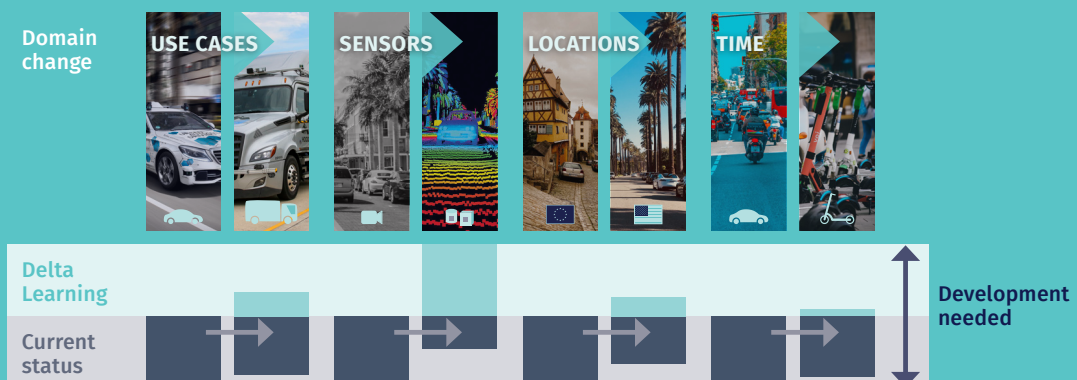**KI DELTA LEARNING**
Scalable AI for Automated Driving

Towards mass deployment of autonomous vehicles through flexible AI and efficient training methods

Scalable AI for unrestricted use in the Open World

Highly and fully automated vehicles face a large variety of complex situations in a continuously evolving world of mobility. This leads to great challenges in scaling AI (artificial intelligence) modules for serial production of autonomous vehicles. Currently, automotive AI solutions react reliably only in limited scenarios and algorithms must be constantly retrained for new domains, resulting in enormous development costs.
In KI Delta Learning, leading partners from science and industry investigate versatile machine learning solutions that enable a more efficient training of AI modules and, in turn, the unrestricted realisation of automated driving in the Open World. Through new methods for efficiently transferring existing knowledge to new application areas the project aims to bridge deltas – the difference in requirements between a known domain and a new target domain – addressing six important use cases.

Domain change

USE CASES SENSORS LOCATIONS TIME

Delta Learning

Current status

Development needed

Delta Learning – 6 use cases

❭ **Sensors:** Changes in positioning and technologies

❭ **Countries:** Changes in infrastructure, signage and traffic rules

❭ **Traffic areas:** From simple to complex traffic routing

❭ **Short-term changes:** Day time, weather conditions

❭ **Long-term changes:** New mobility concepts

❭ **Networks:** Developments in training strategies and neural networks architectures

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New methods for a scalable AI

To remedy these deltas, new methods are developed and validated supported by a project-specific delta data set in three main areas: transfer learning, didactics and automotive suitability.

Data acquisition – the delta between general training data sets and specific Delta Learning data

Available training data sets are often unspecific to delta learning and only suitable to a limited extent for achieving the project objectives. For the first time, the collection of a comprehensive project-specific data set provides the basis for the efficient development of Delta Learning methods.

Transfer learning – the delta between previously trained and new domains

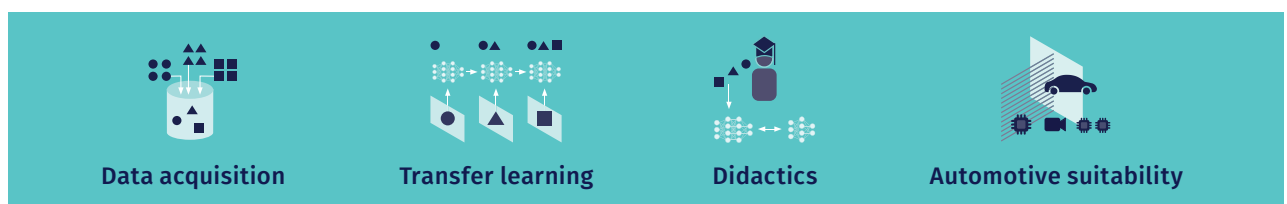New tools and methods will be developed to enable AI modules to be extended and transferred to new domains and new tasks without significantly reducing their performance in their original application area.

Didactics – the delta in the learning process

Not only the knowledge itself, but also how the knowledge is conveyed, has an influence on the learning results. Therefore, project work will focus on targeted learning strategies and model structures for effective and efficient training.

Automotive suitability – the delta between special requirements in the automotive industry and current AI approaches of other research areas

AI modules must have important properties such as robustness and real-time capability in the automotive context. New domains due to changes in the open world represent deltas in addition to new hardware requirements for the integration into the embedded environment.

| Data acquisition | Transfer learning | Didactics | Automotive suitability |

Partners

External partners

Mercedes-Benz · BMW GROUP · BOSCH · CARIAD · Porsche Engineering driving technologies · Valeo · ZF · MORE AUTOMOTIVE · Technische Universität Braunschweig · eict

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