23. FORUM

GEHEIMNISSE IM RODGAU-DUDENHOFENER WALD

DIGITALE FAHRZEUGE UND PHYSISCHES TESTEN?

AUTOMOTIVE CLUSTER Rhein Main Neckar
WIR BEWEGEN DEUTSCHLAND

SEGULA TECHNOLOGIES

VORTRAG

»Testen im Rahmen der Homologation: Anforderungen für aktuelle und künftige Regularien«

Emmeram Klotz (TUV SUD / Head of Testing and Validation)

Testen im Rahmen der Homologation: Anforderungen für aktuelle und künftige Regularien

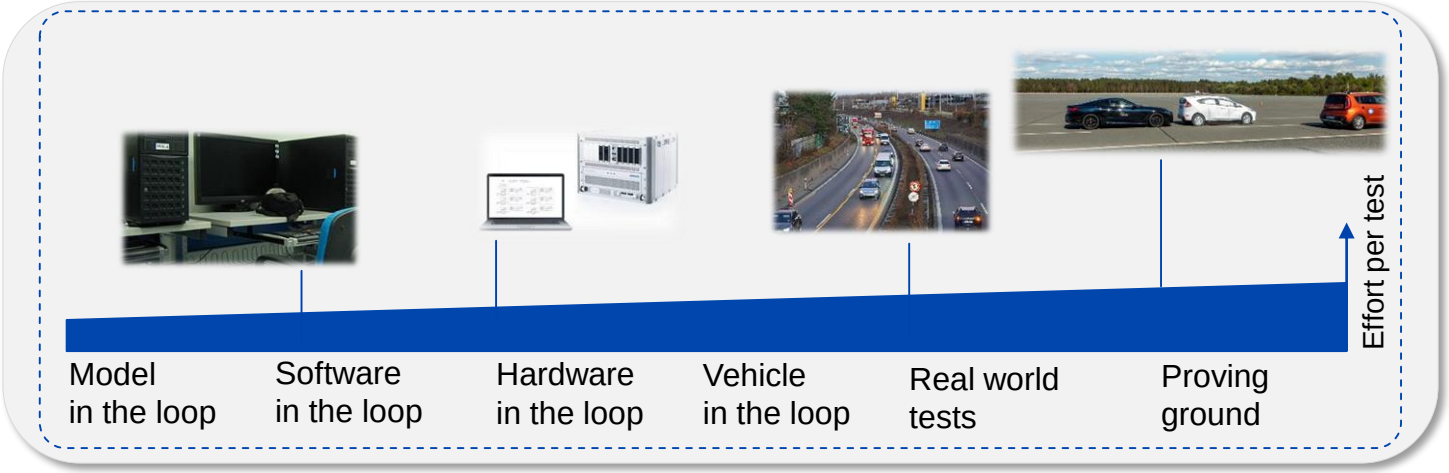
Emmeram Klotz
Head of Testing and Validation
AS-GHS-TES

Add value.
Inspire trust.

Agenda

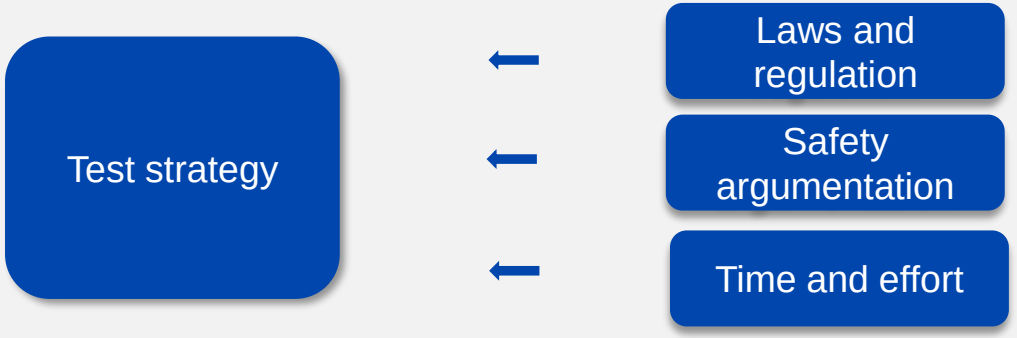
- Challenges
- Equipment
- Proving ground
- Examples of new regulations

Challenges for AD/ADAS-Testing – trends



Rising complexity of driving functions require new approaches in test and validation

- Infinite number of potential traffic scenarios to be safeguarded
- New regulations for automated driving with rising complexity of test scenarios
- New test methods available for type approval:
  - Scenario based Testing (SBT)
  - Virtual methods



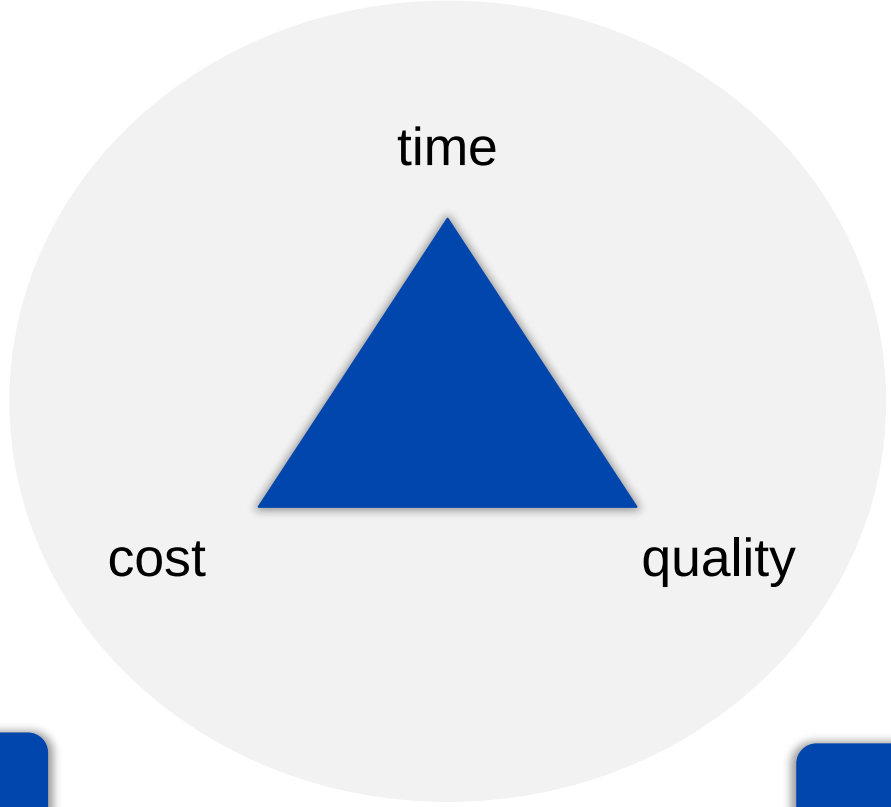
Challenge: optimize the available test resources to ensure **safety**, **conformity** and **cost efficiency**

Challenges for AD/ADAS-Testing – homologation perspective

Start of production

Proving ground

Equipment callibration



Test equipment

Staff qualification

Travel cost

Documentation

Logistics

Designation

Challenges in AD/ADAS-Testing – test equipment

- Actual regulations (UNECE, EU, national,…) and standards (EuroNCAP, ISO) require intensive use of advanced testing equipment

Challenges

- **High investment cost**
- **Low availability of rental systems**
- **Specialized testing experts needed**
- **No standard interfaces**

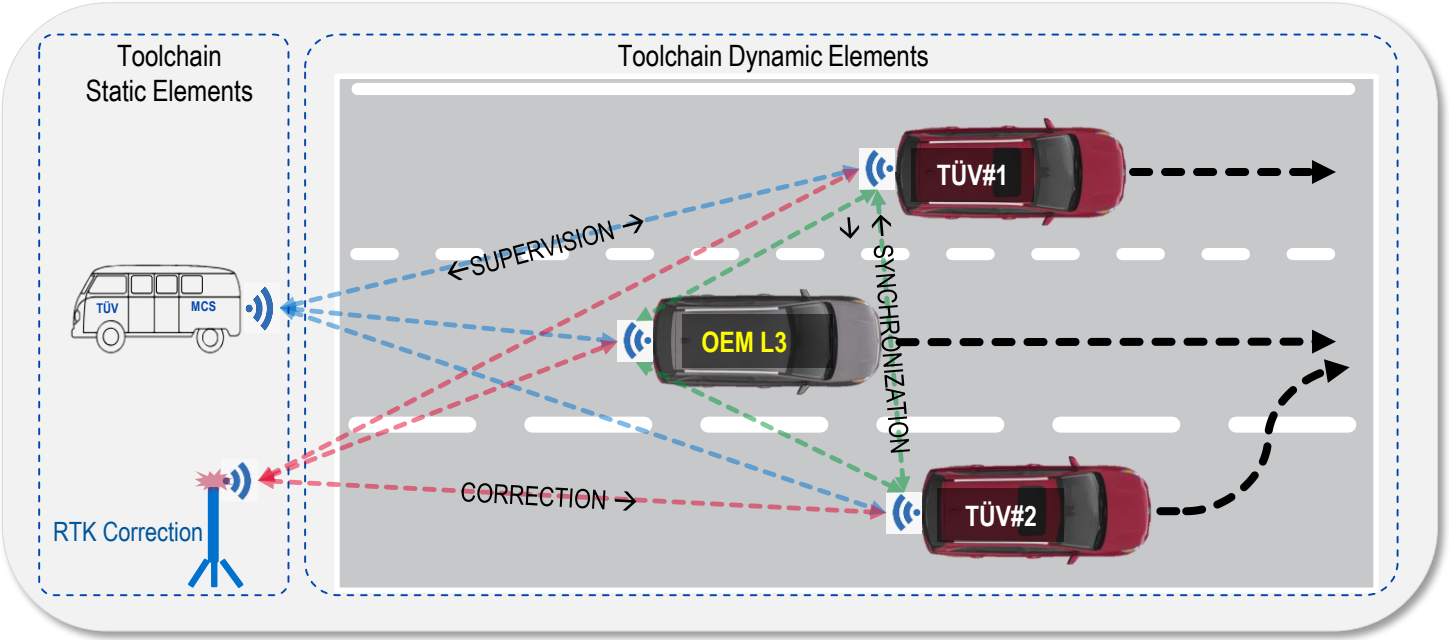
Equipment	Breaking UNECE R13(H)	Steering equipment UNECE R79	Lane Departure Warning Systems (LDWS) UNECE R130	Advanced emergency Braking Systems (AEBS) UNECE R131	Electronic Stability Control (ESC) UNECE R140	Blind Spot Information System for the Detection of Bicycles UNECE R151	Advanced Emergency Braking Systems (AEBS) UNECE R152	Automated Lane Keeping Systems (ALKS) UNECE R157	Moving Off Information System (MOIS) UNECE R159	GSR 2.0 ISA	Level 4 Act / AFGBV	Level 4 EU Regulation
Measuring steering wheel		1										
Localization system	1	2	1	2	1	1	2	3	1	1	2	2
Movable platform GST				(1)			(1)	(1)			1	1
Movable platform VRU						1	1		1		1	1
Dummy GST				(1)			(1)	(1)			1	1
Dummy Audult Pedestrian							1		1		1	1
Dummy Child Pedestrian									1		1	1
Dummy Bicycle						1			1		1	1
Dummy Powered Twowheeler											(1)	(1)
Steering robot		(1)			1						(1)	(1)
Pedal robot	(1)										(1)	(1)
Traffic simulation car				1			1	2			1	1
Data acquisition system (CAN, etc.)	1	(1)	(1)			(1)	(1)	(1)	(1)	(1)	(1)	(1)

()...depending on the requirement profile
1, 2, 3,etc. ...number of parts needed

Challenges in AD/ADAS-Testing – example scenario based testing

AV-Testing for precise, accurate and repeatable scenario based assessment on proving grounds

- **Physical scenario based testing** using state of the art technologies to test your automated vehicle function
- **Assessment** of your workflow and toolchain to add value to your automated vehicle projects
- **Licensing** the TÜV SÜD workflow and become a partner
- Use our **Consulting** Services to enhance your autonomous vehicle testing workflow and benefit from our experience



Challenges in AD/ADAS-Testing – example ADDW
ADDW feasibility study with ACEA

Advanced Driver Distraction Warning Systems
Ref. Ares(2023)2154725 - 24/03/2023

Part 1: Technical requirements for the advanced driver distraction warning (ADDW) systems
Part 2: Test procedure for spot-check testing of ADDW systems by type approval authorities and technical services
Part 3: Procedures for assessment of technical documentation by the vehicle manufacturer to be provided to the approval authorities and technical services

Main focus of the study:

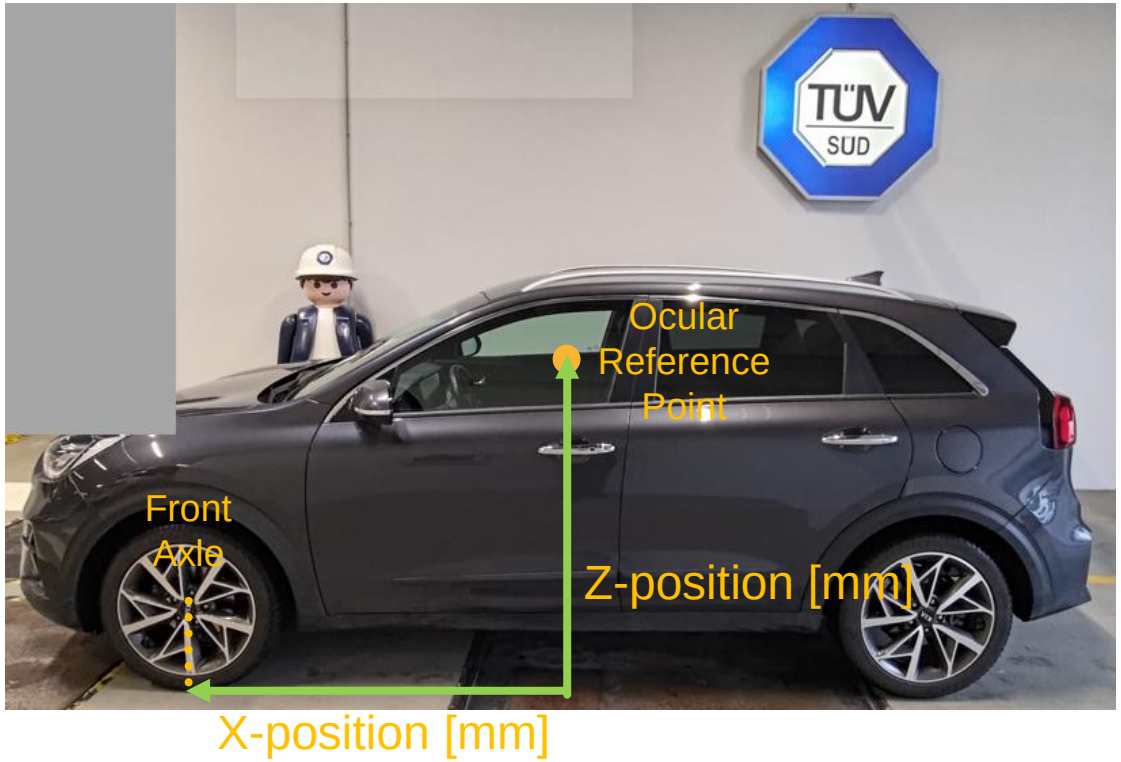
Verification of the test procedure (Part 2)

- Is the test procedure described clearly?
- Are the results reproduceable?
- Which test equipment is needed?
- What is the effort for doing the tests?

Challenges in AD/ADAS-Testing – ADDW
Vehicle Delivery and Test Preparation

- **What we need:**

1) Ocular Reference Point to adjust the test driver



2) Marking of AREA 3 fixation points

or

CAD dashboard drawing with AREA 3 lines
(we can place the dots ourself)