VERIFICATION
VALIDATION
METHODS

PROJECT of the PEGASUS FAMILY

SCENARIO CONCEPTS TO DERIVE SCENARIOS FROM DATA FOR THE TEST

Representing Scenario Attributes at Different Levels of Concretization

Nicolas Wagener, Hendrik Weber, RWTH Aachen University

The scenario database shall allow an efficient handling of scenarios for supporting the V&V process. For this, it is important, to provide a representation of scenarios at a reasonable level of granularity.
One basic assumption taken over from the scenario concepts within PEGASUS is that scenario are defined by from the perspective of the ego-vehicle, which allows working with data from both FOTs and traffic observation.

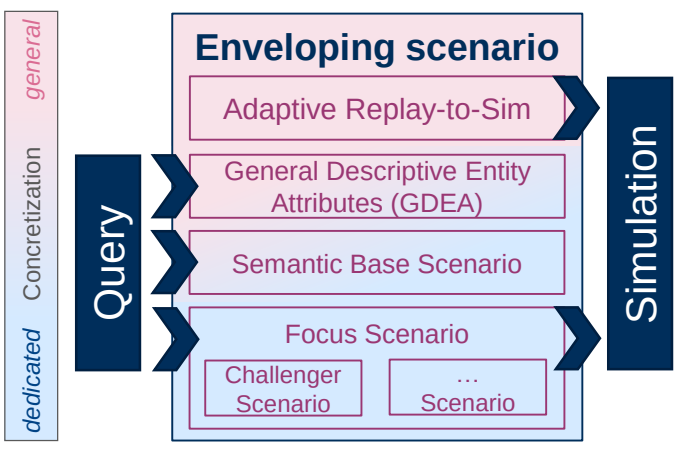
Different levels of scenario concretization
First, **General Descriptive Entity Attributes (GDEA)** are derived from the time-series data providing a logical representation of the static entities and a storyboard of events for dynamic elements. While the events within GDEA are derived primarily from geometric relations, **Base Scenarios** are introduced which help to decompose the scenario into actions and interactions between traffic participants by introducing a limited set of semantic concepts.

Although the base scenarios allow a more understandable description of what is going on in a recorded scenario, they do not yet assign meaningful scenarios for testing. For this, focus scenarios are introduced, which aim at clustering certain relevant scenarios from which dedicated test cases may be derived. A subset of these focus scenarios are scenarios interpreted according to the PEGASUS challenger approach, which builds scenarios around the crash-relevant interaction with another vehicle an is extended for the urban use case. Additional types of focus scenarios may be defined, which cover over test-worthy aspects, e.g., tactical decision making.

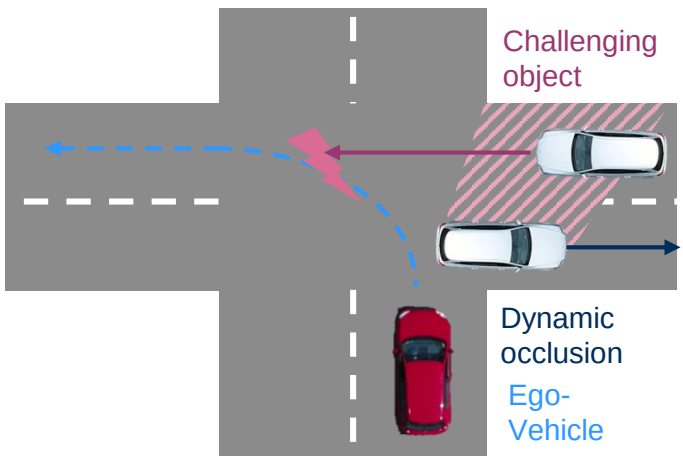
From measured data to usable scenarios
All scenario representations highlighted above can be used for querying the scenario database. Scenarios for simulation can follow two main approaches:

1. **Adaptive Replay-To-Sim (ARtS)** provides scenarios close to what is happening in the real-world scenario yet making it possible for the VuT to behave freely within the simulated scenario.
2. **Modeling the scenario according to the focus scenario.** E.g., for crash-relevant interactions, scenarios will be modeled around the primary conflict (challenger) and accompanying roles such as dynamic occlusions or action constraints.

Combinations of the two are also possible to account for additional objects in a focus scenario scenario.



Scenario representations at different concretization levels



Application of challenger approach to intersection scenario

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