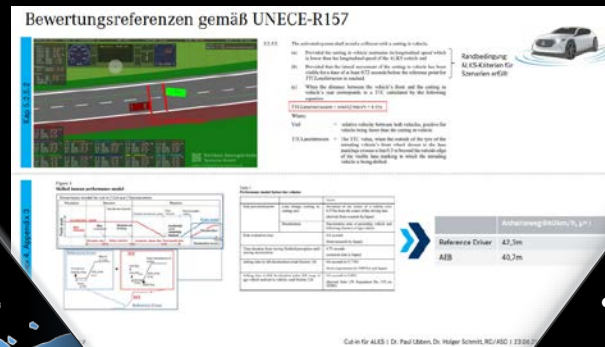
## Examples for usual scenarios

- modelled w.r.t. PEGASUS
- approx. 50 parameters per scenario
- Real traffic based parameter distributions (Data Analytics)



## Cloud-Computing

- 2 Azure Cloud locations
  - Dublin and Amsterdam
- 2 MB data centers
  - Immendingen and Sindelfingen
- 12.000 Cores
- highly automatized, optimized orchestration and scheduling

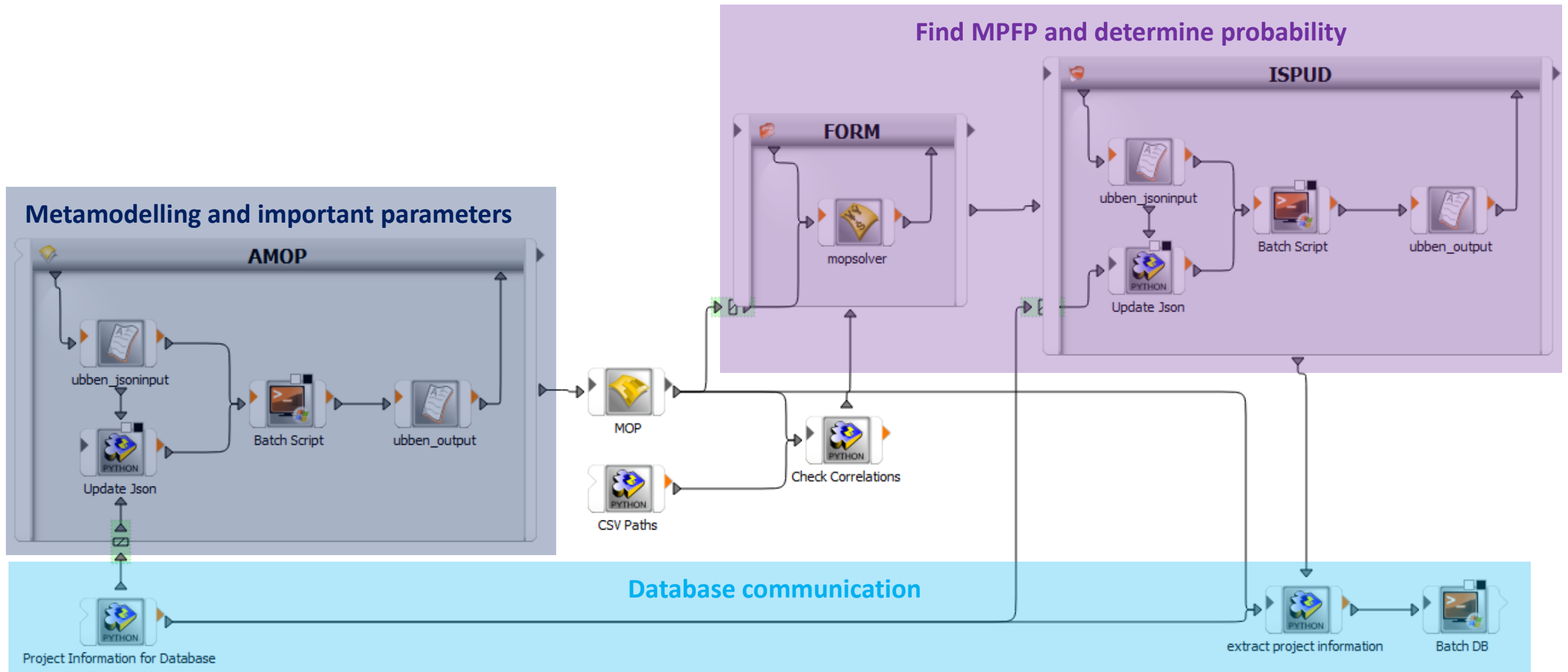


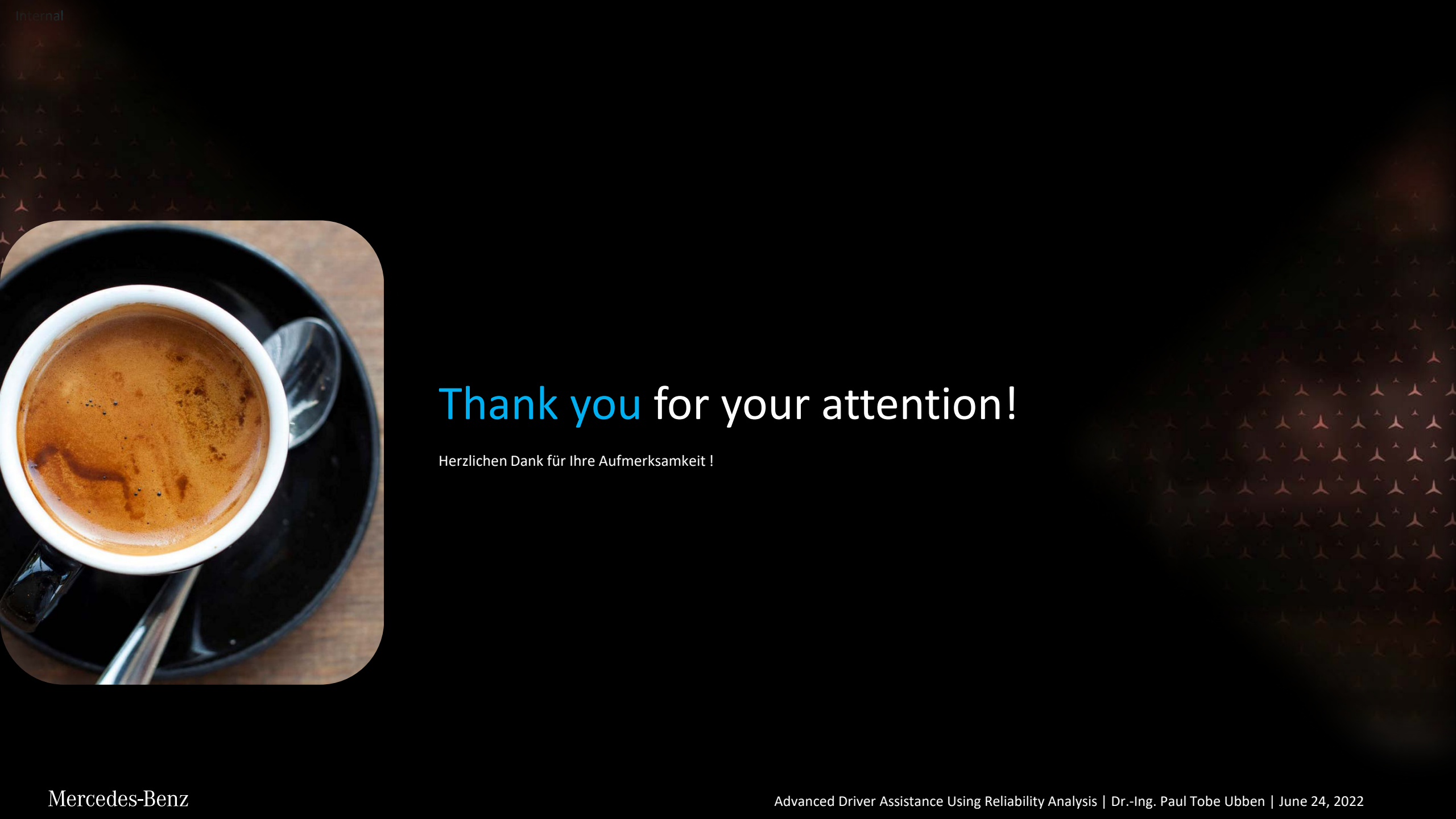
## Examples for unusual scenarios

- rare but expected scenarios
- additional subscenarios for different object types
- specific sensor performance tests for rare object types



# Optislang Workflow





Thank you for your attention!

Herzlichen Dank für Ihre Aufmerksamkeit !