Enabling the Software-Defined Vehicle through an Integrated Simulation Environment

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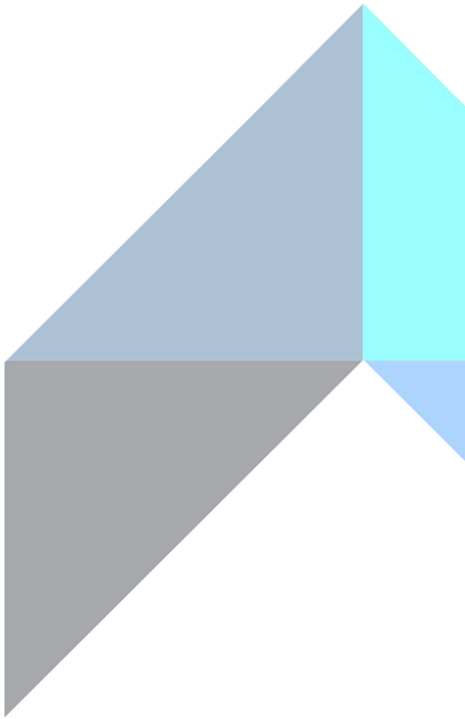
Introduction to Software-Defined Vehicles



Industry Transformation

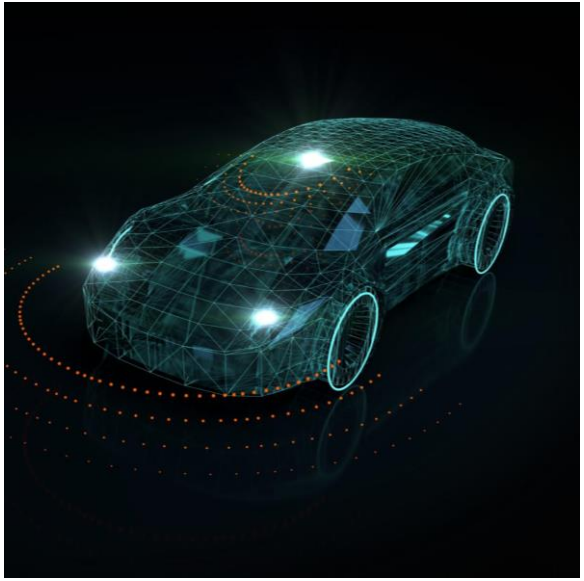
Shift to Software-Defined Vehicles

- The automotive industry is undergoing a paradigm shift from hardware-centric to software-centric development.
- SDVs represent a new class of vehicles where software defines functionality, performance, and user experience.

Evolving Engineering Workflows

- This shift demands new engineering approaches, especially in simulation and integration.

What is a Software-Defined Vehicle?



Centralised Computing Architecture

SDVs utilise centralised computing to integrate hardware and software efficiently.

Real-Time Connectivity and Cloud

Continuous connectivity with cloud services enables dynamic updates and diagnostics.

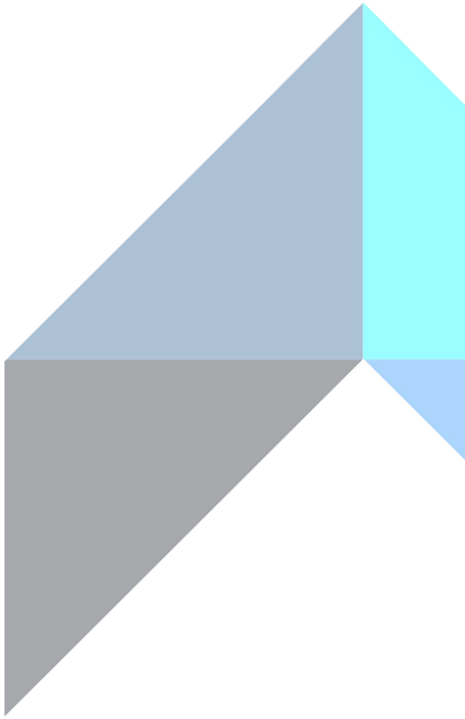
Dynamic Software Updates

Software layers allow dynamic feature upgrades improving vehicle functionality over time.

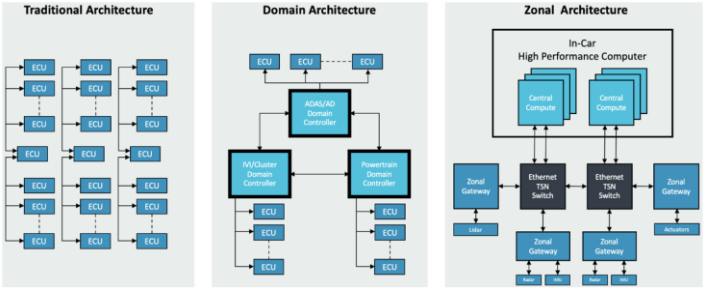
Personalised User Interfaces

SDVs provide personalised, adaptable interfaces enhancing user experience.

SDV Architecture and Engineering Challenges



SDV Architecture Overview



Layered Architecture

SDV architecture is modular with layered structure from hardware to cloud, enabling scalability and reusability.

Hardware Layer

Hardware layer includes sensors, actuators, and ECUs essential for vehicle operation and data collection.

Middleware Layer

Middleware manages communication and data flow between hardware and applications in the SDV.

Application Layer

ADAS, infotainment (smart cockpit), powertrain control, chassis, …

Cloud Services

Cloud supports data analytics, remote updates, and service orchestration for continuous SDV improvements.

Engineering Challenges

System Complexity

Developing SDVs involves managing complex integration of subsystems like ADAS, infotainment, powertrain and chassis.

Safety Standards Compliance

Meeting safety standards like ISO 26262 and ASPICE is essential for ensuring SDV reliability and safety.

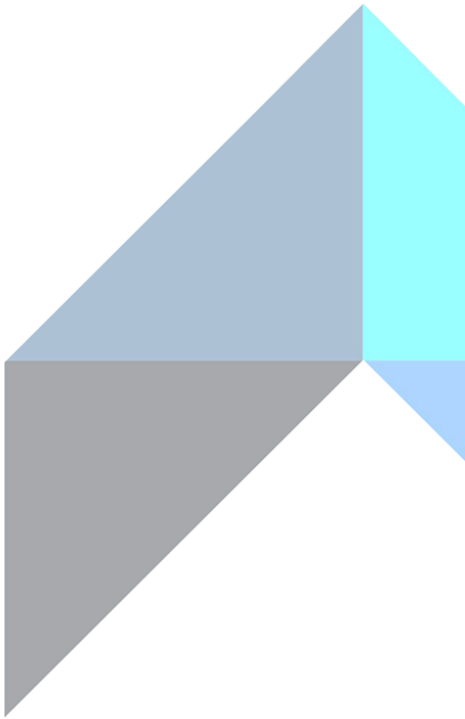
Validation and Testing

Robust validation and testing across diverse hardware platforms are crucial for SDV development success.

Simulation and Development Tools

Advanced simulation and integrated development environments facilitate addressing engineering challenges effectively.

SDV System Integration



Importance of System Integration

Ensures Interoperability

System integration guarantees seamless interoperability between various vehicle subsystems and domains in SDV development. (ADAS, Infotainment, Powertrain, Chassis)

Supports Scalability and Reuse

Integration enables scalable development and component reuse, enhancing efficiency and reducing costs.

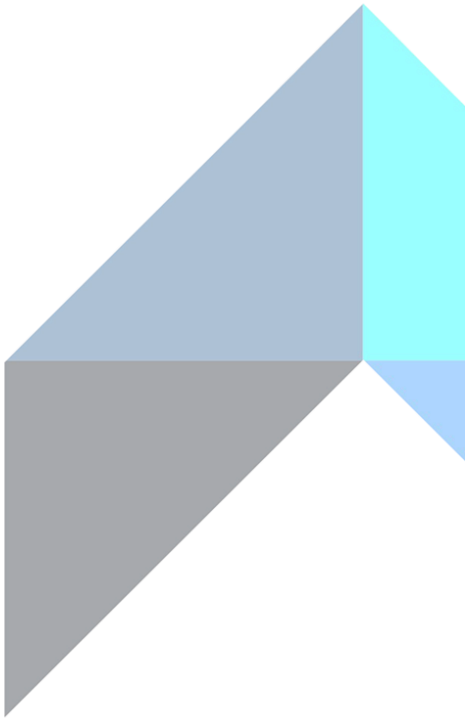
Enhances Safety and Compliance

System integration supports compliance with safety standards necessary for advanced driver assistance systems.

Facilitates Complex Features

Effective integration reduces development time and enables complex feature implementation in smart vehicles.

Simulation Strategies



Role of Simulation

Early Validation

Simulation enables early validation of software and system interactions, reducing dependency on physical prototypes.

Comprehensive Testing Methods

Supports Model-in-the-Loop, Software-in-the-Loop, Hardware-in-the-Loop and X-in-the-Loop testing for thorough validation. Supports iterative development and continuous integration

Scenario-Based Testing

Simulation allows testing of edge cases and rare scenarios that are difficult to reproduce physically.

Virtual Prototyping Benefits

Cost Savings

Virtual prototyping reduces expenses by minimising the need for physical prototypes and testing.

Faster Iteration

Engineers can quickly simulate and refine designs, accelerating the development timeline.

Early Issue Detection

Simulations help identify and resolve system issues early in the development cycle.

Collaborative Development

Virtual prototypes enable teamwork across locations, improving innovation and efficiency.

Integrated Simulation Environment

Holistic Testing Framework

Combines physics models, embedded software, and real-time data for comprehensive system testing.

Cross-Domain Co-Simulation

Enables simultaneous simulation of vehicle dynamics, sensor models, and network communication

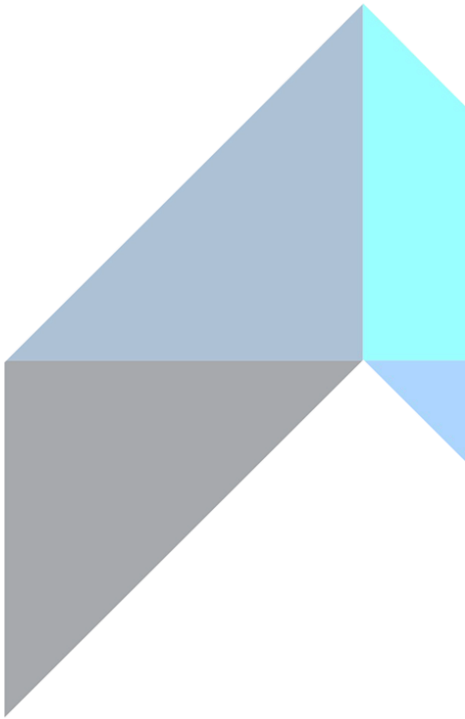
Scalable Testing & Deployment

Supports testing from component to system level with continuous integration and deployment.

Real-Time Feedback Loops

Enhances simulation accuracy and relevance through continuous real-time data feedback.

Our Solution



KAN-Do


KAN-Do®
A Tool-Agnostic, End-to-End, and Scalable
Simulation Integration Platform

KAN-Do Simulation Platform

Modular and Scalable Design

The platform is modular and scalable, adapting to the needs of various development stages and project sizes.

Integration with OEM Toolchains

Seamless integration with OEM toolchains and support for open standards like FMI, AUTOSAR, and ROS ensures compatibility and flexibility.

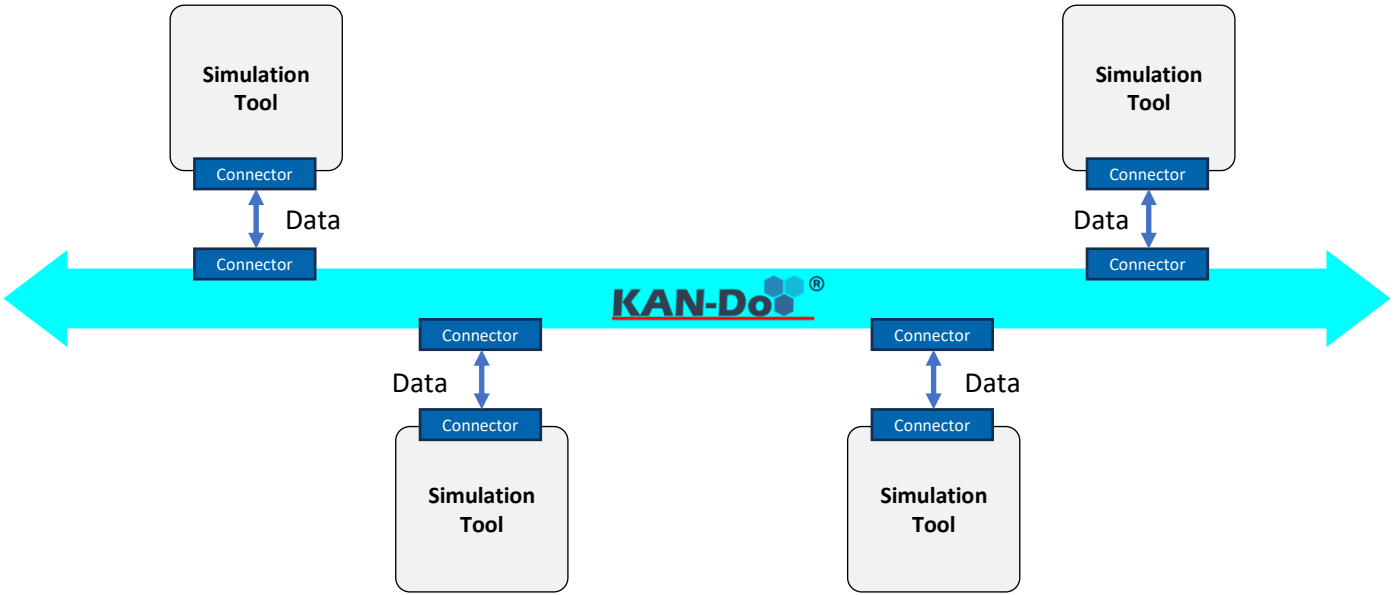
Real-Time Co-Simulation and Testing

Supports real-time feedback, co-simulation, and continuous testing for thorough system validation.

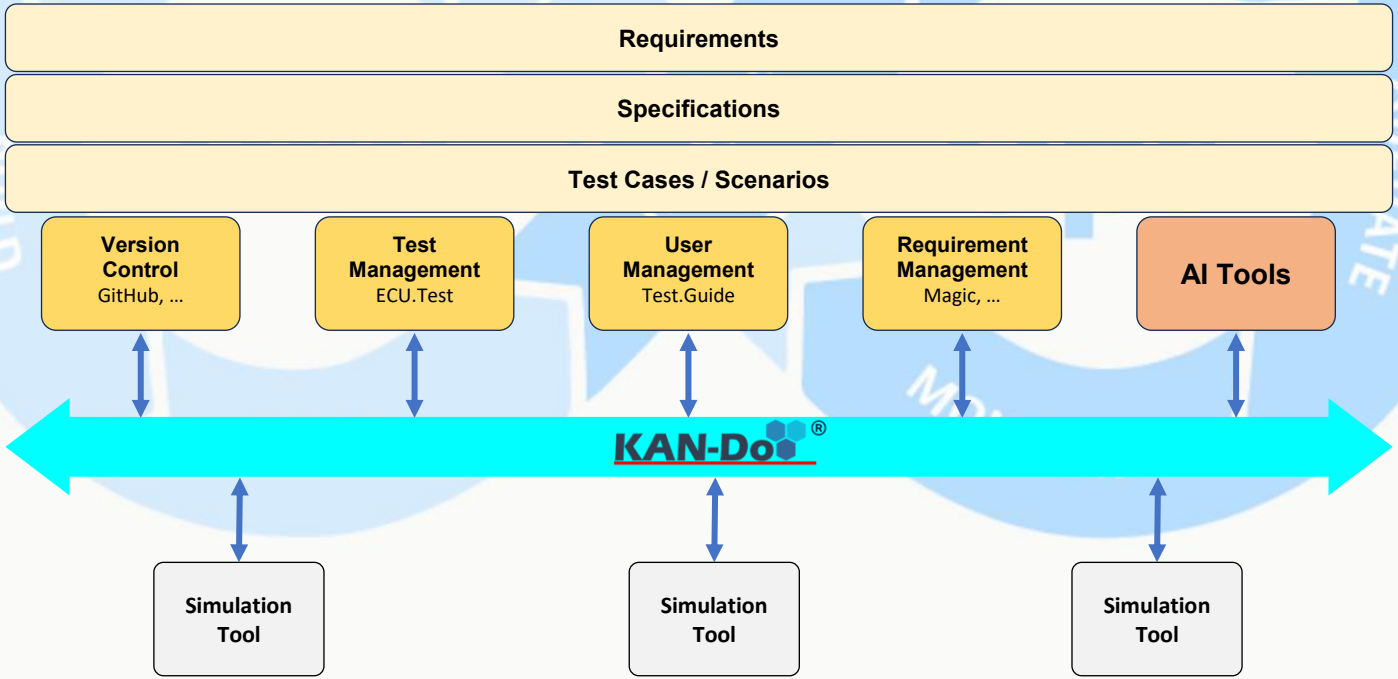
Wide Range of Applications

Flexible and interoperable platform suitable for component testing up to full vehicle simulation.

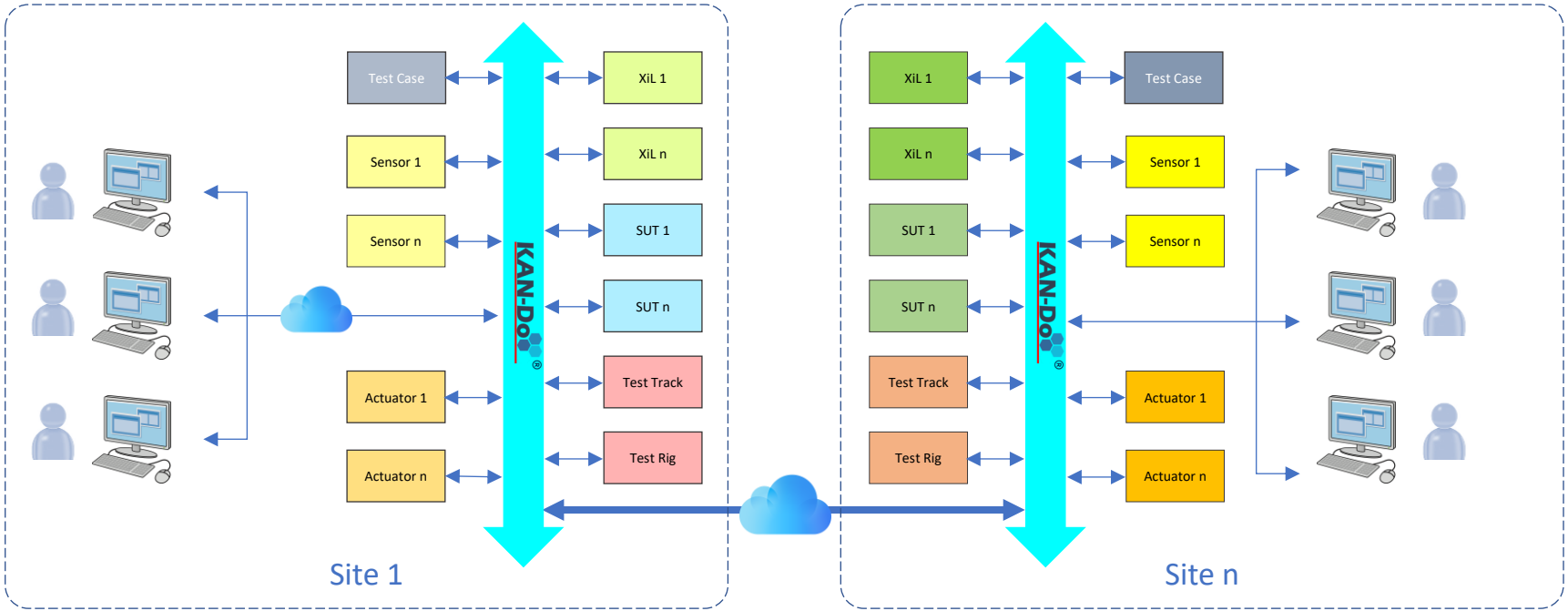
KAN-Do: Data Centric Approach



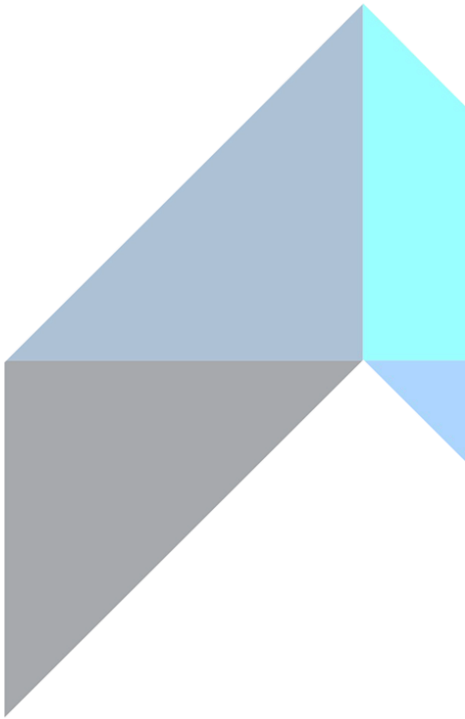
KAN-Do: An End-to-End Solution



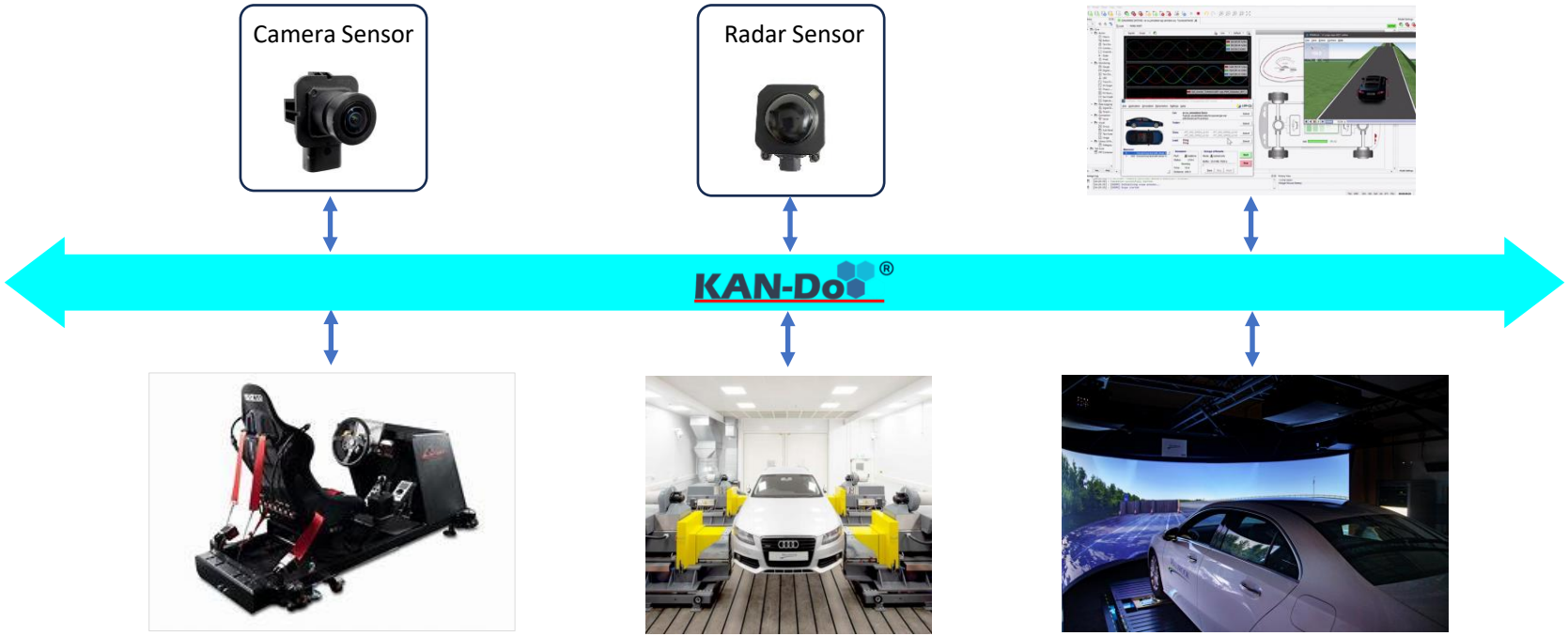
KAN-Do: Cloud/Remote Connectivity



Examples / Use Cases



KAN-Do Use Case: Powertrain / ADAS



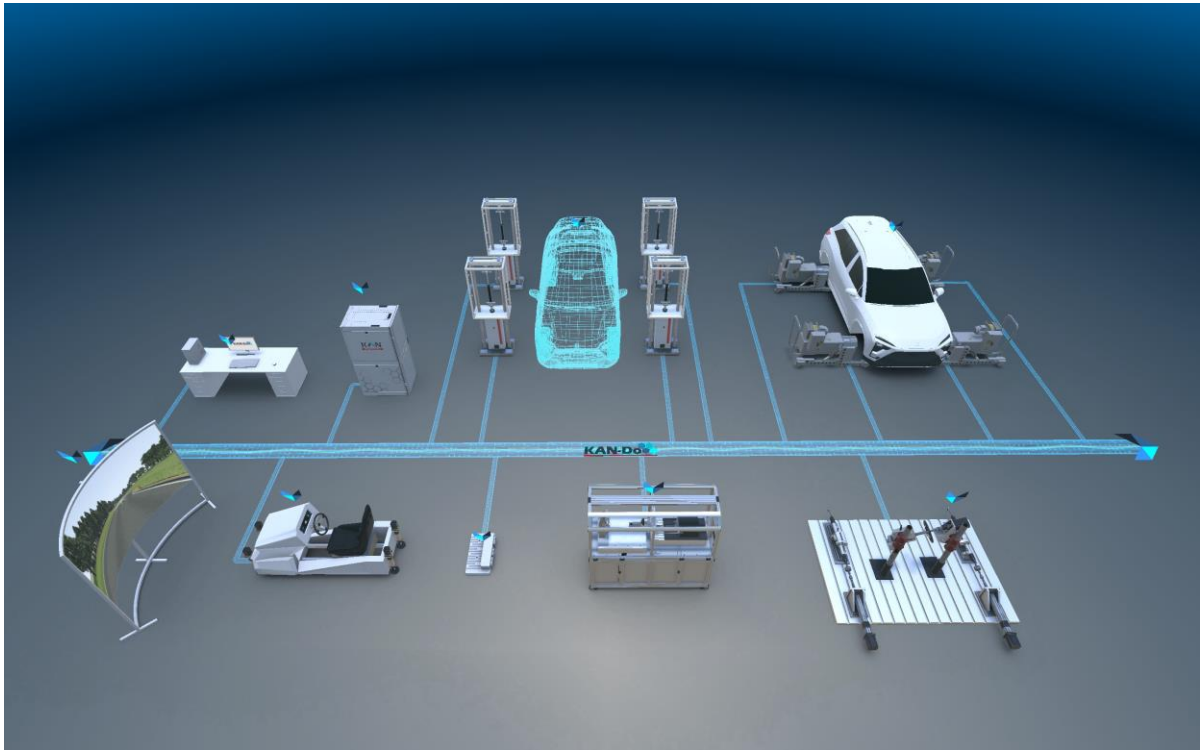
KAN-Do Use Case: Infotainment / UI_UX / DMS

Biometric Sensors

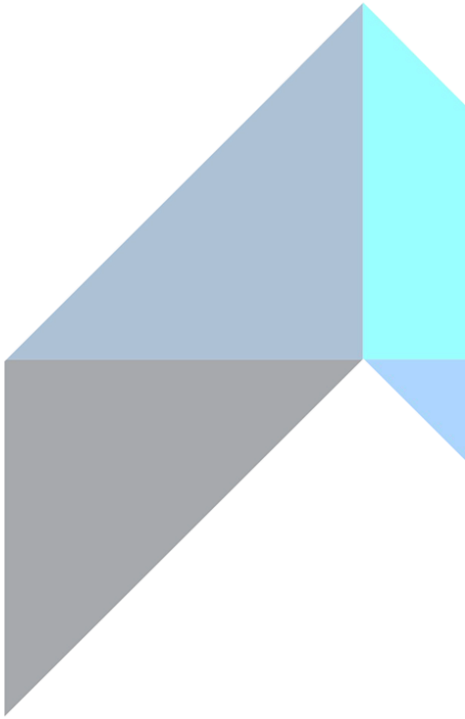
- Eye Tracking,
- Head tracking,
- Hand Tracking,
- Heart rate,
- Stress level ,
- XR, …

KAN-Do®

KAN-Do Use Case: Integrated Chassis / PT / DiL

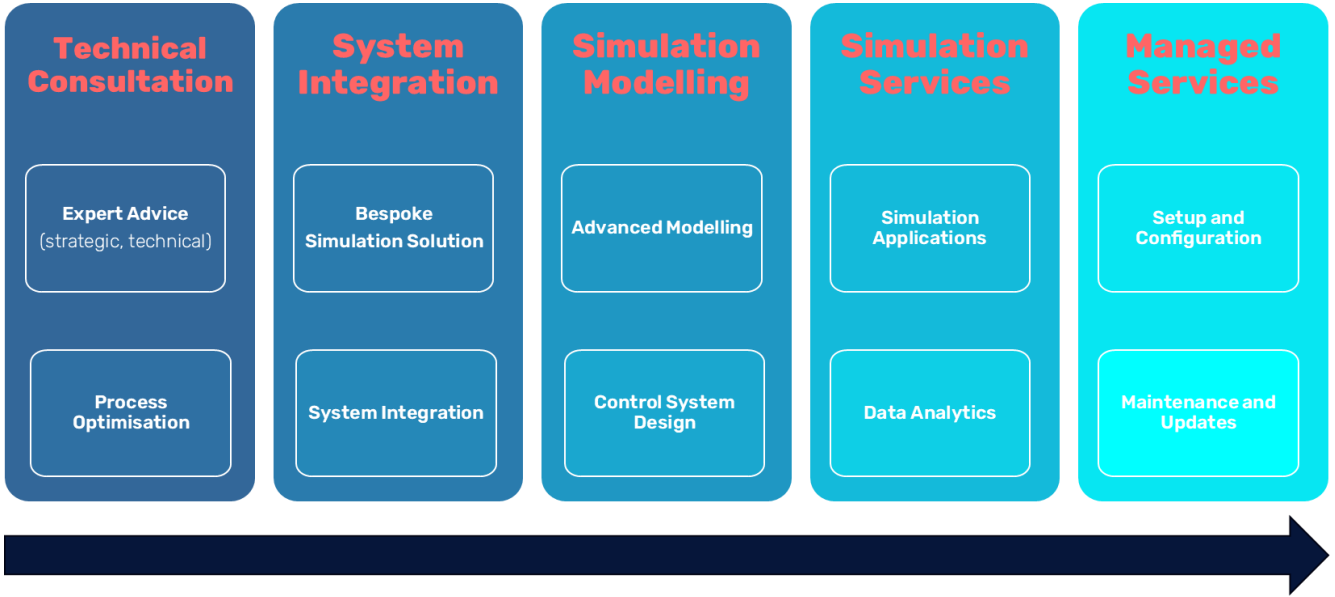


How can we help?



KAN Engineering

End-to-End Solutions for the Automotive Simulation Applications



Thank you !

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