



Leveraging SAFEXPLAIN solutions for distributed AI in EdgeAI-Trust

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SAFEXPLAIN and EdgeAI-Trust SC5

- In the previous presentation by Francisco we've already seen significant ongoing leverage of software architectural solutions for SAFEXPLAIN to EdgeAI-Trust
- In this presentation we're going to briefly explore potential leveraging of other **SAFEXPLAIN** results for **EdgeAI-Trust**, namely those previously presented by Javier and Giuseppe on methods and tools to achieve compliance to safety standards for AI-based demonstrators/products, with special reference to Verification & Validation
- Within the huge **EdgeAI-Trust** work-plan, there is a **Supply Chain (SC)** entirely dedicated to edge-AI solution for mobility:
 - **SC5 Automated vehicles**
 - *SC Type: Enabling technology & Technology demonstrator*
 - *SC coordination partners: ZF*
 - ***Vision:*** *To create a safer, more efficient, and sustainable mobility ecosystem by leveraging AI technologies*
 - ***Mission:*** *To develop and deploy AI-powered solutions that improve the safety, reliability, and efficiency of mobility systems, while also reducing their environmental impact.*

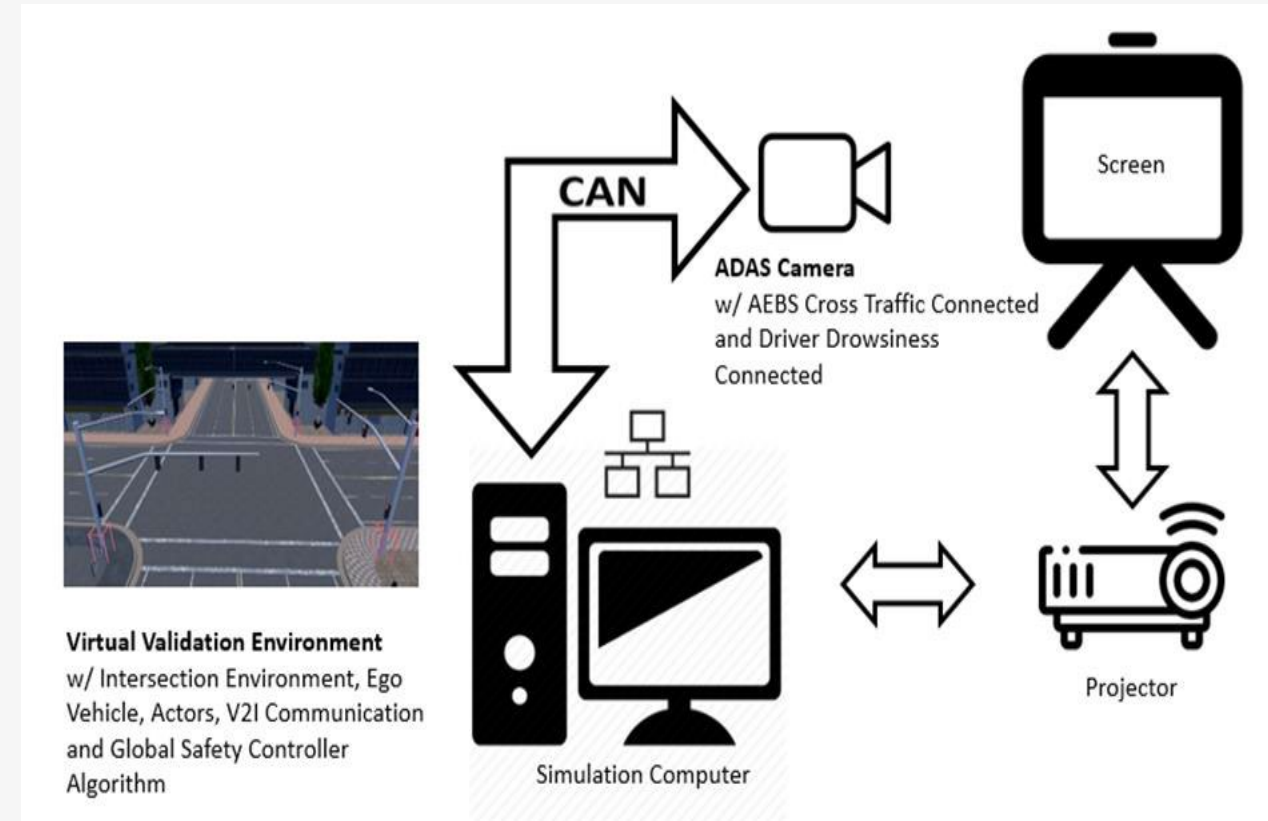
SC5 results and objectives

- One major **expected result** is (among others):
- Improved safety: By incorporating AI-powered perception and decision-making systems in autonomous vehicles and traffic management systems, these use cases could help reduce accidents and improve overall safety on the roads.
- One major **targeted objective** is (among others):
- Enhance public safety by deploying AI-powered collision avoidance systems in vehicles that can detect and prevent potential accidents before they occur.

From what we've already seen so far – and even more after what we're going to see in the afternoon session – it's quite clear that this objective and result is perfectly aligned with SAFEXPLAIN ones...

SC5 DEM3 in assisted driving

- ...but there is more than just alignment with the SC... we even have a specific demonstrator in advanced assisted driving
- **Demonstrator 3 : *Virtual verification and validation of connected ADAS at intersections***
- It is led by TOFAS, with a strong Turkish automotive partnership
- This demonstrator focuses on preventing collisions at intersections and enhancing the safety of drivers by developing hardware and software for ADAS



Some features of SC5 DEM3

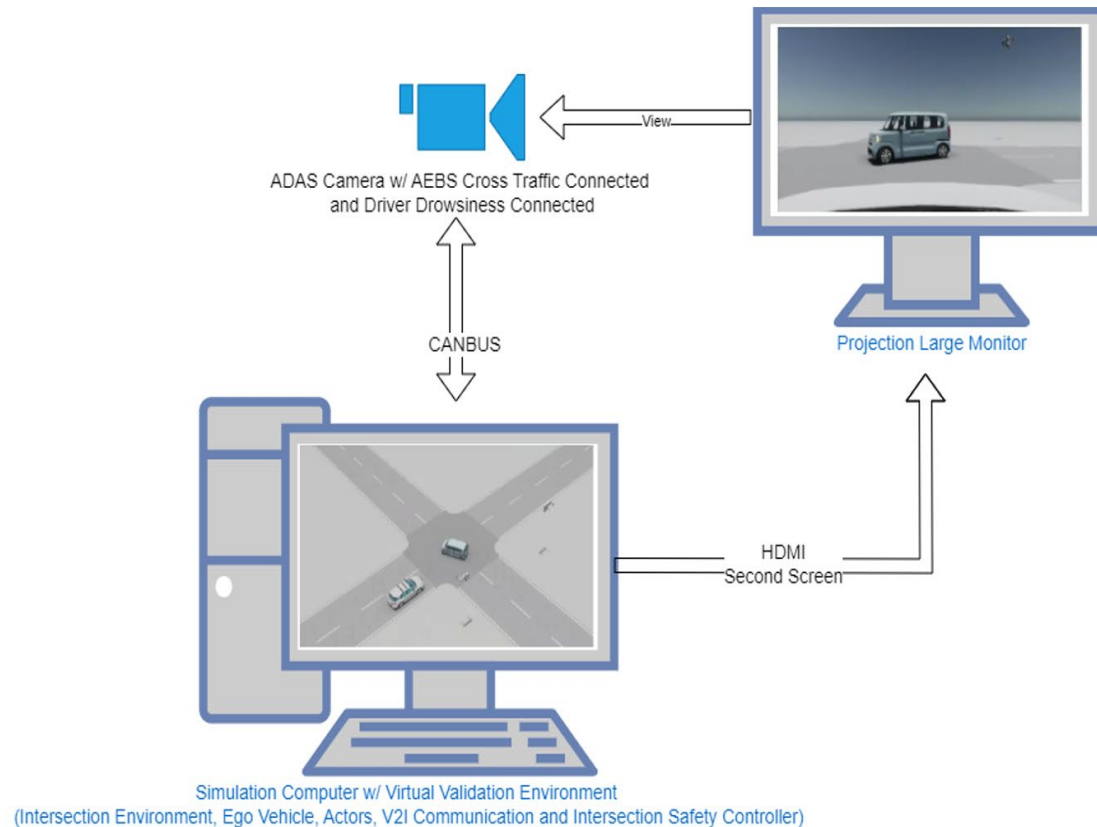


Figure 6 Structure of the VVE simulation environment (A) for demonstrator 3

These are some features of the demonstrator for which *SAFEXPLAIN results would greatly assist*, considering that an explicit claim is made about compliance with both the *ISO 26262* and the *ISO 21448 (SOTIF)* standards:

- *The ego vehicle would be equipped with an ADAS Camera and would navigate into the intersection. Other vehicles, pedestrians, and cyclists would also be simulated as actors in the environment.*
- *The ADAS Cross Traffic Connected system feature is an advanced safety system that uses AI and image processing algorithms to enable smart cameras to process data locally. Function includes Advanced Emergency Braking System (AEBS), Lane Keeping Assist (LKA), Traffic Sign Recognition (TSR), Pedestrian and Cyclist Detection, Intelligent Speed Adaptation (ISA), and High Beam Assist.*

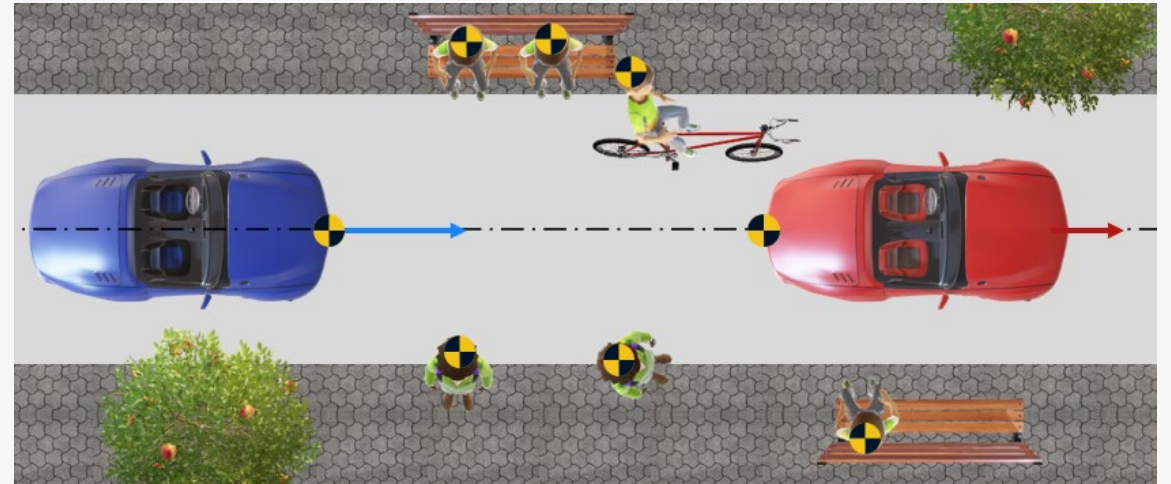
Automotive Scenarios Catalogue

In SAFEXPLAIN (as already covered by Giuseppe's presentation) EXI has developed a full Catalogue of ODD-based, SOTIF-compliant scenarios and associated test cases.

Just as an example of a scenario that is likely to be relevant for DEM3, we can mention this one:

[DS-21](#) – Driving in the city (shared space with pedestrians and vehicle)

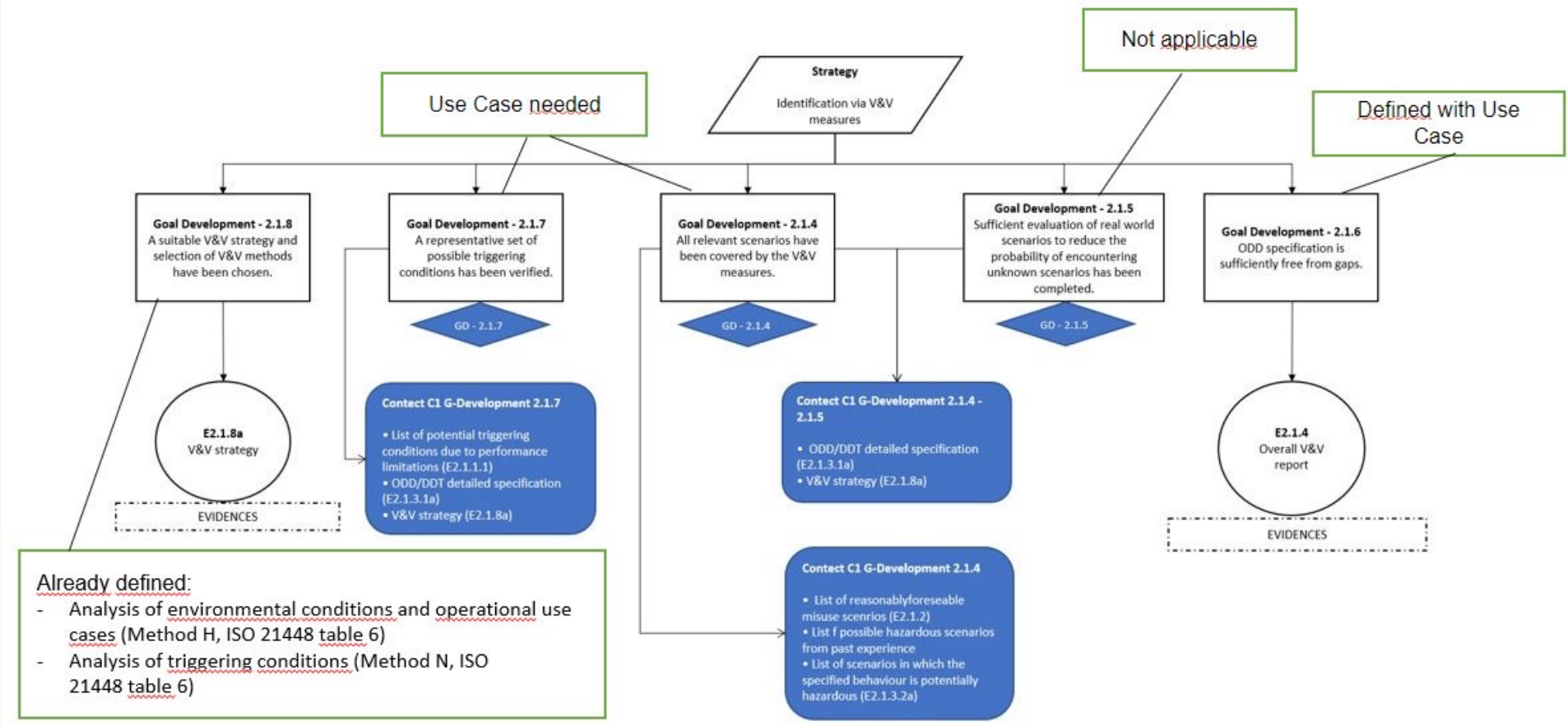
For each scenario we have detailed description with qualitative and qualitative parameters, conditions, constraints, test cases...



DS-21 – Driving in the city (example)

- When the distance with the target vehicle or vulnerable users decreases so that the driver or the vulnerable users are in dangerous zone (possible collision) the intended functionality shall warn the driver and, if no driver reaction occurs and the collision is imminent, shall decelerate the vehicle.
- The probability of Exposure (duration) of these scenario conditions is E2, considering the following combinations:
 - Driving behind other vehicle with normal distance – E4 (>10 % of average operating time)
 - E.g., 10% of 8000h = 800 h
 - Driving in the city – E4 (>10 % of average operating time)
 - E.g., 10% of 8000h = 800 h
 - Persons within danger zone (ca. 1 vehicle length in front of vehicle) – E3 (1% to 10% of average operating time)
 - E.g., from 80 h to 800 h
- The scenario conditions/constraints are the following:
 - The Ego vehicle drives at constant speed in the city towards both moving target vehicle and VRUs (pedestrians and/or cyclist).
 - The Ego vehicle speed range is [5 km/h, 50 km/h]
 - The target vehicle drive at 20 km/h
 - The following environmental conditions shall be present:
 - Dry and daylight with minimum 1000 lux and Sun angle >15 ° to horizon
 - Dry and night with maximum 10 lux
 - Road surface is asphalt or concrete
 - The following Preconditions shall be met:
 - both vehicles shall keep steady speed and path
 - steering angle shall be lower than the override threshold
 - yaw rates shall be lower than the override threshold

SOTIF safety argumentation



Significant aspects required for SOTIF compliance can be addressed with SAFEXPLAIN results

Some interim conclusions

- the two only partners that are partners in both projects, BSC and EXIDA, are not directly involved in SC5, so it took some time to appropriately identify this 'internal' opportunity
- in July, a dedicated meeting was held with presentations from EXIDA of certain SAFEXPLAIN results to DEM3 partners, and at the end DEM3 formulated an expression of interest to further the collaboration
- now EXI is waiting for specific requests according to DEM3 advancement, in order to cater for specific support
- it is clearly a win-win situation, where on one side there is a take up of results by other users for a challenging demo, and on the other side the opportunity of getting both access to assets and qualified assistance to achieve stated claims



Thanks for your attention!
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