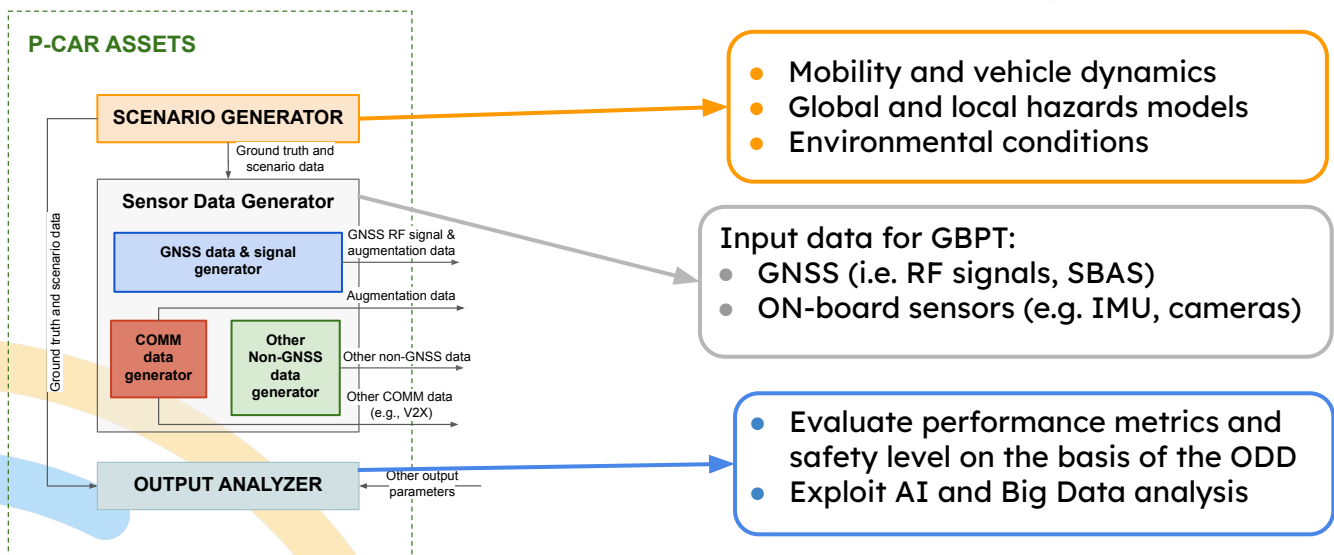
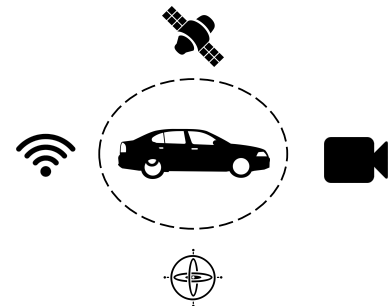


Safety and Performance Assessment of Automated Driving Systems (ADS) Technologies

P-CAR (PNT Center for Automated Road-Transport) aims to realize a laboratory for **testing and validation** of ADS Technologies exploiting **Positioning, Navigation and Timing (PNT)** data. Although track and public road testing remain a cornerstone of verification and validation (V&V) processes, it is insufficient on its own to address the vast array of edge cases, particularly those related to environmental variability, sensor limitations, and communication failures. In this context, the **Everything-in-the-Loop (XiL)** approach proposed in P-CAR aims to provide a powerful tool to complement field testing. By combining virtual testing methodologies with real-world data, the P-CAR program seeks to bridge the gap between simulation and track testing, ensuring that ADS meet the highest standards of safety and reliability.

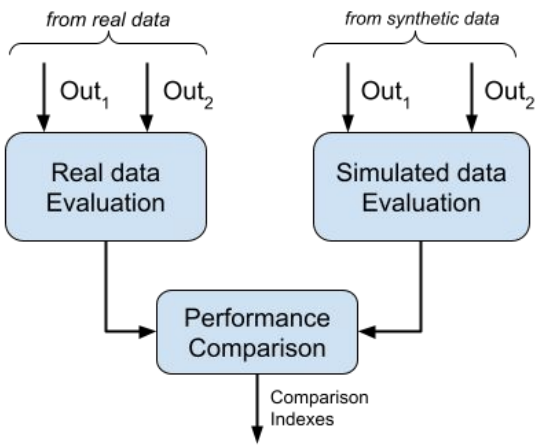
Strategy

- Digital twin of operational environment
- Validation with faults injection
 - *Positioning, Telecom, Cybersecurity*
- Report for certification
- Remote Access



Standards

- UNECE R155 (Cybersecurity Management System)
- UNECE R156 (Software Update)
- UNECE R157 (ALKS - L3 Automation)
- ISO/SAE 21434 (Vehicle Cybersecurity Engineering)
- ISO 26262, SOTIF, ETSI/ISO V2X standards



Assessment Methodology

- Iterative V&V chain that links virtual modelling with on-field assessment
- Identification of Test scenarios and functionalities
- Key elements reproducibility both in the laboratory and on field
- Execution of test cases in the laboratory and on field
- Comparison of results

High fidelity simulation with virtualised operational scenario in the laboratory and on-field tests to ensuring **Hazard Identification and Risk Assessment** as required by EU regulations.

Use cases in Strong Synergy with Top Players in the Transport Ecosystem



P-CAR is in line with the Automotive Action Plan of the European Commission being a strategic infrastructure for the adoption of ADS technologies, contributing also to the digitalisation of other transport means advancing research, innovation and resiliency.