

**BMW
GROUP**



ROLLS-ROYCE
MOTOR CARS LTD



BMW HIGHWAY ASSISTANT.

M. HAMBAUER – HEAD OF SYSTEM APPROVAL FOR ASSISTED AND AUTOMATED DRIVING FUNCTIONS.

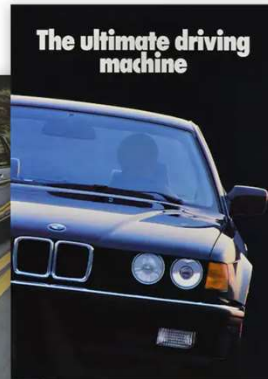
THE HISTORY OF „FREUDE AM FAHREN“.

Hecht im Karpfenteich

Das ist er, der BMW 1800 Ti, der die Weltschleife über den Nürburgring schneidet. Stuttgart als der Klassen-Amer...
 DIE NEUE KLASSE



*...aus Freude
am Fahren...*



Mitbestimmung

Die Freude am Fahren ist unser Konstruktionsprinzip. Danach haben wir in drei sechszig-jährigen Automobilen gehandelt. Die Automobile der „Neuen Klasse“ handlich, überaus leicht, vital und funktionell. Die technische Überlegenheit dieser Automobile gab BMW-Fahrern die Möglichkeit, doch Straßenverkehr mit Ausreißern. Den Verkehrsstrom in Fluß zu halten. Die Sicherheit zu erhöhen.

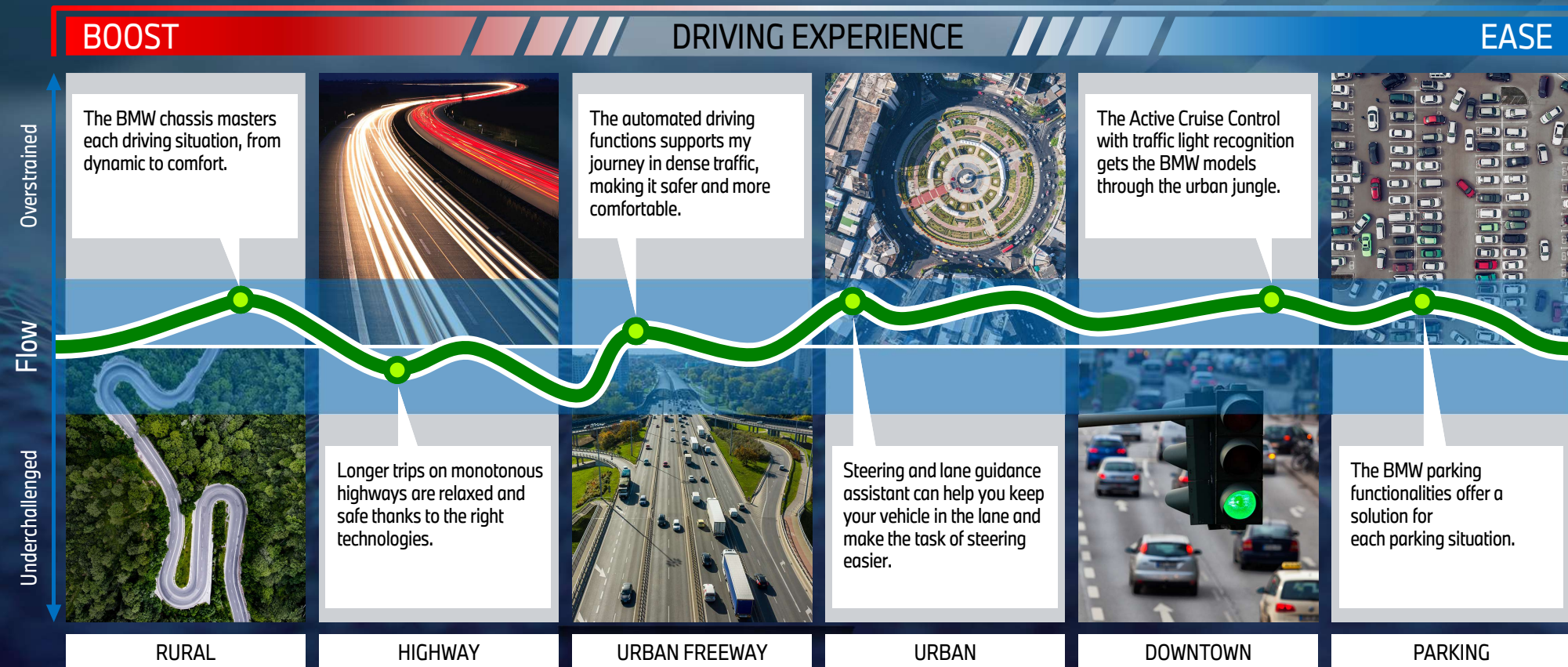
Damit haben wir den BMW 2500 und BMW 2800 gebaut. Für noch mehr Freude im Fahren.

Damit in den sechzig Jahren noch mehr Fahrer, mit Bestimmung können.



Aus Freude am Fahren - BMW

SHEER DRIVING PLEASURE AT BMW. WITH BOOST AND EASE IN ONE UNIQUE FLOW OF DRIVING EXPERIENCE.



DRIVER ASSISTANCE SYSTEMS – FOCUS ON SAFETY AND CUSTOMER BENEFITS.

LEVEL 4

L4 AVP

LEVEL 3

L3 Offer @ BMW 7 series

LEVEL 2 WITH EXTENDED DRIVER MONITORING

First OEM with L2+ Offer in Germany

LEVEL 2

First Steering Assist

LEVEL 1

First Active Cruise Control
@ BMW 7 Series

MORE THAN 40 FEATURES: Safety, Comfort, Parking

2000

...

2010 ... 2012

...

2019

...

2023

BMW DELIVERS HIGH-END TECHNOLOGY: ON-BOARD&OFF-BOARD.

HIGHWAY ASSISTANT WITH ACTIVE LANE CHANGE.



- » **Highest comfort** through longer hands-off driving journeys.
- » **Highest safety** standards through precise driver monitoring, HD Live Maps and second lane guard.
- » **Seamless switch** between Hands-on and Hands-off.
- » Active Lane Change with **eye activation** as an **industry premier**.



NEXT LEVEL IN ASSISTED DRIVING: HIGHWAY AND LANE CHANGE ASSISTANT.

SAE – LEVEL 2
EXTENDED DRIVER
MONITORING ENABLES
LANE CHANGE ON
HIGHWAY.



HIGHEST SAFETY

through precise driver monitoring, HD Live Maps
and full validation before handover to the customer.

UNIQUE DRIVING EXPERIENCE

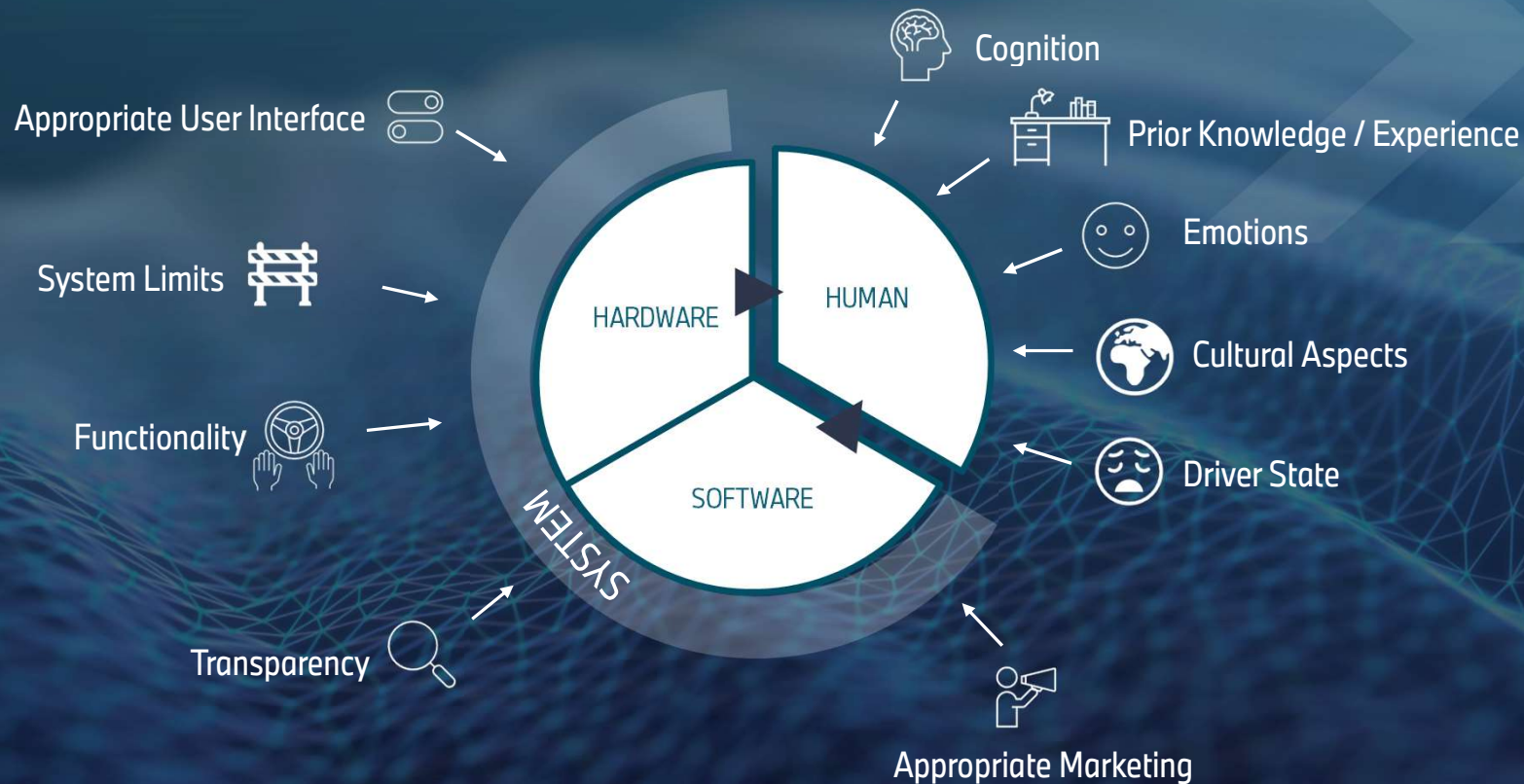
through intuitive interaction of driver and
vehicle and longer hands-off driving journeys.




AUTOMOTIVE INNOVATIONS AWARDS 2023

Most innovative premium brand:
"Autonomous driving & ADAS".

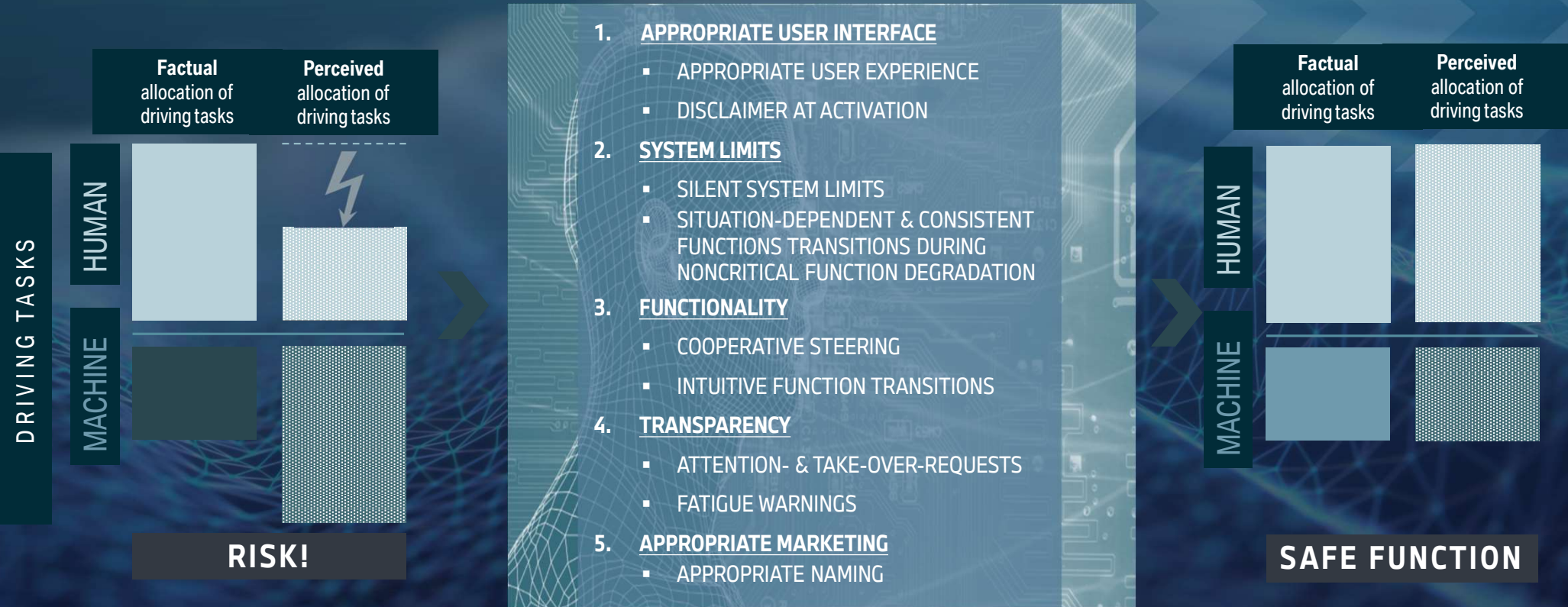
THE HUMAN FACTOR IN THE DEVELOPMENT OF LEVEL 2 ADAS.



 The driver is part of the system and therefore, also part of the safety chain of ADAS (SAE L2)

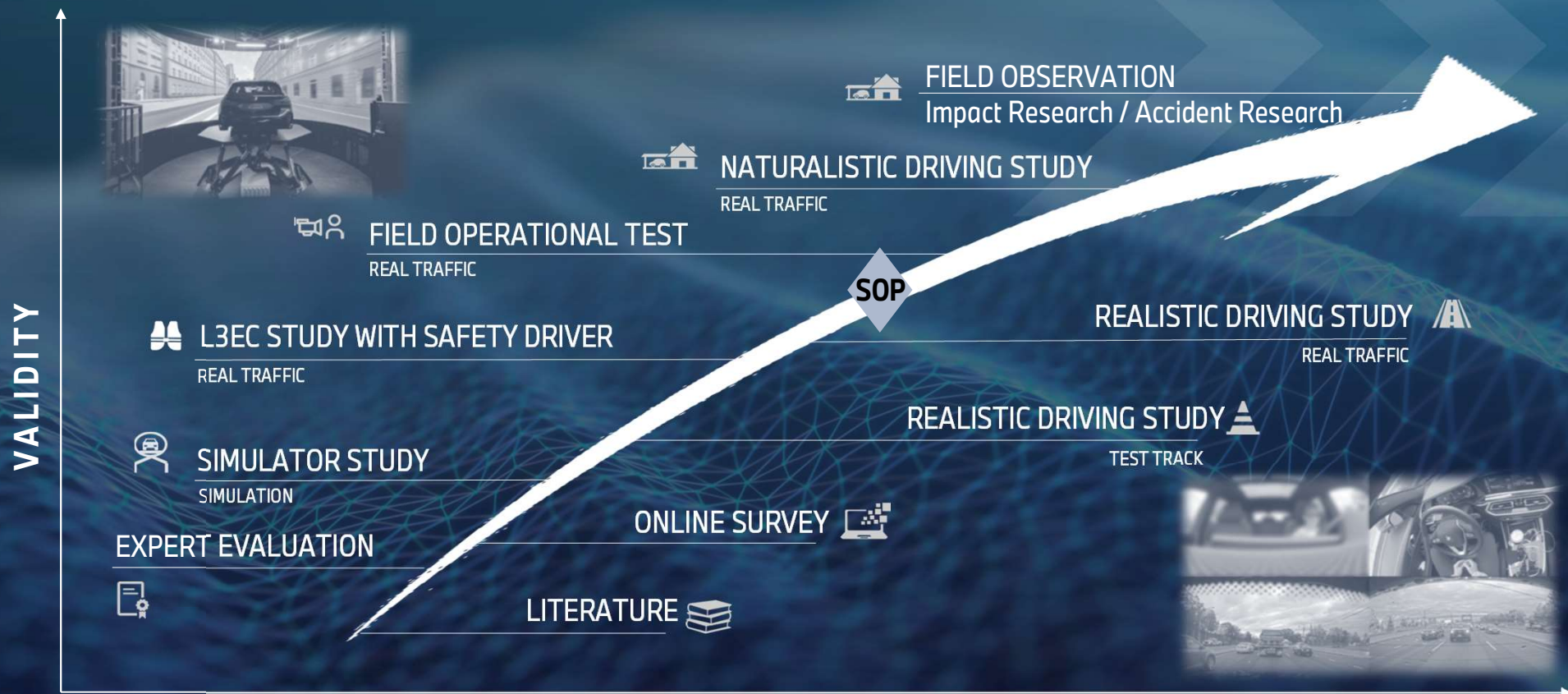
The **driver is part of the system** and needs to be **considered in the development of ADAS**.
Various factors have an impact on how a human driver behaves and interacts with the system.

GENERAL MEASURES FOR A SAFE FUNCTION. PROMOTING A CORRECT SYSTEM UNDERSTANDING.



The driver needs to have the opportunity to be aware of the allocation of driving task and his responsibility at all times.
A tailored user interface, among other things, supports the driver to do so.

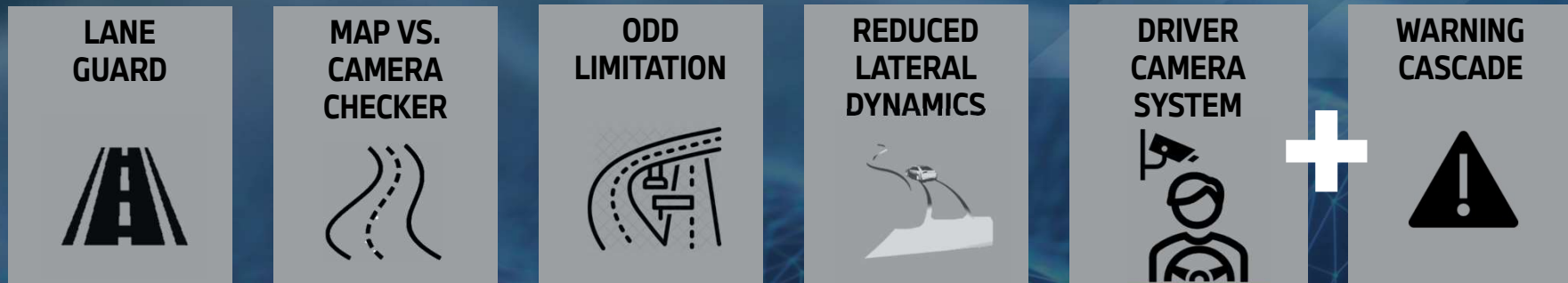
BMW TOOLS FOR DEVELOPING ADAS/ADS WRT SOTIF HUMAN FACTORS.



Validation and Verification of ADAS needs to consider **different aspects from concept phase to field observation.**
Adapted tools with respect to **specific system characteristics and validation targets** are required.

TECHNICAL SAFETY MEASURES FOR BMW HIGHWAY ASSISTANT.

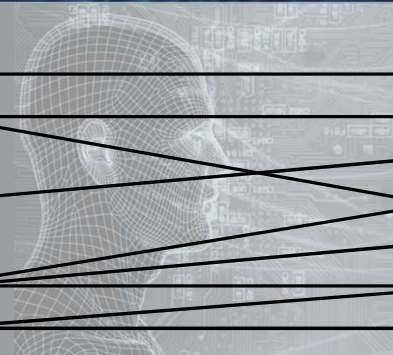
Technical Measures



Human Factors Measures

WHY?

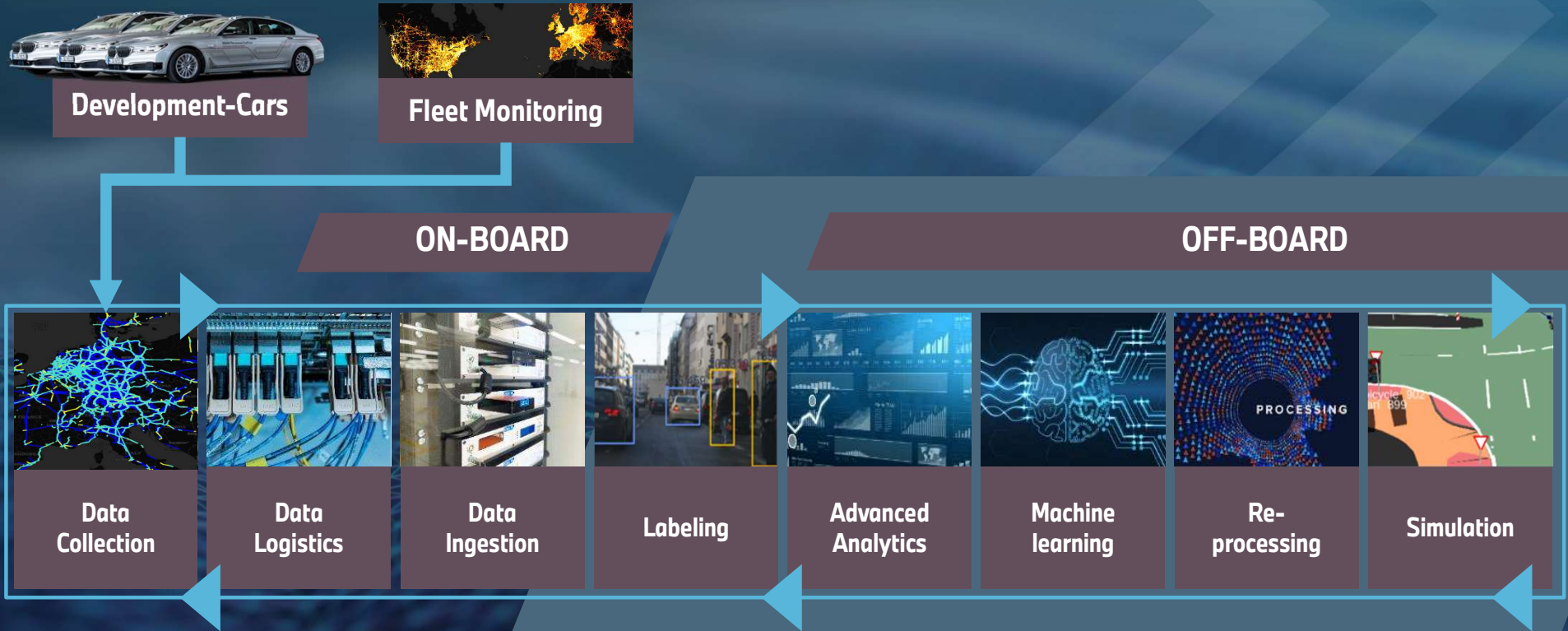
- ... support the driver's mental model
- ... minimize the risk for overtrust and overreliance
- ... minimize the risk for driver distraction and loss of driver attention
- ... maintain driver involvement
- ... increase controllability of system limits



HOW?

- Appropriate marketing and naming
- Tailored User Interface
- Monitoring driver attention and vigilance
- Non-salient degradation of the function
- Cooperative functional design
- Regular experience with system limits
- Transparency of the functionality

DATA IS THE BASIS FOR SAFETY-DRIVEN AND AGILE FUNCTIONAL DEVELOPMENT.



The future is a **scaled data driven development** to improve the function in front of the customers more quickly and on a larger scale. Super-fast **over-the-air upgrades** helps us to bring the latest updates to the customer.

BMW HIGHWAY AND LANE CHANGE ASSISTANT. STUDIES, STANDARDS AND REGULATION.



VDA Verband der Automobilindustrie | FAT Forschungsgemeinschaft Automobiltechnik

FAT-Schriftenreihe 369
Level 2 hands-off—Recommendations and guidance

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Level 2 hands-off
—
Recommendations and guidance

Report 216300

Independent studies confirm systems that have been qualified for a Hands-Free use case.



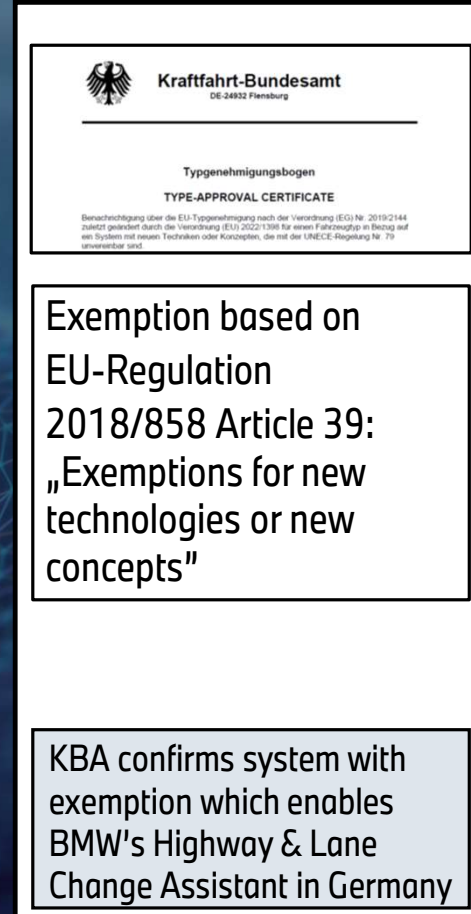
ISO PUBLICLY AVAILABLE SPECIFICATION ISO/PAS 11585 First edition 2023-01

Road vehicles — Partial driving automation — Technical characteristics of conditional hands-free driving systems

Véhicules routiers — Automatisation partielle de la conduite — Caractéristiques techniques des systèmes de conduite mains libres conditionnels

Reference number ISO/PAS 11585:2023(01) © ISO 2023

Technical Characteristics are harmonized to describe Systems which enables Hands-Free Use Cases



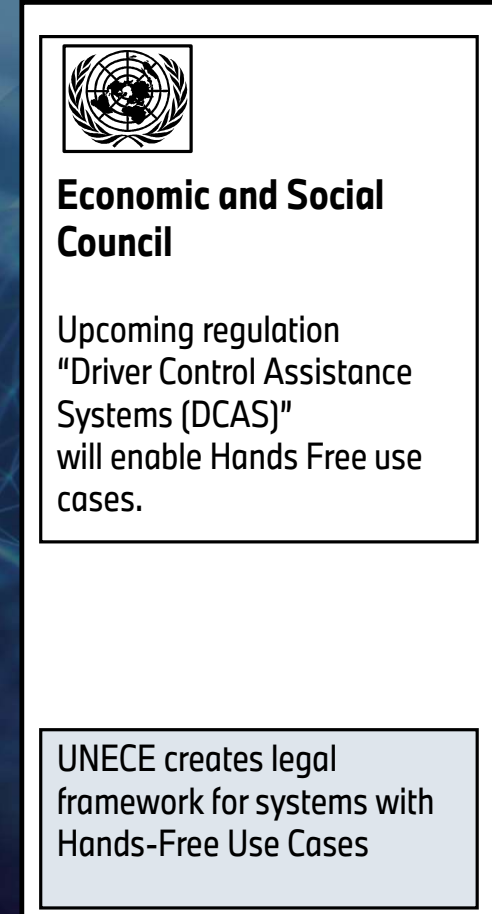
Kraftfahrt-Bundesamt DE-24832 Flensburg

Typgenehmigungsbogen
TYPE-APPROVAL CERTIFICATE

Benachteiligung über die EU-Typgenehmigung nach der Verordnung (EG) Nr. 2019/2144 zulässig genehmigt durch die Verordnung (EU) 2022/1398 für einen Fahrzeugtyp in Bezug auf ein System mit neuen Techniken oder Konzepten, die mit der UNECE-Regelung Nr. 79 unvereinbar sind

Exemption based on EU-Regulation 2018/858 Article 39: „Exemptions for new technologies or new concepts“

KBA confirms system with exemption which enables BMW's Highway & Lane Change Assistant in Germany



Economic and Social Council

Upcoming regulation “Driver Control Assistance Systems (DCAS)” will enable Hands Free use cases.

UNECE creates legal framework for systems with Hands-Free Use Cases

CONCLUSION.



Cognition
Experience & Knowledge
Driver State
Emotion
Culture



Infrastructure
Environment
Data



Vehicle
+ ADAS
+ Automation



Regulation
Standardization
Research



Assisted Driving Systems are no safety systems, but they need to be safe systems.



A possible safety benefit comes as a “side effect” from a prober system design and an intended use of the driver which can more then counter-balances of the inherent risks of a complex mechatronic traffic systems.



A safety oriented development process considering human factors, environment and the system to create safe customer value is the base.



Regulatory should allow innovations and at the same time ensure safe systems. A globally harmonized regulatory for ADAS must be the goal.

THANK YOU.



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