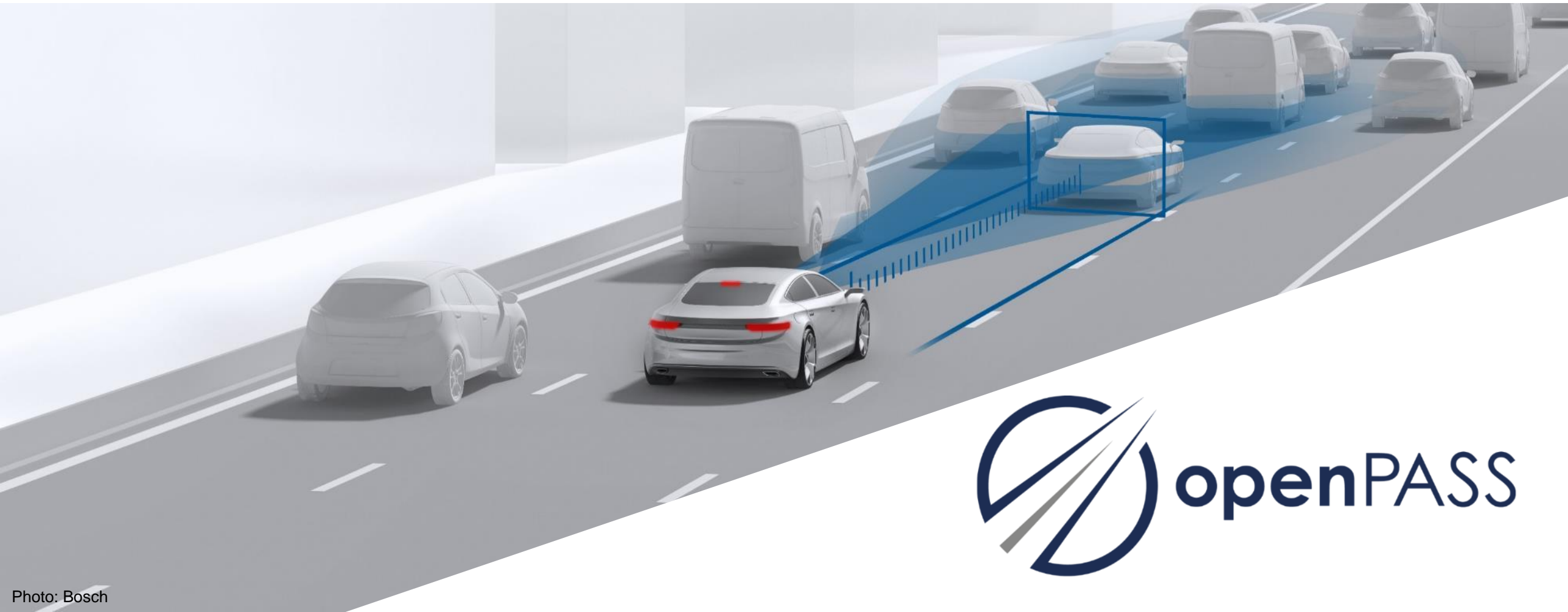


OPENPASS



TARGET OBJECTIVES

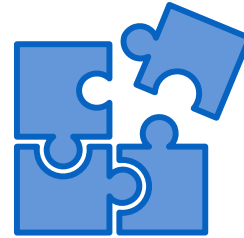
openPASS – open Platform for Assessment of Safety Systems

Harmonized and flexible platform for scenario-based traffic simulation of advanced driver assistance systems and automated driving functions



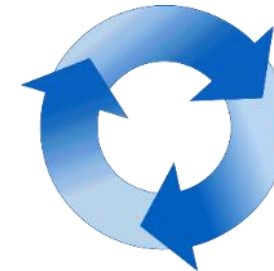
Traffic simulation

Stochastic variation



Modularity and flexibility

Reproducibility through determinism



Standardized interfaces

High level of transparency and acceptance through publicly available open source platform by using open standards and building up a modular ecosystem

WORKING GROUP

openPASS Working Group



Driver members

BMW
GROUP



BOSCH

Mercedes-Benz



VOLKSWAGEN
AKTIENGESELLSCHAFT

User member

TOYOTA

Service provider

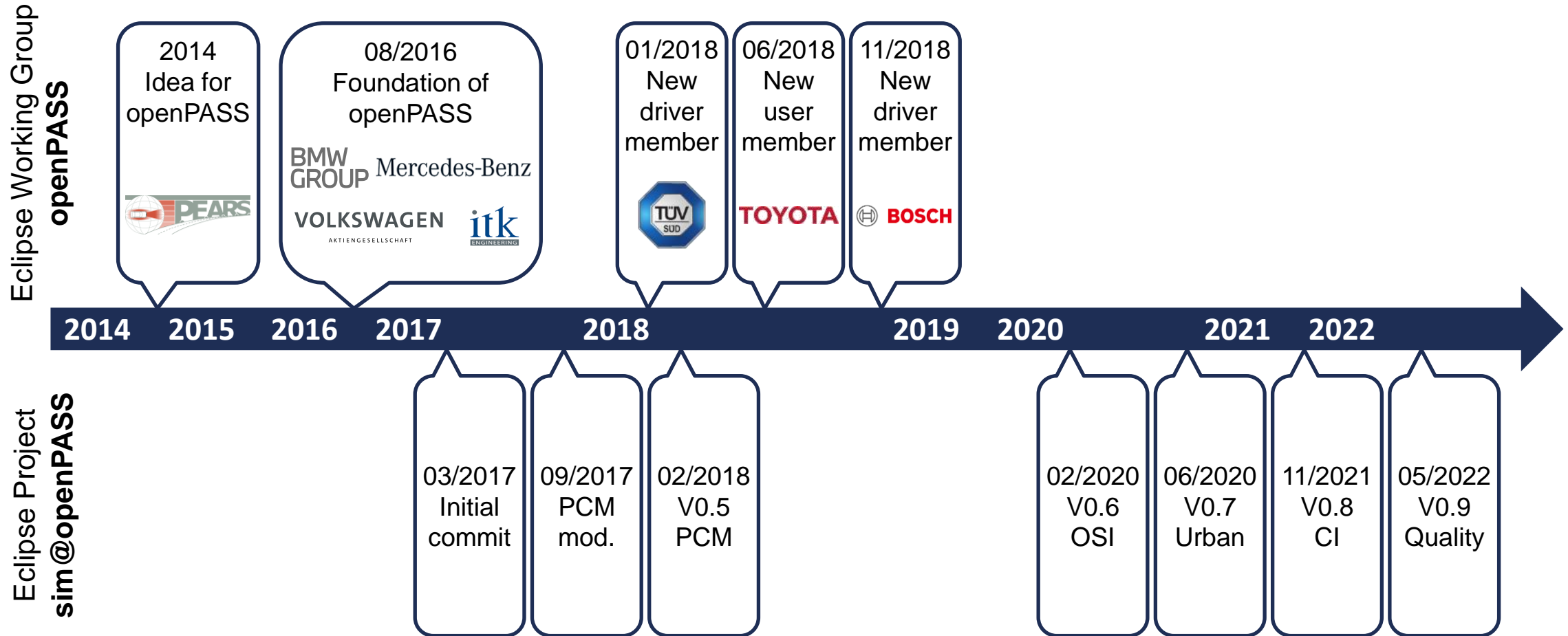
itk
ENGINEERING



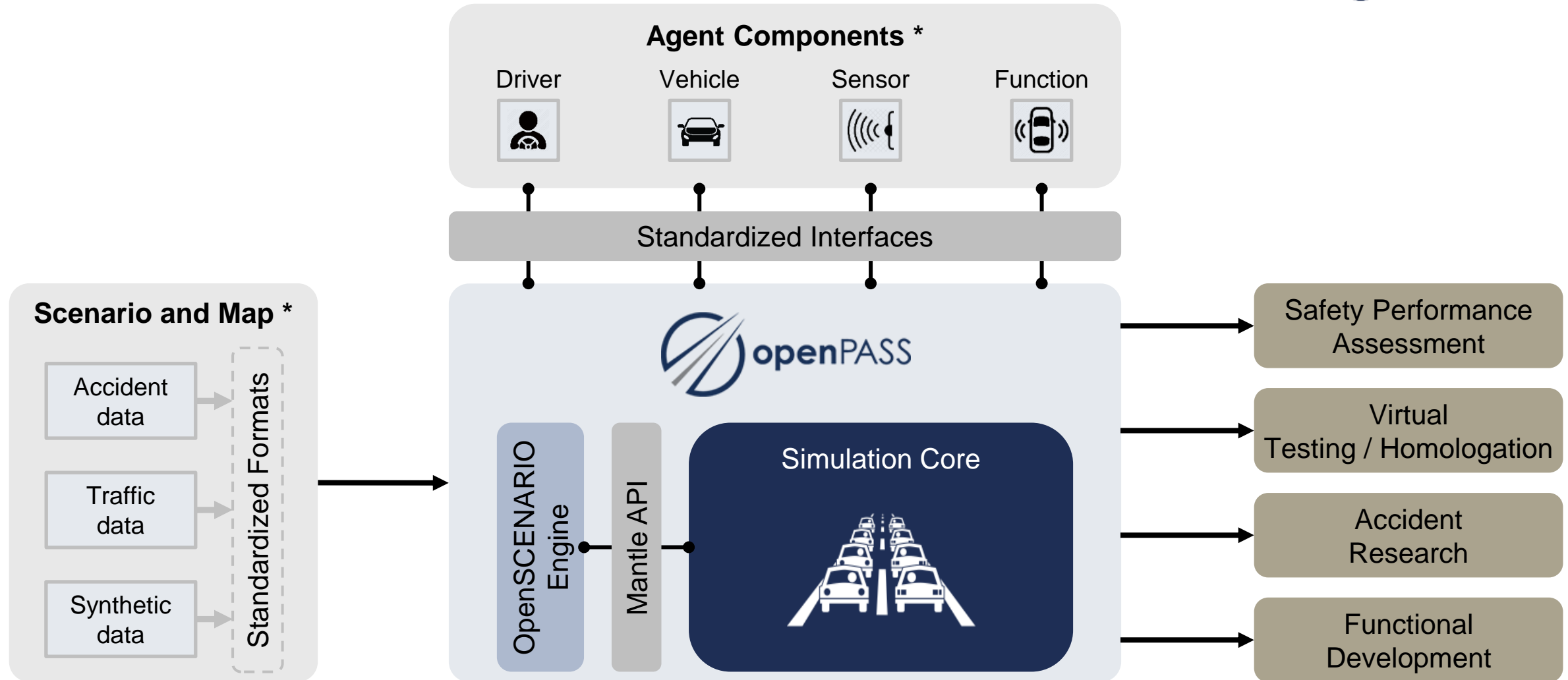
Eclipse Automotive Working Groups



TIMELINE

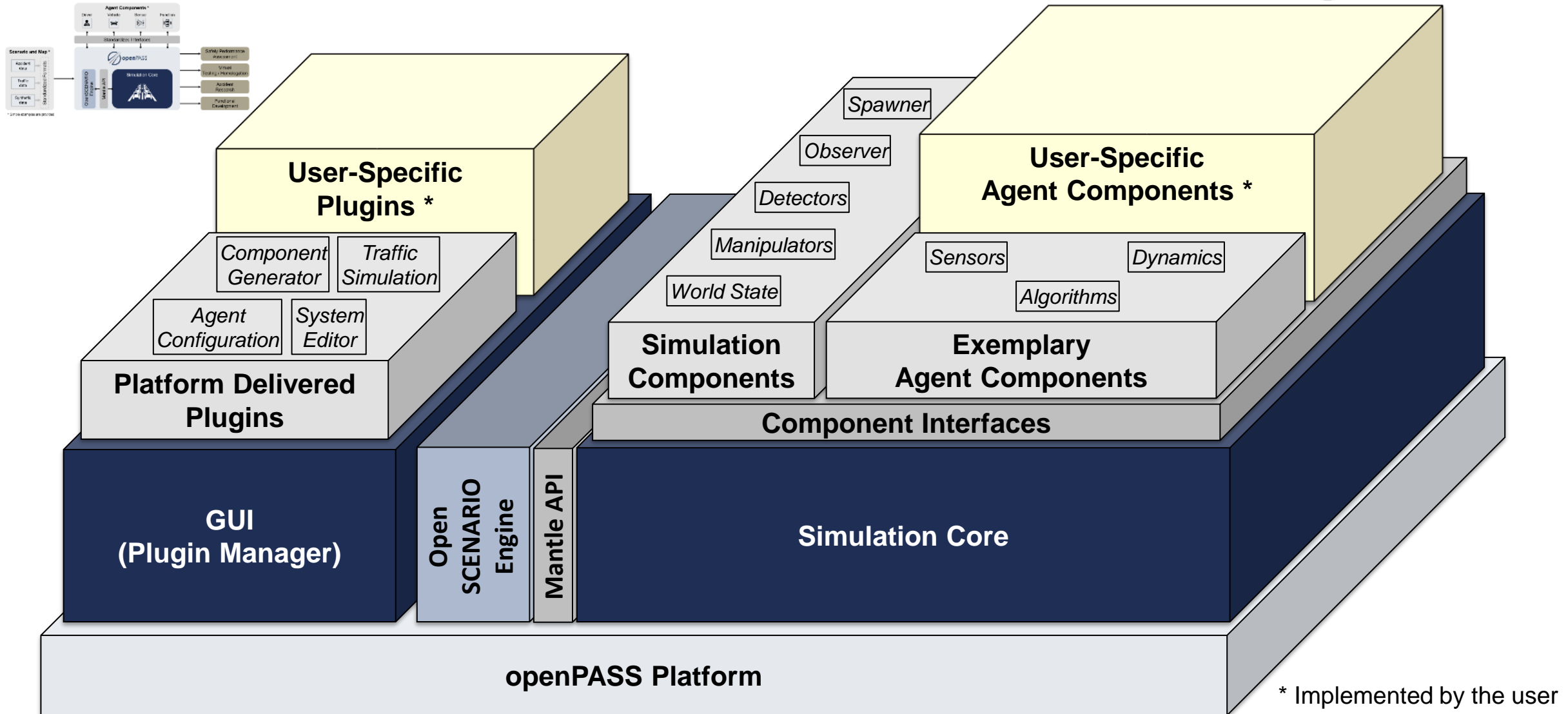


PLATFORM CONCEPT

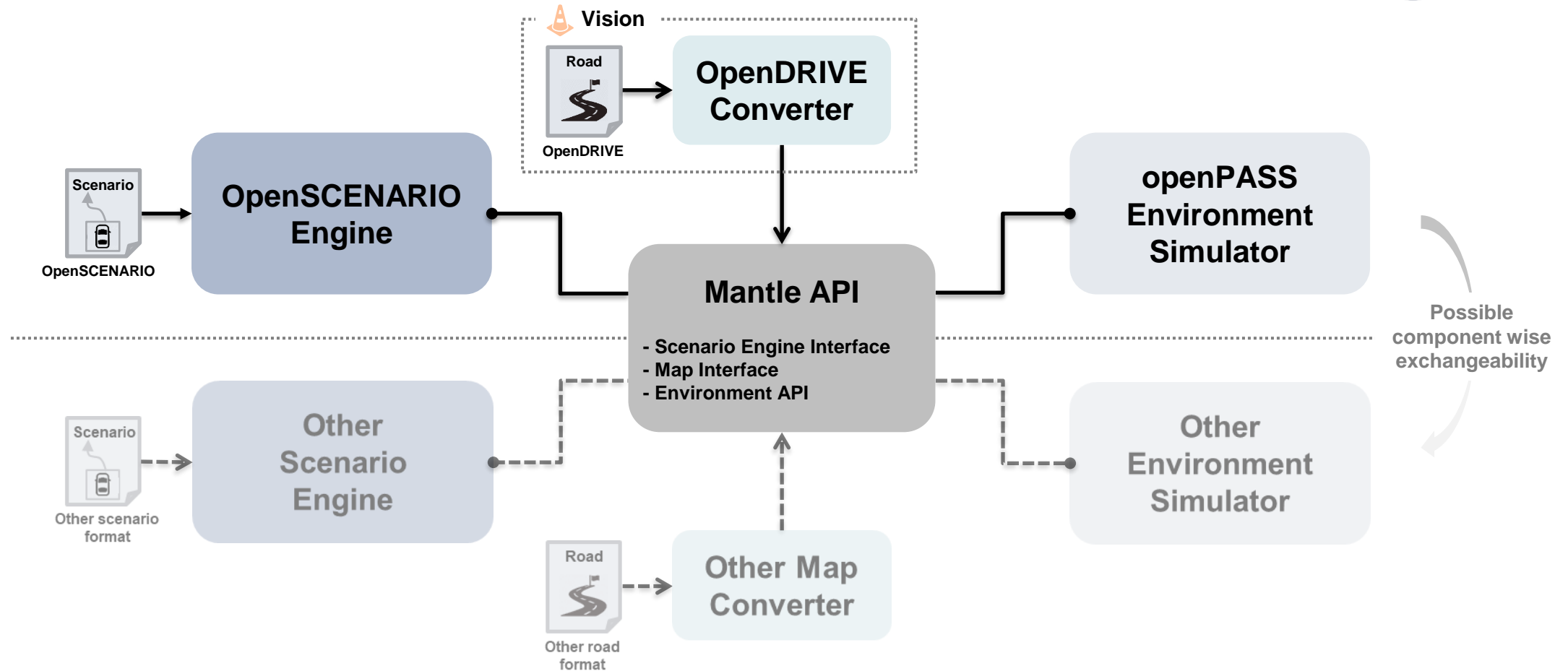


* Simple examples are provided

PLATFORM STRUCTURE

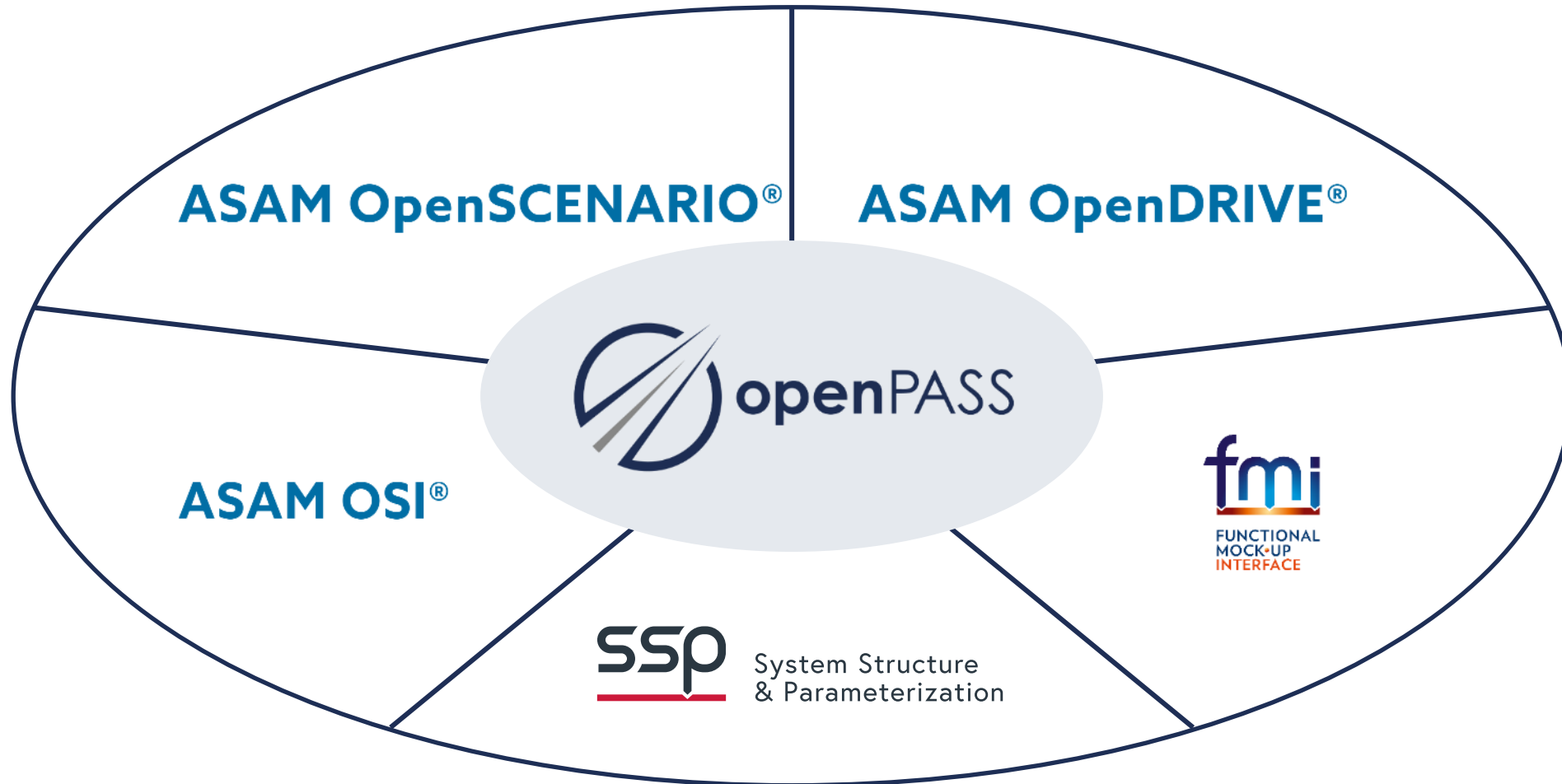


SCENARIO-BASED SIMULATION TOOLCHAIN



The modular architecture based on the Mantle API allows for the exchangeability of scenario engines, map converters and environment simulators.

SUPPORTED STANDARDS



SIMULATION PROCESS

Simulation Process



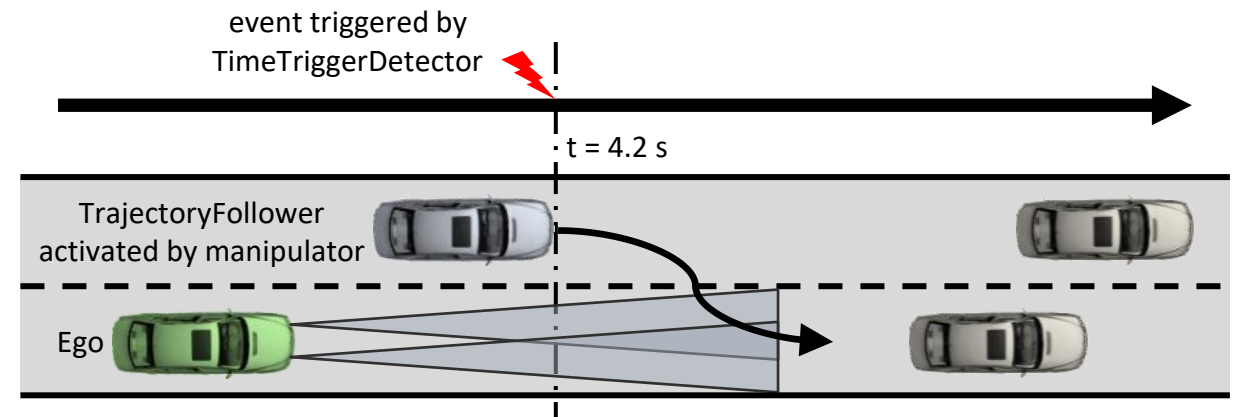
USE CASE TRAFFIC-SCENARIO SIMULATION

Features:

- Closed loop simulation of traffic scenarios
- Stochastic variation of the scenarios
- Intervention through detection of events and triggered actions
- Faster-than-real-time execution of the simulation

Example: AEB intervention triggered by passive cut-in manoeuvre

- Highway scenario with random surrounding traffic
- Ego vehicle with simple AEB system and abstract sensors
- Time-based event trigger
- Trajectory controlled lane change for scenario vehicle



EXEMPLARY SIMULATION RESULTS

TRAFFIC-SCENARIO SIMULATION



Traffic-scenario simulation without AEB

No AEB intervention



Traffic-scenario simulation with AEB

AEB intervention triggered by passive cut-in
manoeuvre

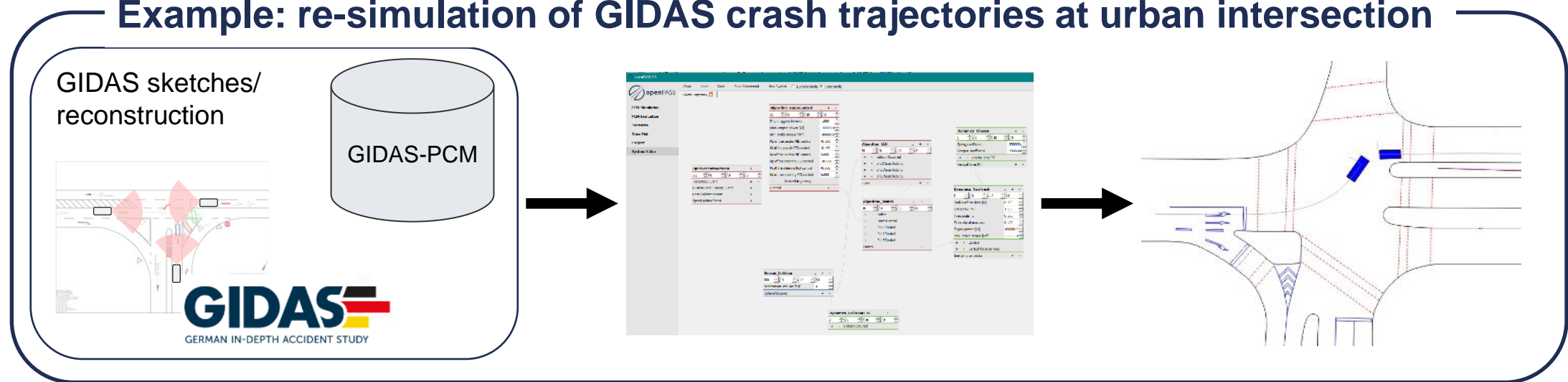


USE CASE CRASH RE-SIMULATION

Features:

- Create openPASS configuration files from GIDAS-PCM accident scenario database via xml-writer
- Stochastic variation of the scenarios (positions, velocities)
- Basis components for re-simulation: trajectory follower, vehicle dynamics model, impact calculation
- Agent setup prepared for flexible counterfactual simulation, e. g. with user-specific AEB system
- Store results in csv files in case folders and plot results in GUI

Example: re-simulation of GIDAS crash trajectories at urban intersection

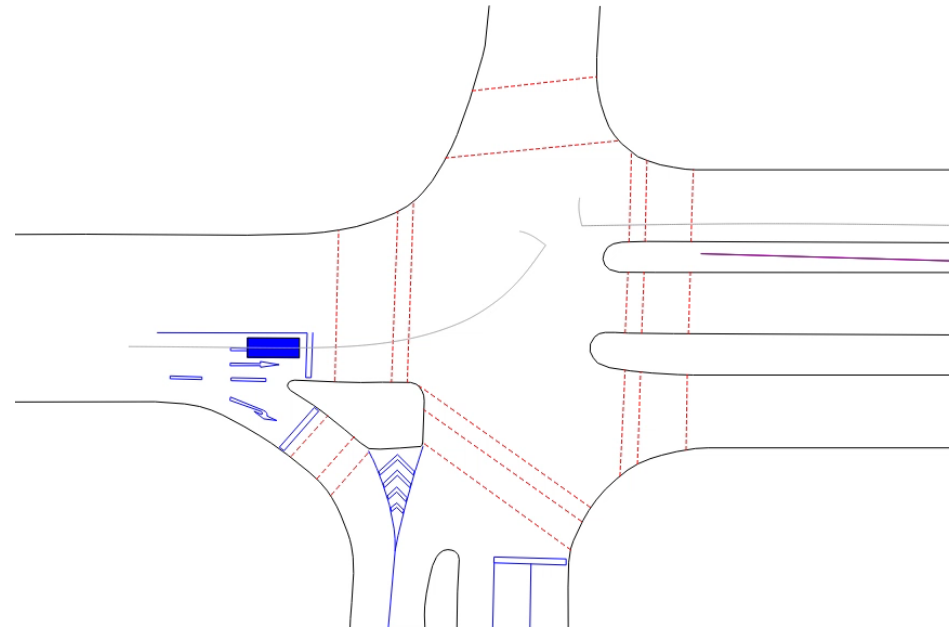


EXEMPLARY SIMULATION RESULTS

CRASH RE-SIMULATION

Crash re-simulation

Oncoming collision at intersection (LTAP – “left turn across path”) with post-crash behaviour



EXEMPLARY USAGE OF OPENPASS IN PUBLIC PROJECTS



Project duration:

- 09/2017 – 10/2021

Project objectives:

- Largest European Project on automated driving
- Piloting, collecting data and conducting impact assessment for automated driving

Application of openPASS:

- Simulation of different scenarios concerning typical motorway situations

Project duration:

- 06/2018 – 11/2021

Project objectives:

- Analysis of occupant vehicle safety requirements for HAVs
- Prediction of remaining crashes / future ODD-specific relevant crash configurations

Application of openPASS:

- Simulation with motorway traffic model including human imperfection
- Realistic collision frequency to validate motorway test case

Project duration:

- 03/2019 – 10/2022

Project objectives:

- Simulation-based engineering and testing for automated driving
- Standardization of interfaces

Application of openPASS:

- Embedding of simulation models (e. g. pedestrian, driver, automated driving function, ...)
- Exemplary application for running a criticality analysis

Project duration:

- 07/2019 – 06/2023

Project objectives:

- Development of a methodical approach to proof safety for HAVs in urban environment
- Significant shift from real-world testing to simulation

Application of openPASS:

- Using openPASS as an exemplary simulation tool for the criticality analysis
- Scenario-based simulation with openPASS

CONCLUSION

- openPASS is an open source platform for scenario-based traffic simulation of advanced driver assistance systems and automated driving functions
- Open source platform for high level of acceptance and transparency by using open standards
- Modular structure for easy platform extension und inclusion of user-specific models
- Support for standards and standardized interfaces for a flexible simulation setup
- Exemplary applications of openPASS:



Traffic-scenario simulation



Crash re-simulation

PARTICIPATION IN THE WORKING GROUP



The company should be at least an Eclipse Solution Member

- Networking and learning
- The annual membership fee for Solutions Members is tiered based on revenue



Working Group participation agreement

- Contribution in development of openPASS
- Discussion of the roadmap
- Active collaboration with the working group

Membership Privileges

Privilege	Driver Member	User Member	Service Provider Member	Project Manager
Steering Committee	X	Elected	Elected	-
Architecture Committee	X	-	-	X
Quality Committee	X	Elected	Elected	X
General Assembly	X	X	X	-

For more information, look at the openPASS charter:

https://www.eclipse.org/org/workinggroups/openpasswg_charter.php

COMMUNICATION WITH THE WORKING GROUP



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For more information, contact us or subscribe to the public WG mailing list:

<https://accounts.eclipse.org/mailling-list/openpass-wg>