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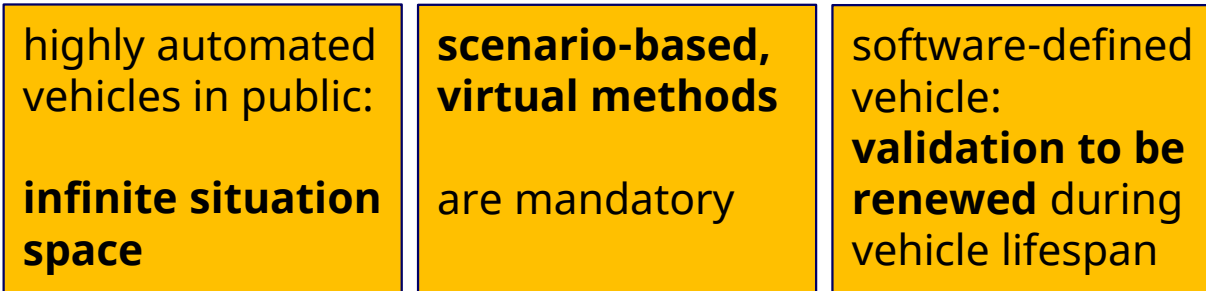
# European SCART-Institute: Scenario-based Type Approval Processes in Europe – Current Status and Outlook

SCART – Safety of Conected and Automated Road Traffic



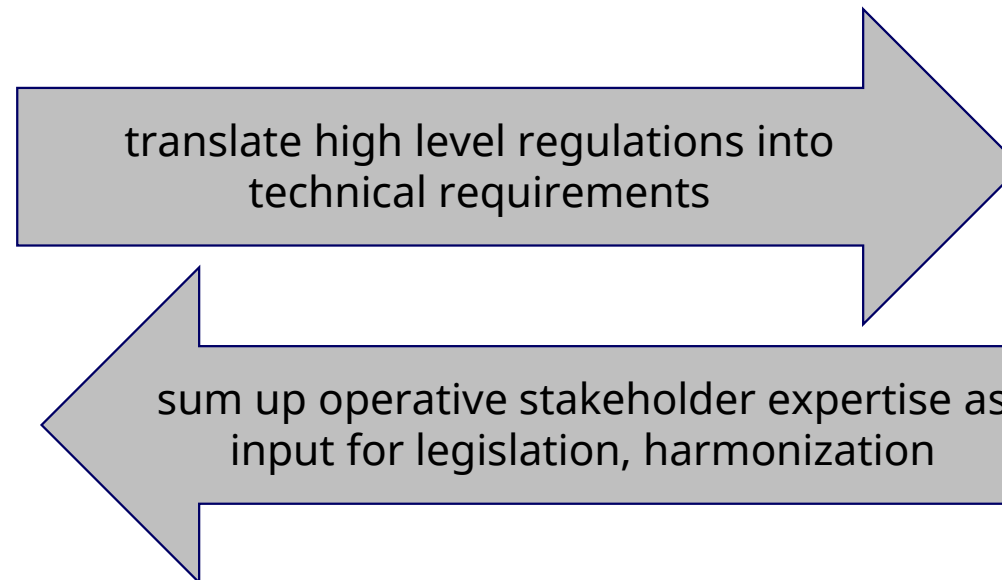
# Why we in Europe have to find our own way.

What is new in automated driving?



**Legislation**  
- UNECE, EU, national

**High Level Regulations:**  
„Vehicle has to behave at least as safely as a human driver“



**Operative Business**  
- development  
- approval, certification  
- technical inspection  
- market surveillance

**Technical Requirements:**  
- concrete behavior in concrete scenarios  
- defined processes and toolchains  
- defined methodical quality

# An institution is needed to **SUPPORT (!)** the established partners in homologation (Authority + Technical Service + Car Manufacturer) methodically, consistently, trusted by all partners

## European SCART Institute:

- to **collect all regulations and standards** applicable to automated driving **in Europe** and translate them into **technical requirements** (→ publicly available database)
- to **generate concrete scenarios, test criteria, test specifications, simulation quality checks** and maintain the database for Europe
- to **provide facilities for testing** (prototypical test methods) & **developing new test standards**
- to **perpetuate project results** (e. g. out of EU funded and national methodological projects – PEGASUS, SUNRISE, SYNERGIES, etc.)

→ Independent  
→ Non-competitive  
→ Non-profit  
→ Network-approach

driven by

- **Authorities (legislation, executive force)**
- **Technical Services**
- **Academia**
- **Industry (car, suppliers)**
- **Insurance companies**
- **Tech companies (methodology)**

# We are driving it forward!



**Prof. Dr-Ing.  
Günther Prokop**

Professor of  
Automotive  
Engineering at TU  
Dresden,  
Speaker Smart  
Mobility Lab,  
Speaker SCART,  
Co-Chair TLC  
IAMTS



**Prof. Dipl.-Ing.  
Klaus Kompaß**

Former Head of  
Vehicle Safety at  
BMW



**Dipl.-Ing.  
Alexander  
Kraus**

Managing  
Director AVL  
Deutschland  
GmbH,  
Board Member  
IEEE,  
Board Member  
SAE International



**Dipl.-Ing. (FH)  
Henning Stricker**

Managing  
Director TÜV  
Thüringen  
Anlagentechnik  
GmbH & Co. KG



**Dipl.-Ing.  
Armin Gräter**

Former Chairman  
of CCAM  
Association and  
Former Director  
of Digitalisation  
and Automated  
Driving at BMW



**Dr. Abayomi  
Otubushin**

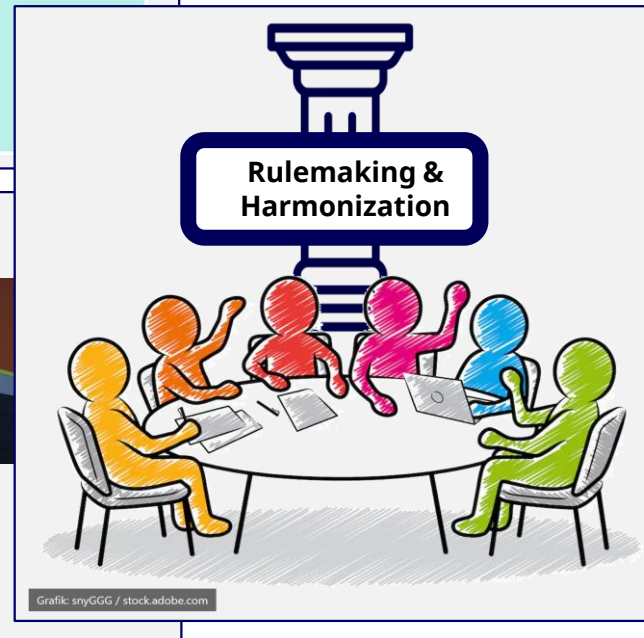
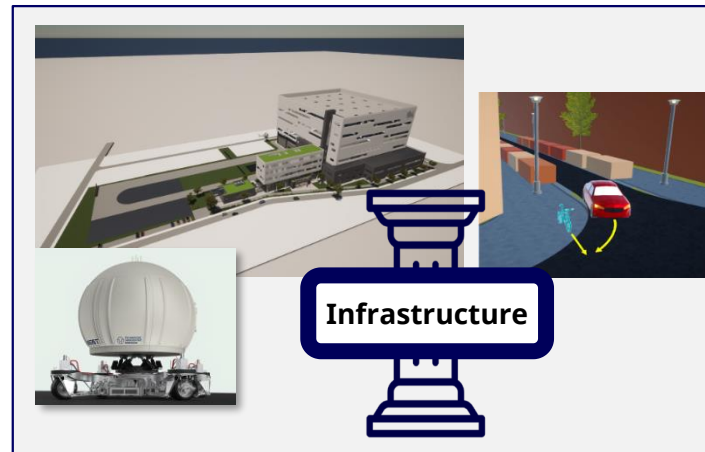
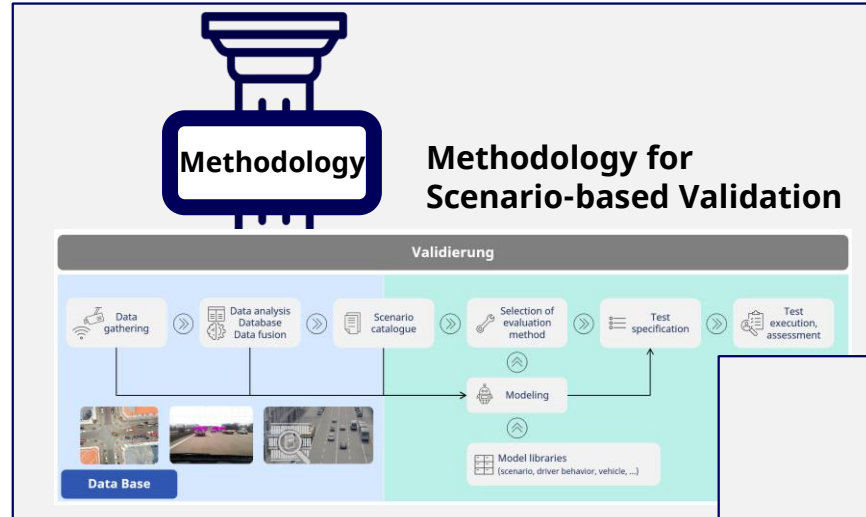
Former Senior  
Manager of  
Government and  
External Affairs at  
BMW



**Rajagopalan  
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M. Eng.**

Research  
Associate at the  
Chair of  
Automotive  
Engineering TU  
Dresden

# The SCART Institute



**Deliverables:**

**Validation relevant...**

**Test Scenarios**

**Test Specifications**

**Specifications for Simulations**

for ...

- ... Type Approval
- ... Test & Validation
- ... Risk Assessment
- ... Teleoperation

# Structural Development

„Smart Mobility Lab – SML“ – Operative from 01/2027



Open House Day: 28th June 2026

# SCART-Institute: Ammersee Workshop Format

Workshop 1 – 17.06.2025  
Workshop 2 – 09.01.2026  
Workshop 3 – 15.06.2026

SCART-Institute  
TU Dresden  
AVL  
BMW  
FSD GmbH  
IEEE SA  
SGS TÜV Saar  
KONTROL GmbH  
TÜV-Verband

**Additional Participants are  
Welcome!**

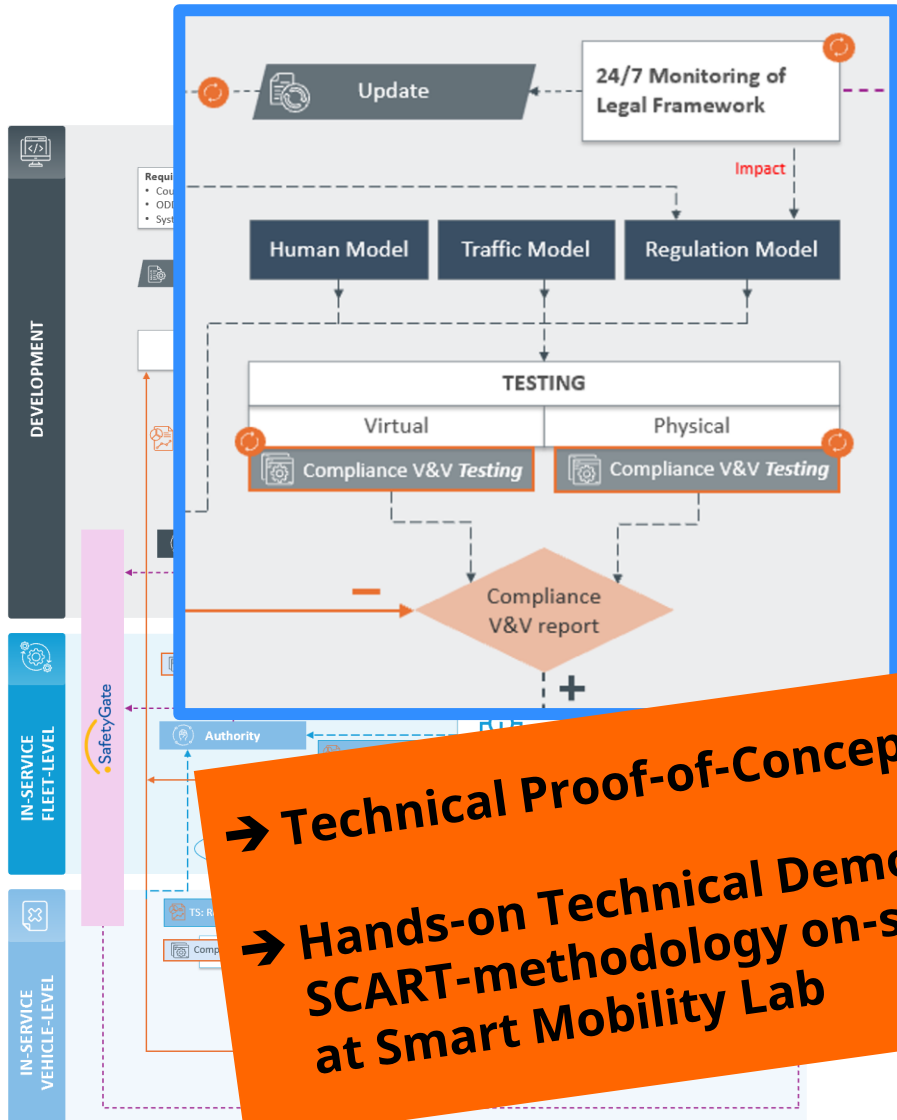


# SCART-Institute: Ammersee Workshop Format

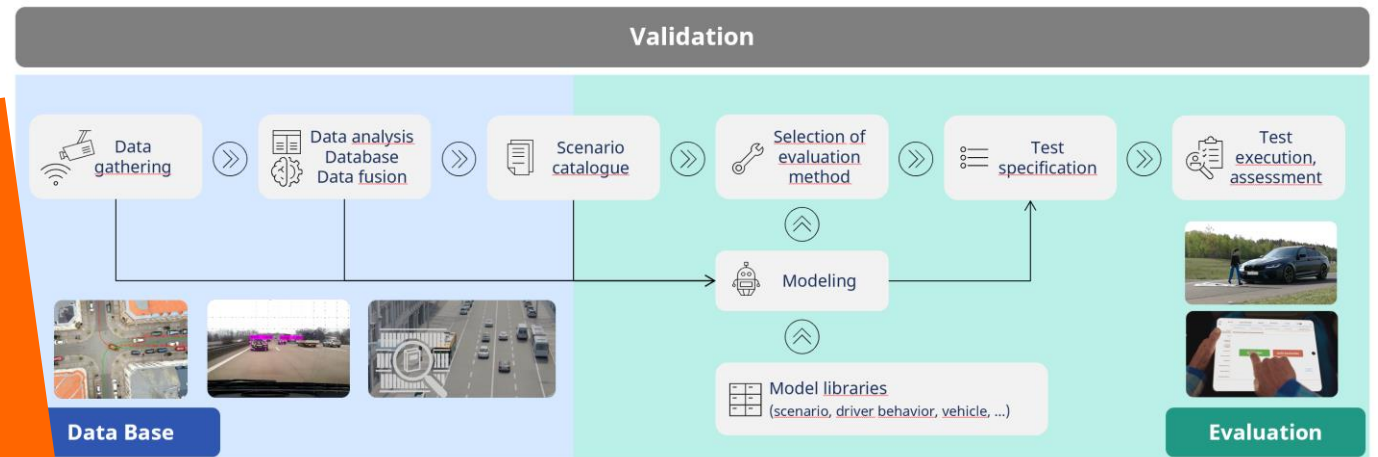
SCART to Support the Established Players in Homologation

(Authority + Technical Service + Car manufacturer)

- Test Scenarios, Pass/Fail Criteria
- Overall Risk Coverage and Representativity Metrics
- Simulation Credibility for Virtual Homologation



→ Technical Proof-of-Concept  
 → Hands-on Technical Demo of SCART-methodology on-site at Smart Mobility Lab



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- **Industry (car, suppliers)**
- **Insurance companies**
- **Tech companies (methodology)**

# 2nd SCART – KBA Workshop on 07.10.2025 in Flensburg

## Virtual Homologation Process

The working draft of the virtual homologation process flow for the overall life cycle was presented to KBA, which was iteratively prepared together with the participants of the Herrsching Workshop.

## Assigning Players for the Virtual Homologation

Dialogue for the distribution of roles for the different stakeholders in the virtual homologation process were initiated. The necessity for SCART was recognized by KBA.

## Follow-up Workshop

Workshop together KBA, BASt, SCART & TÜV-Verband was agreed as the next course action to concretise the next steps.



# 1st SCART – Scientific Workshop on 25.03.2026 in Dresden

## Participants 1st round:

RWTH Aachen  
TU Braunschweig  
TU Dresden

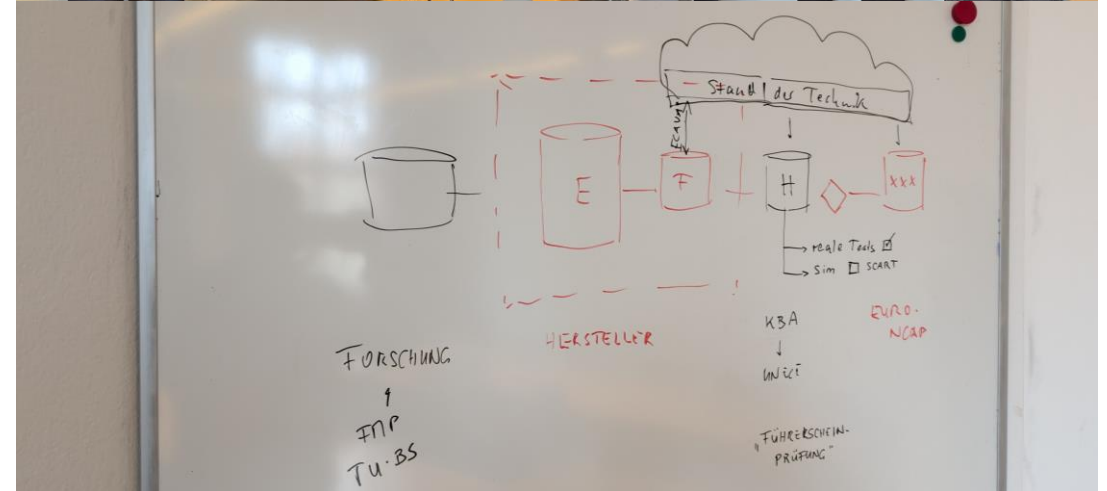
## Prospective participants:

TU Darmstadt  
TH Ingolstadt

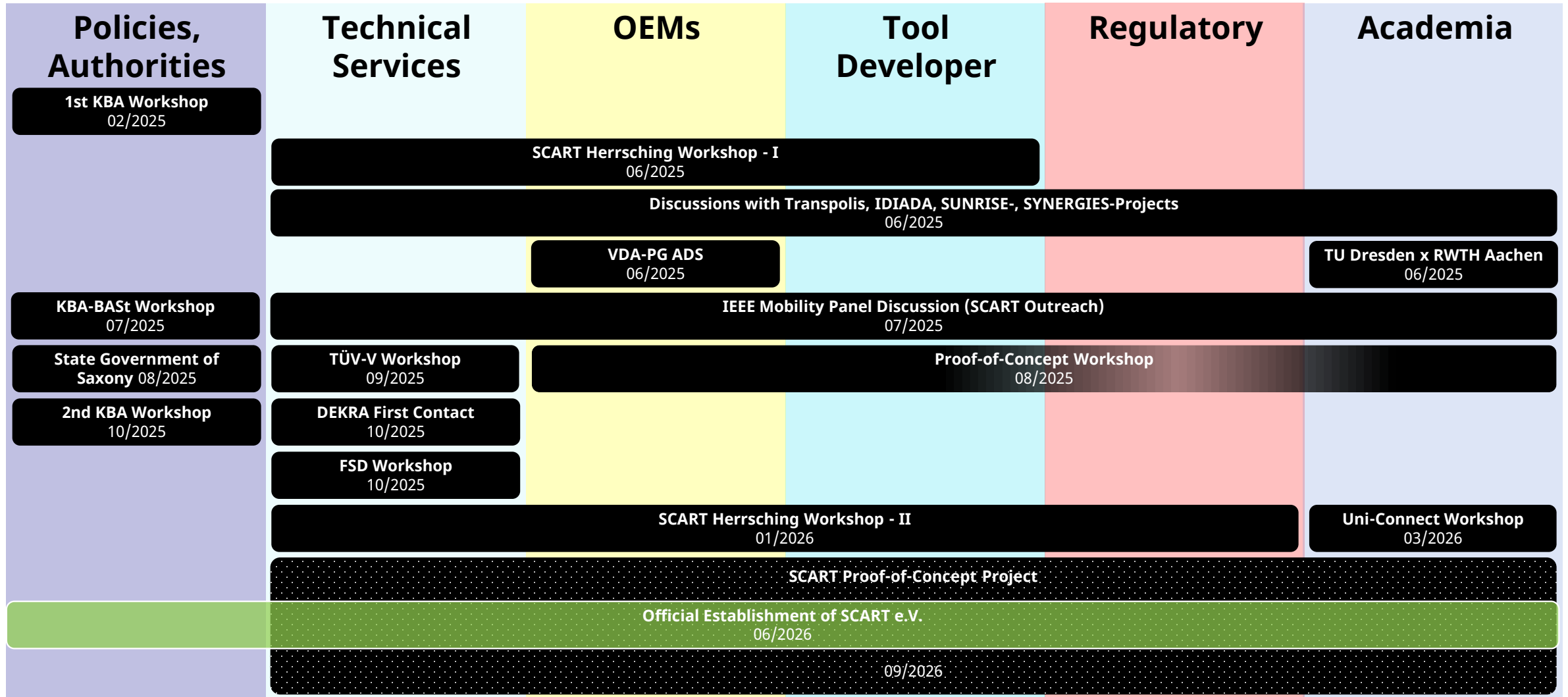
**others are highly welcome!**

## Goal: To align

- methodology,
- investments in research infrastructure,
- role of scientific institutions

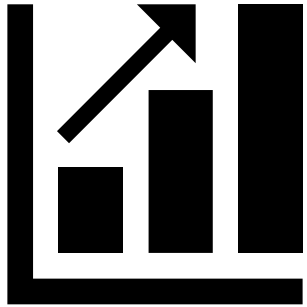


# SCART-Institute: Status Update



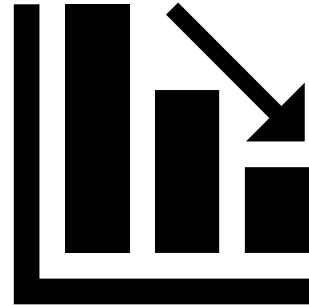
# The SCART Methodology

## Distinguishing features & USPs



### Database Fusion

Increases the depth+size of the traffic database with AI



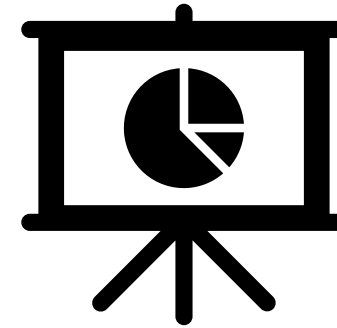
### Scenario Clustering

Reduces the number of Test scenarios



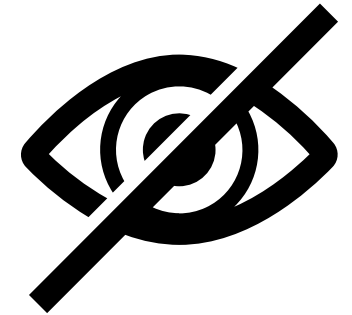
### Criticality Ranking

Quantifies scenario criticality to measure safety



### Scenario Coverage Metric

Measures the representativity of scenarios wrt ODD



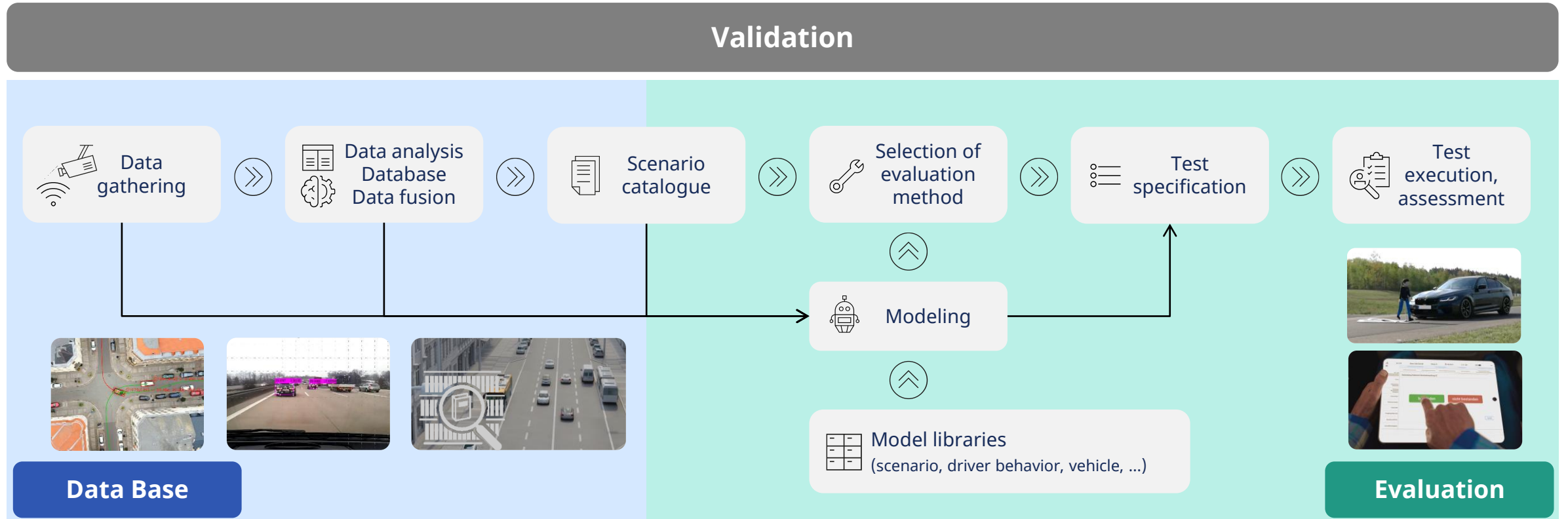
### Generating Synthetic Data

Synthesizes unaccounted scenarios in 4 Categories<sup>#</sup>

<sup>#</sup> Synthetic Scenarios Categories: (1) Fused – statistical matching, (2) Grounded – driving simulation, (3) Bounded – parametrization using probability distribution & (4) Unbounded – explorative

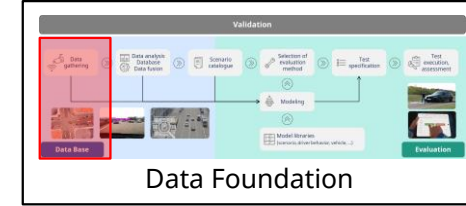
# The SCART Methodology

## General Workflow of the SCART Methodology tool chain

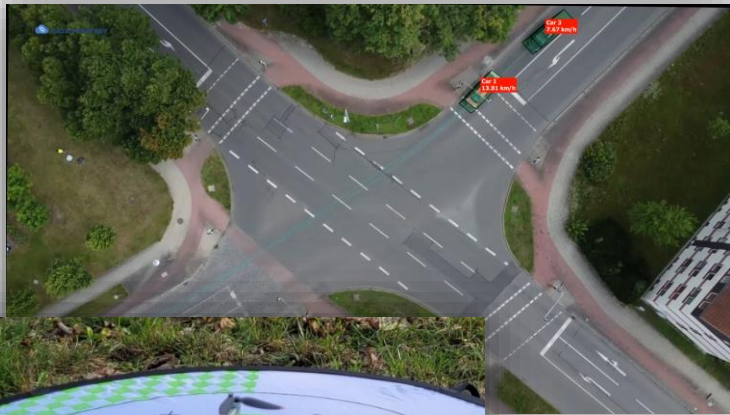


[3] M. Mai, et. al, "Die Dresdner Methode" Ein Baukasten zur ganzheitlichen Bewertung aktiver Sicherheits- und automatisierter Fahrfunktionen," in VDI-Tagung Fahrzeugsicherheit, Berlin, 2022.

# Data Acquisition Methods



## Stationary Traffic Observation



- Traffic Observation from a Bird's Eye-view
- Recording of all Vehicle Movements and the Surrounding Area

## Mobile Traffic Observation



- Vehicle-centric Traffic Observation
- Recording Vehicle Movement, surroundings, and Driver Input

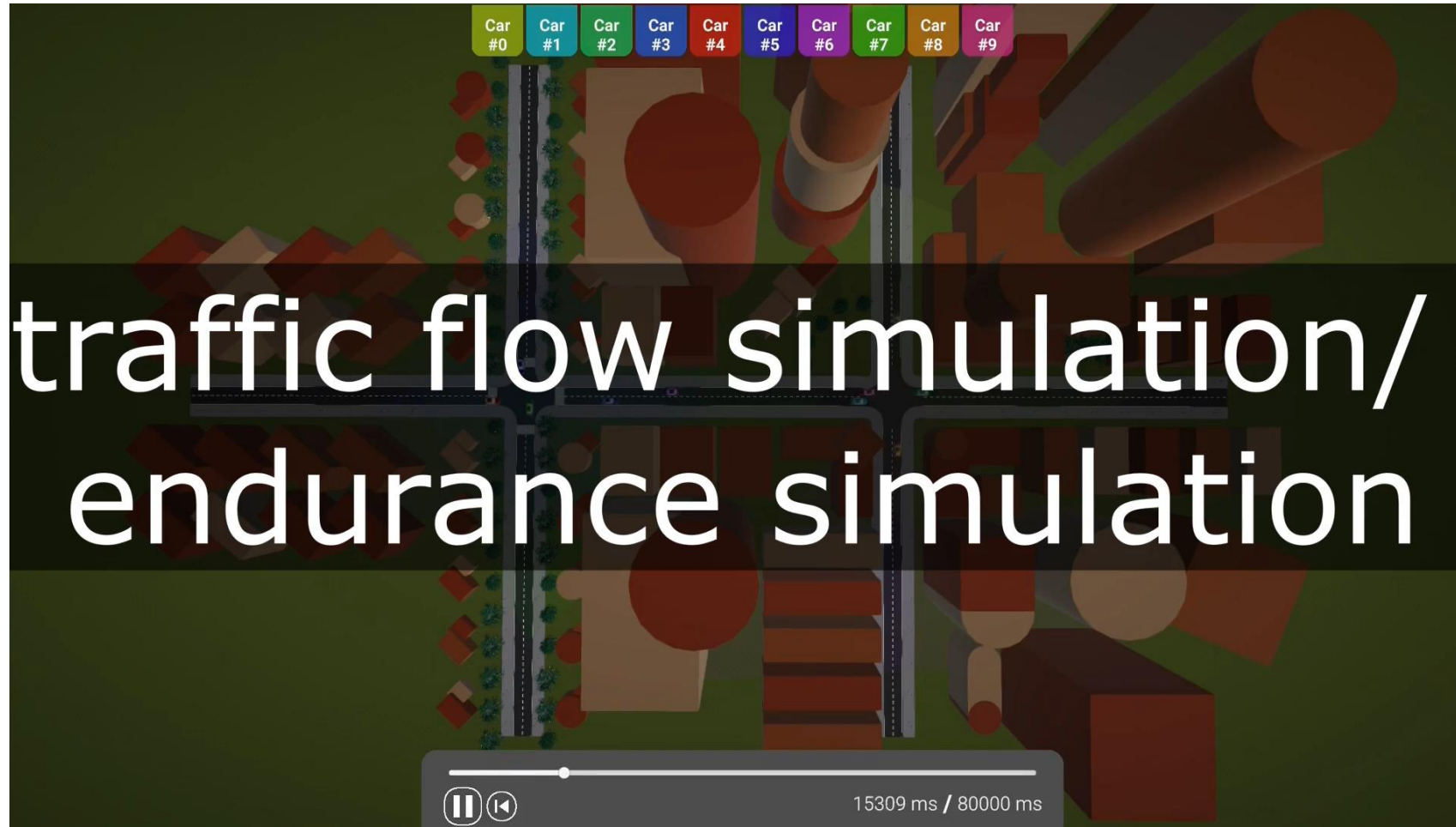
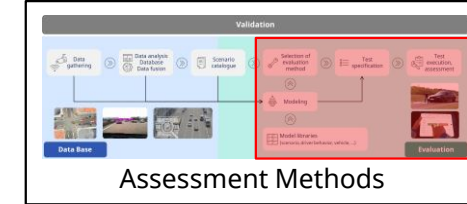
## Dresden Driving Simulator



- Recording Driver Behavior and Inputs

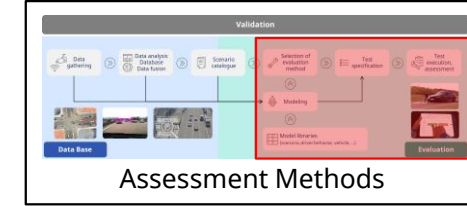
## Assessment Methods

Driver behavior simulation: Driver Reaction Model – DReaM



# Assessment Methods

## Dresden Driving Simulator

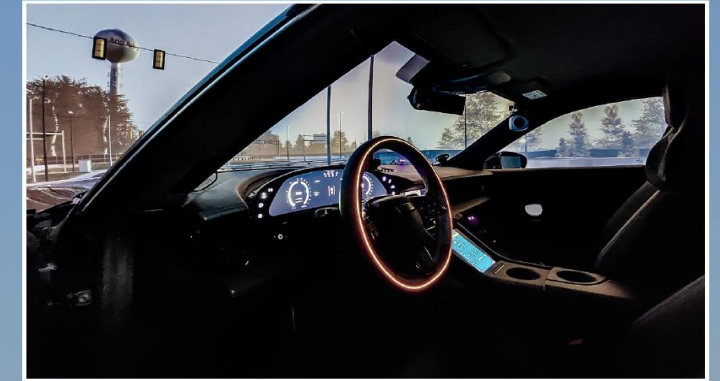


### APPLICATION FIELDS

- Objectification of subjective sensations in vehicle design (comfort, dynamics, safety)
- Development and validation of ADAS (Advanced Driver Assistance Systems) in the context of UX/HMI (User Experience/ Human-Machine Interface)
- Human perception studies
- Traffic psychological studies on driver behavior and validation of driver models
- Traffic space planning
- Accident research and risk profiles for insurance companies

### HIGHLIGHTS

- Sustained G-loads
- Dynamic maneuvers
- 10 controllable DoF
- Immersive visualization
- Modular & interchangeable mockups
- Hall & open space
- Portable
- Durable construction



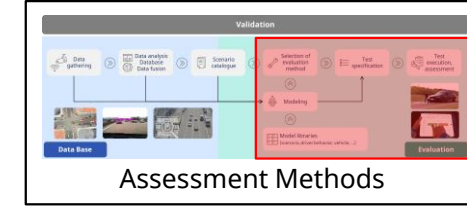
### FEATURES AND PERFORMANCE

- ~5200 kg total mass
- ±0.8 g real acceleration (via motion platform)
- 45 km/h top speed
- Dimensions: 5 x 5 x 5 m
- Low center of gravity: 0.93 m
- Area of motion: 70 x 70 m
- 225° x 40° field of view
- 10 degrees of freedom
- Electric drive system (20 minutes charging time)
- Dynamic driving operation (motion platform): 45 minutes driving time
- Static driving operation (hexapod, yaw drive): continuous operation possible

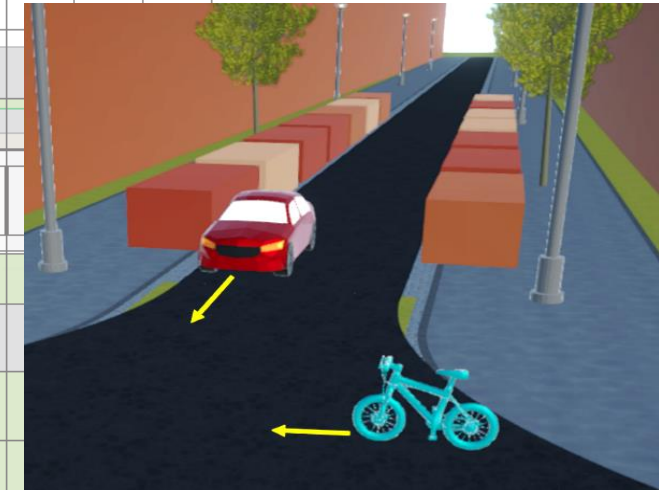


# Assessment Methods

## Cyberphysical testing (CVA)



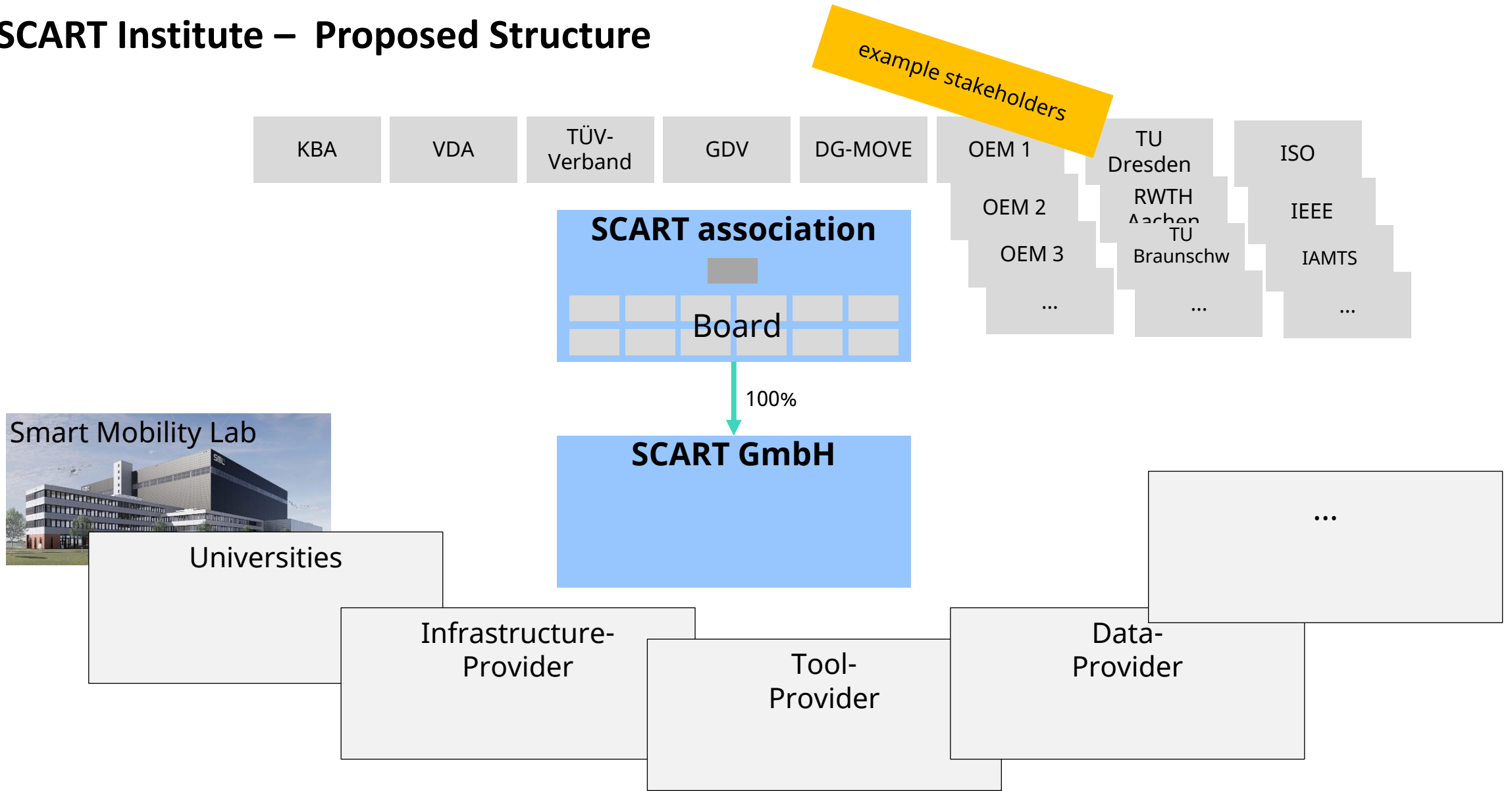
traffic participant 1 passenger car		traffic participant 2 bicyclist	
vehicle	physical	vehicle	physical
	virtual		virtual
driver	physical in scenario	driver	physical in scenario
	physical in simulator		physical in simulator
	virtual		virtual



**POI**  
point of interest

physical		virtual	
environment			
road	static objects	traffic lights	...

# SCART Institute – Proposed Structure



# Why Join SCART?

## Influence Standards

01

Actively shape European and international ADS validation standards

## Reduce Costs & Risk

02

Standardised validation processes reduce validation cost and product liability risk

## Diverse Resources

03

Access to methods, models, know-hows, test infrastructures, etc. across Europe

## Research & Innovation

04

Connect with an broad network of industrial and research partners

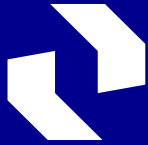
# SCART at Safety Expo 2026

Find us at the Exhibition and learn more about SCART





**SCART**  
SAFE · AUTOMATED · TRAFFIC



Technische  
Universität  
Dresden



LEHRSTUHL KRAFTFAHRZEUGTECHNIK

Thank you for your attention!

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