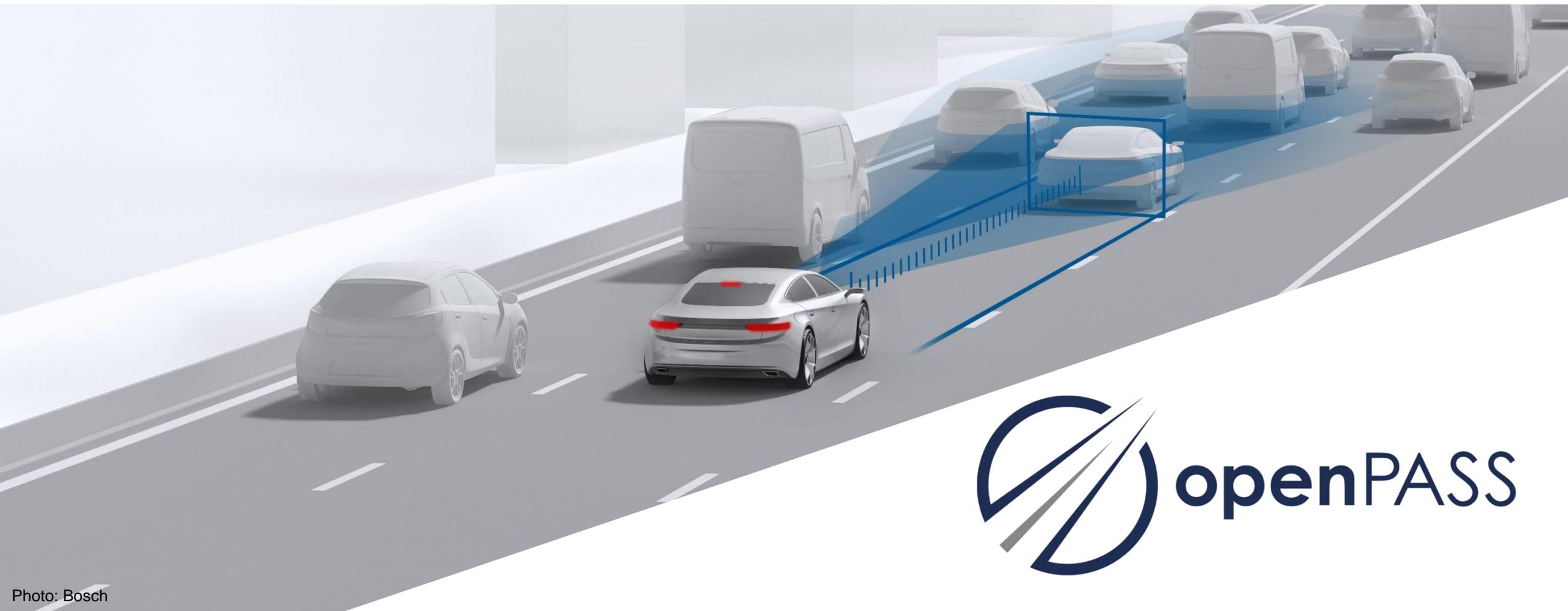


OPENPASS

TUAN DUONG QUANG

25TH OCTOBER 2021 – ECLIPSECON COMMUNITY DAY



TARGET OBJECTIVES



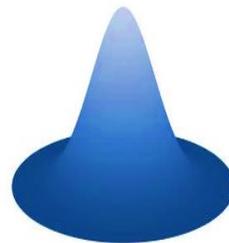
openPASS
(open Platform for Assessment of Safety Systems)

High level of transparency and acceptance through publicly available open source platform



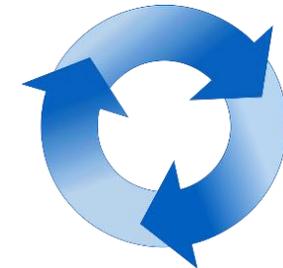
Traffic simulation of highway, rural and urban scenarios

Stochastic variation of scenarios



Standardized interfaces for model integration

Reproducibility through deterministic simulation



Harmonized and flexible platform for effectiveness assessment of advanced driver assistance systems and automated driving

WORKING GROUP



openPASS Working Group

Driver members:

**BMW
GROUP**



BOSCH



VOLKSWAGEN
GROUP OF AMERICA



User member:

TOYOTA

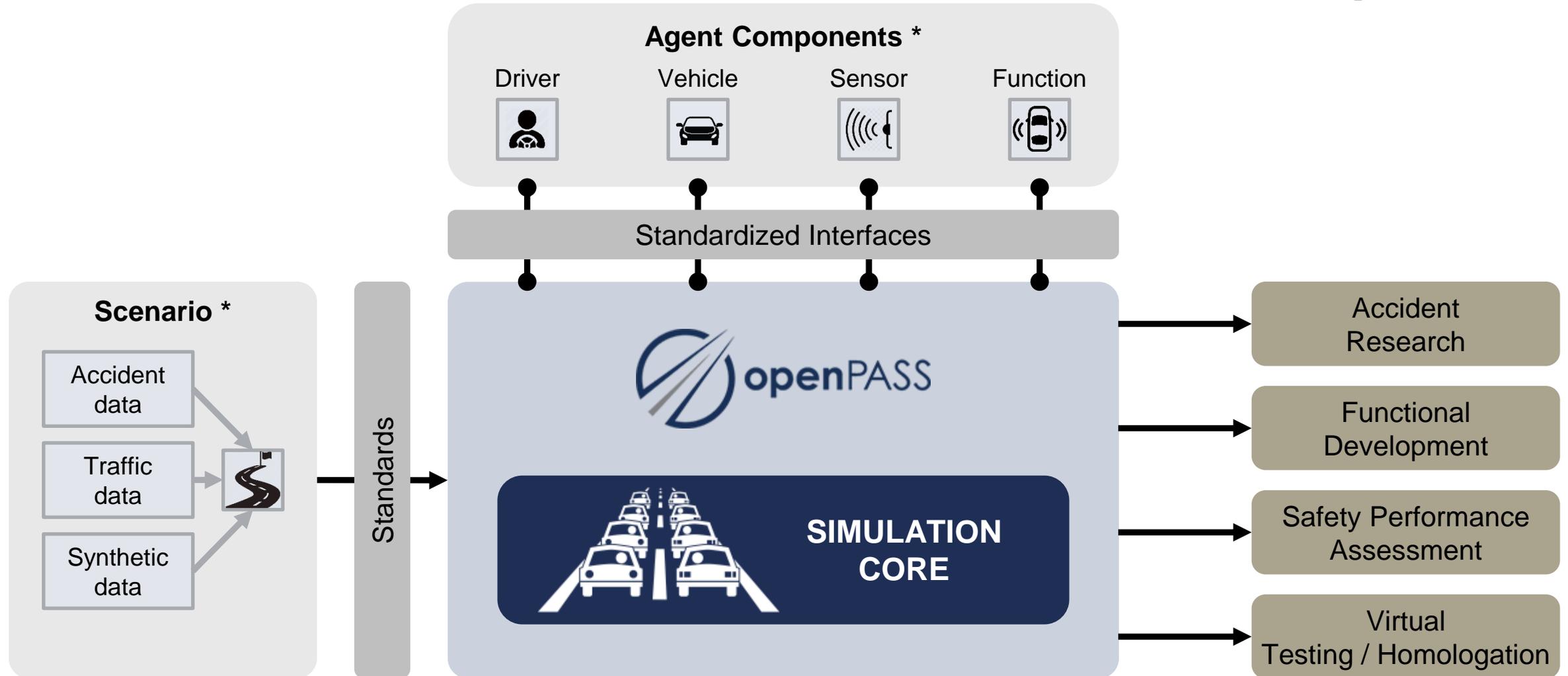
Service provider:



Eclipse Automotive Working Groups

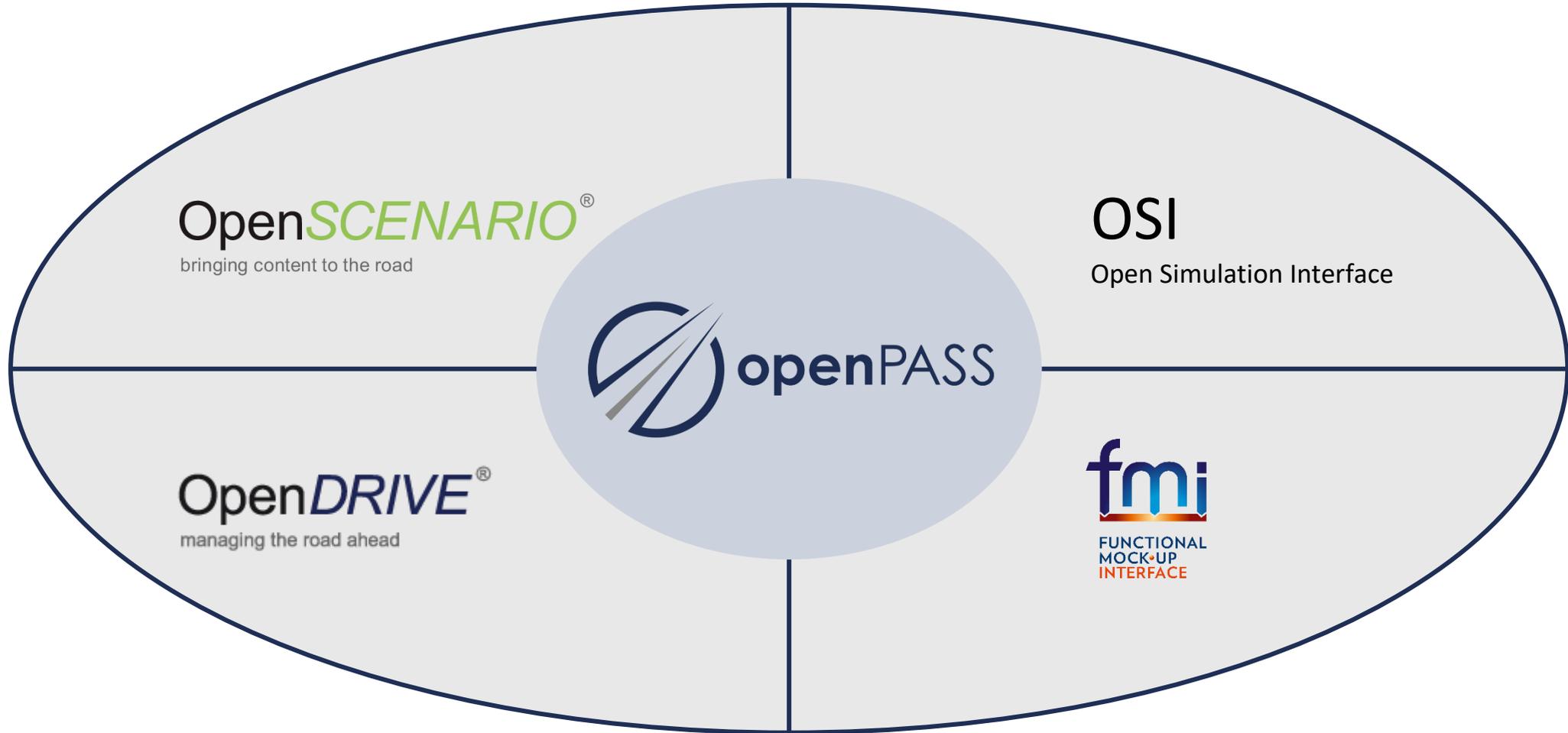


PLATFORM CONCEPT

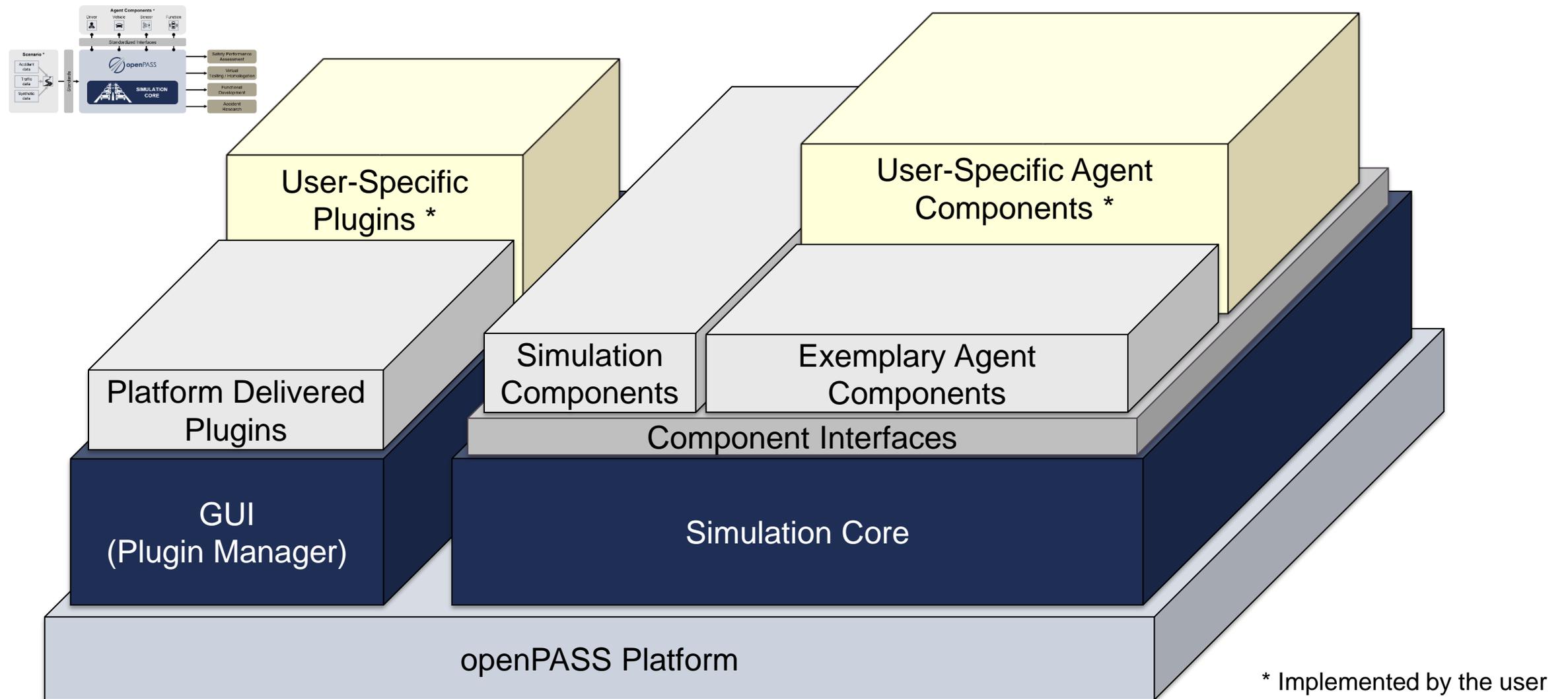


* Simple examples are provided

CURRENTLY AND FUTURE SUPPORTED STANDARDS



PLATFORM STRUCTURE



SIMULATION PROCESS USER PERSPECTIVE

Simulation Process



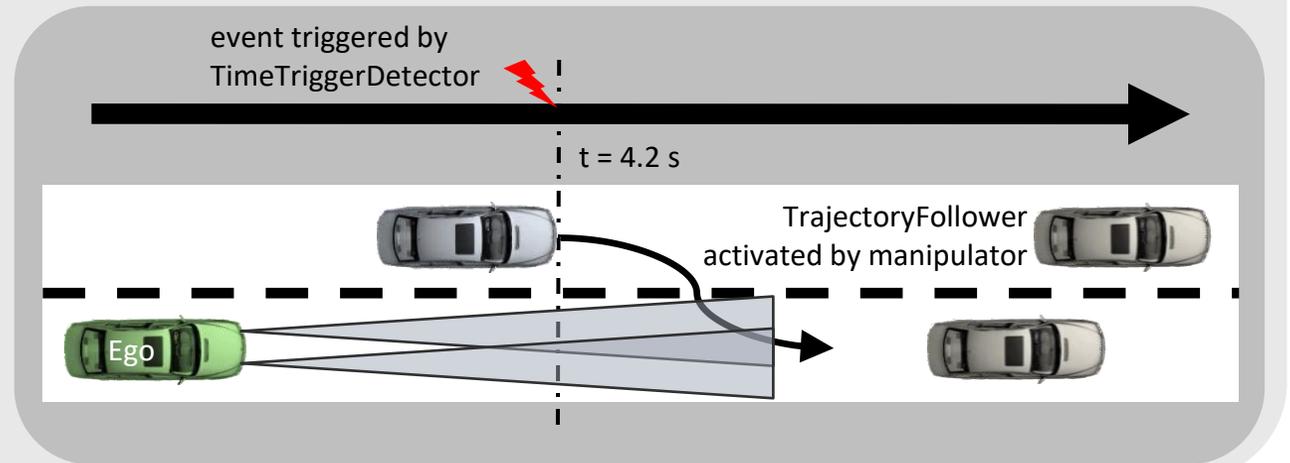
USE CASE TRAFFIC-SCENARIO SIMULATION

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

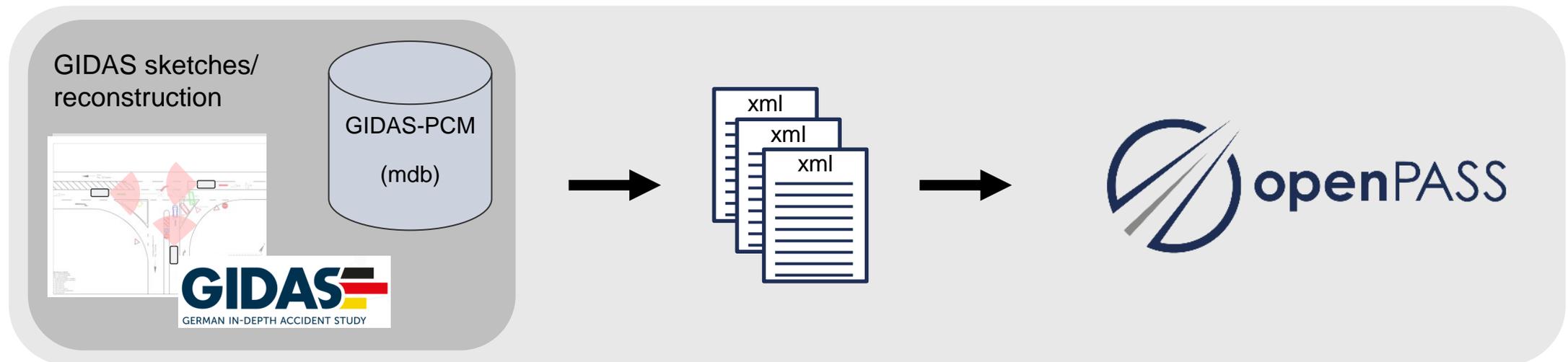


USE CASE CRASH RE-SIMULATION

Features:

- Create configuration files from GIDAS-PCM accident scenario database
- Stochastic variation of the scenarios (positions, velocities)
- Basis components for re-simulation: sensor, trajectory follower, two track vehicle model, impact calculation
- Store results in csv files in case folders

Example question: How many selected cases could be avoided by a AEB function?



EXEMPLARY SIMULATION RESULTS TRAFFIC-SCENARIO SIMULATION



Traffic-scenario simulation without AEB

No AEB intervention



Traffic-scenario simulation with AEB

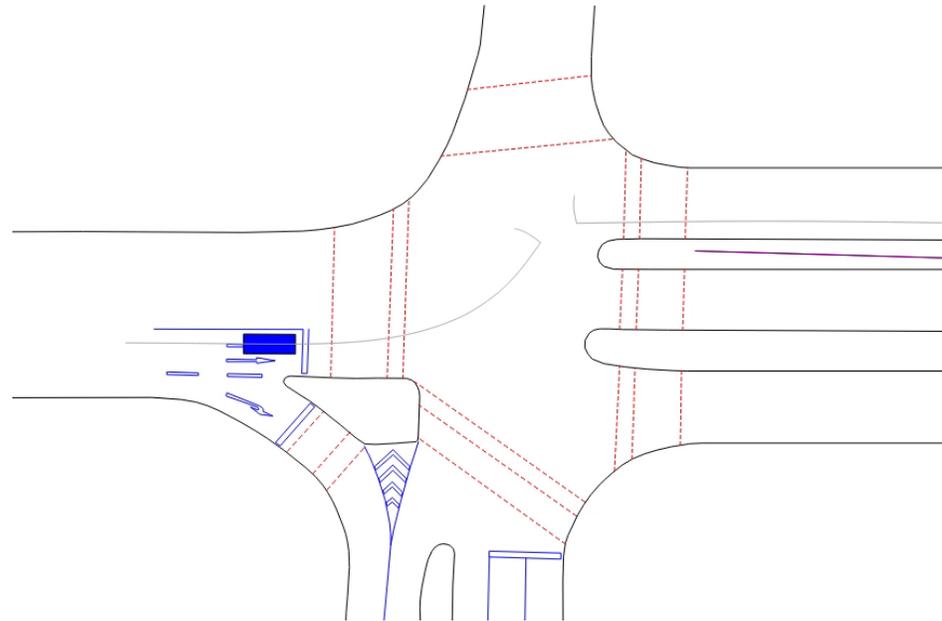
AEB intervention triggered by passive cut-in maneuver



EXEMPLARY SIMULATION RESULTS CRASH RE-SIMULATION

Crash re-simulation from GIDAS-PCM case

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



TIMELINE



Eclipse Working Group **openPASS** (idea for openPASS generated within P.E.A.R.S. in 2014)

08/2016
Foundation of
openPASS



01/2018
New
driver
member



06/2018
New
user
member



11/2018
New
driver
member



2016 2017 2018 2019 2020 2021 2022+

03/2017
Initial
commit

09/2017
PCM
mod.

02/2018
V0.5
PCM

02/2020
V0.6
OSI

10/2020
V0.7
Urban

10/2021
V0.8
Quality

...

Eclipse Project **sim@openPASS**

CONCLUSION

- openPASS is an open source platform for effectiveness assessment of advanced driver assistance systems and automated driving
- Open source platform for high level of acceptance and transparency
- 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