

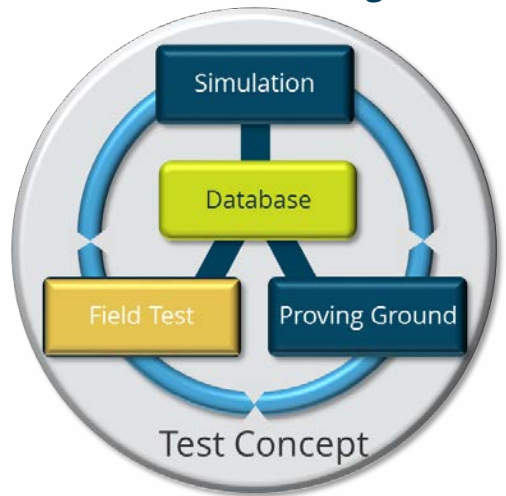
# FIELD TEST



## ➔ PEGASUS Method for Assessment of HIGHLY Automated Driving Functions

The objective of PEGASUS Testing was to develop the PEGASUS method regarding completeness, correctness and consistency.

Field test as test platform to test the HAF-function in a real traffic environment with different environment conditions



Goal:  
Input:  
Output

Test of the HAD-function in real world traffic (long term testing)  
global guidance of conditions, pass criteria, original vehicle as system under test  
Evaluated real world test drive, measurement data as input for data bases

	Simulation	Proving Ground	Field Test
Test coverage			No explicit scenarios pre-settable, depending on the real traffic
Effort qualification of testing tools and methods	SIMULATION you will find on stand 21.	Proving Ground you will find on stand 27.	Low due to purchase of already qualified standard measuring equipment
Effort for test setup and preparation			Very high, Fleet of vehicles must be equipped with suitable measuring equipment, if necessary reference measuring equipment.
Effort for test enforcement			Very high, since vehicles and test drivers are on the road in endurance tests
Standardization methodology and tools			Measurement technology and implementation already OEM-specific established
Limitations			No scenario selection possible, high risk of overlooking relevant but rare scenarios



Supported by:



on the basis of a decision by the German Bundestag

# FIELD TEST



**Field test** as test platform to test the HAF-function in a real traffic environment with different environment conditions

➔ **Target:**

Find „Surprises“, e.g.:

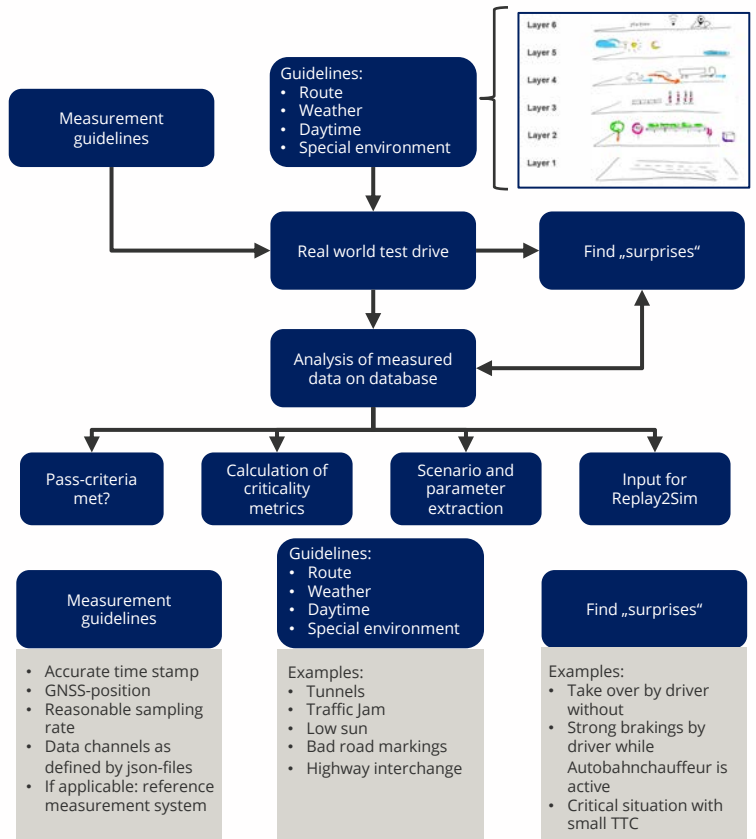
- Unknown behavior
- Pass-Criteria violated
- Implementation of new scenarios and new parameters
- Analyze how surrounding traffic handles Ego-Vehicle

➔ **Execution**

on public streets using existing infrastructure (e.g. test field A9, geodetic surveyed routes within the Pegasus project). Where necessary, guidelines for route and time to create challenging situations (e.g. lots of traffic, tunnel or weather).

➔ **Results** after analyzing test drive on database:

- Evaluated test drive as per Pass-/Fail-criteria and critical metric
- New or additional logical



## Examples for PASS-/FAIL-Criteria



No Accident  
→ distance to surrounding traffic etc. >0



Correct distance to ahead driving traffic Not leaving Ego lane (except for a lane change)



Meet with speed limits or other traffic regulations

Main criteria for Simulation / Proving ground in Pegasus

Additional criteria for field testing



Supported by:



on the basis of a decision by the German Bundestag

TESTING AND SAFEGUARDING – Booth No. 27

# FIELD TEST

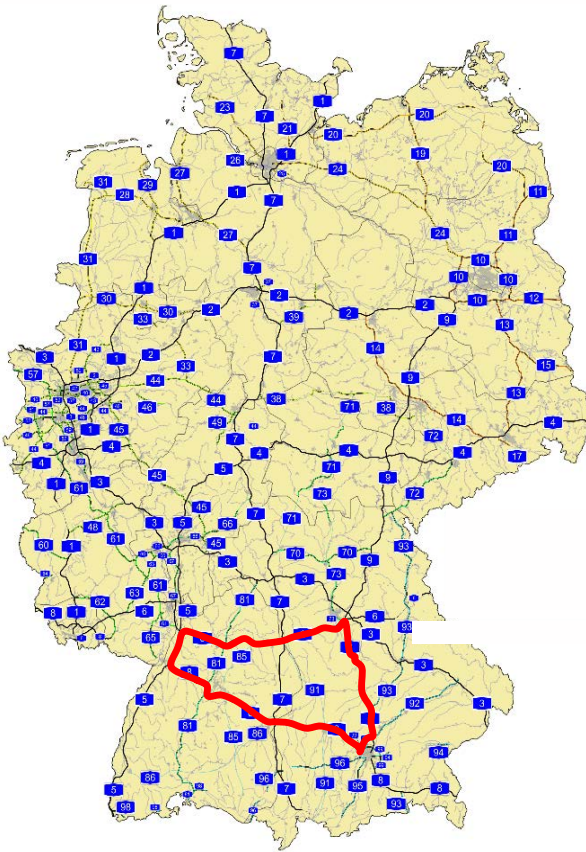
→ ALL FEATURES DEPENDING ON OEM'S ODD



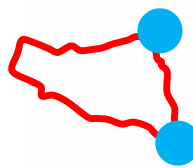
Route guidelines in PEGASUS  
Highways in Germany  
Layer 1-3



Special Environment (Examples)  
Layer 1-3



Special Infrastructure  
Layer 6



Reference maps  
by 3D-Mapping



Digital test field A9

Weather guideline:  
Test drive for all permissible weather conditions  
(OEM-specific) → Layer 5



Traffic conditions  
→ Layer 4



Supported by:



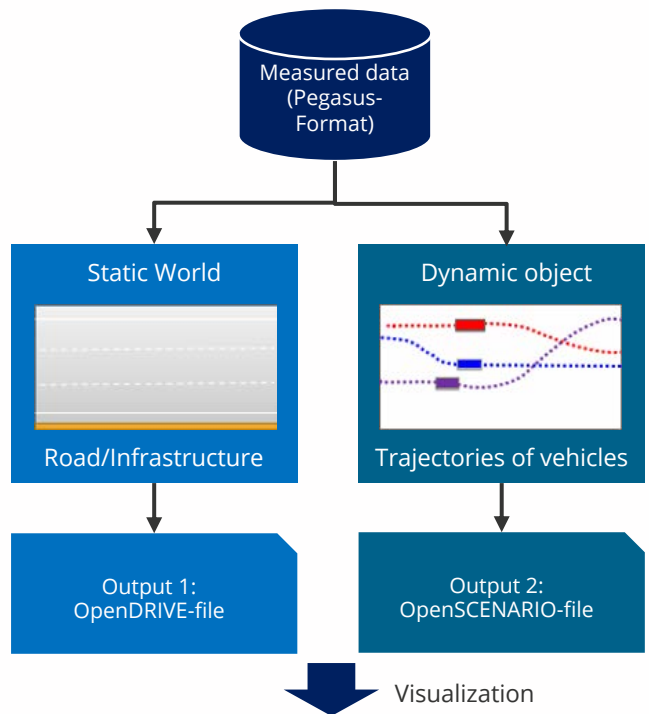
on the basis of a decision  
by the German Bundestag

# REPLAY2SIM



Automatized creation of specific scenarios as input for simulation out of measured scenarios

- ➔ **Input data:**  
Measured scenarios of field test as Pegasus data file
- ➔ **Extraction** of necessary sensor data information
- ➔ **Generation of the static world** description as OpenDRIVE-format:  
Course of the road  
Crash barriers  
Infrastructure (Signs etc.)
- ➔ **Generation of trajectories** of relevant dynamic objects (vehicles) in OpenSCENARIO-format:  
Vehicle ahead  
Traffic on other lanes  
Lane change, cut-in cut-out
- ➔ **Result:**  
Specific scenarios in OpenDRIVE- and OpenSCENARIO-Format, which are usable in simulations.



Supported by:



on the basis of a decision by the German Bundestag

TESTING AND SAFEGUARDING – Booth No. 27

# STATUS OF DATA EVALUATION (ON PEGASUS DATABASE)

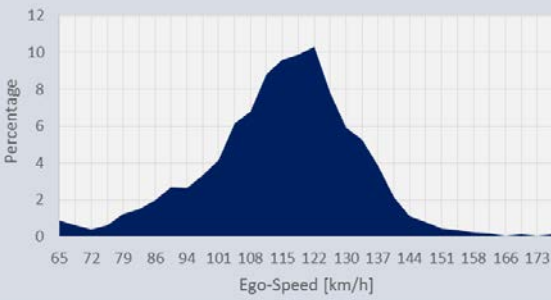


Examples of data analytics (Example not based on real world data):

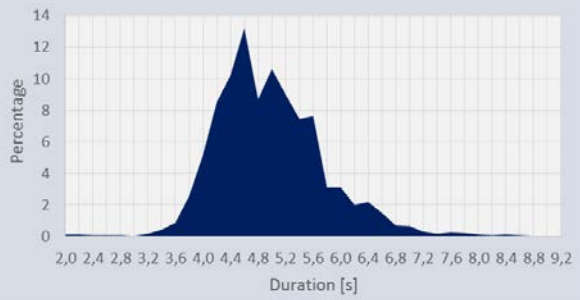
In total more than 100,000 km uploaded in data base

Scenario for data analytics: Cut-in

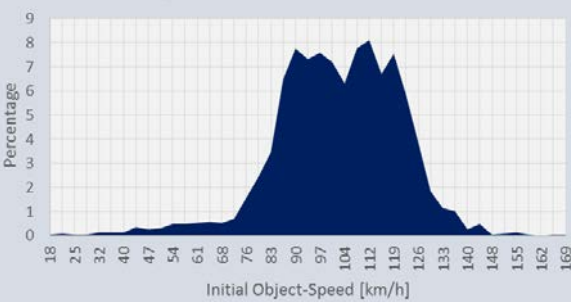
Histogramm of Ego-Speed



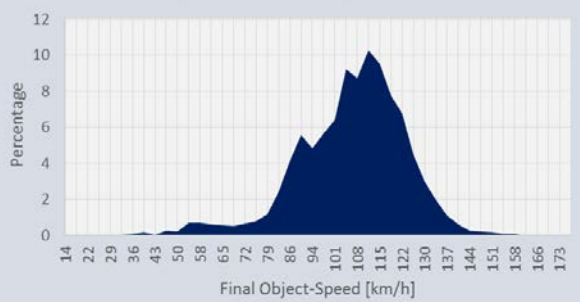
Histogramm of Cut-in duration



Histogramm of initial Object-Speed



Histogramm of final Object-Speed



→For details refer to Stand 15 (Data base, fka)



Supported by:



on the basis of a decision  
by the German Bundestag