

Automatic Traffic Scenario Conversion from OpenSCENARIO to CommonRoad



Yuanfei Lin, Michael Ratzel, and Matthias Althoff
Cyber-Physical Systems Group, Technical University of Munich

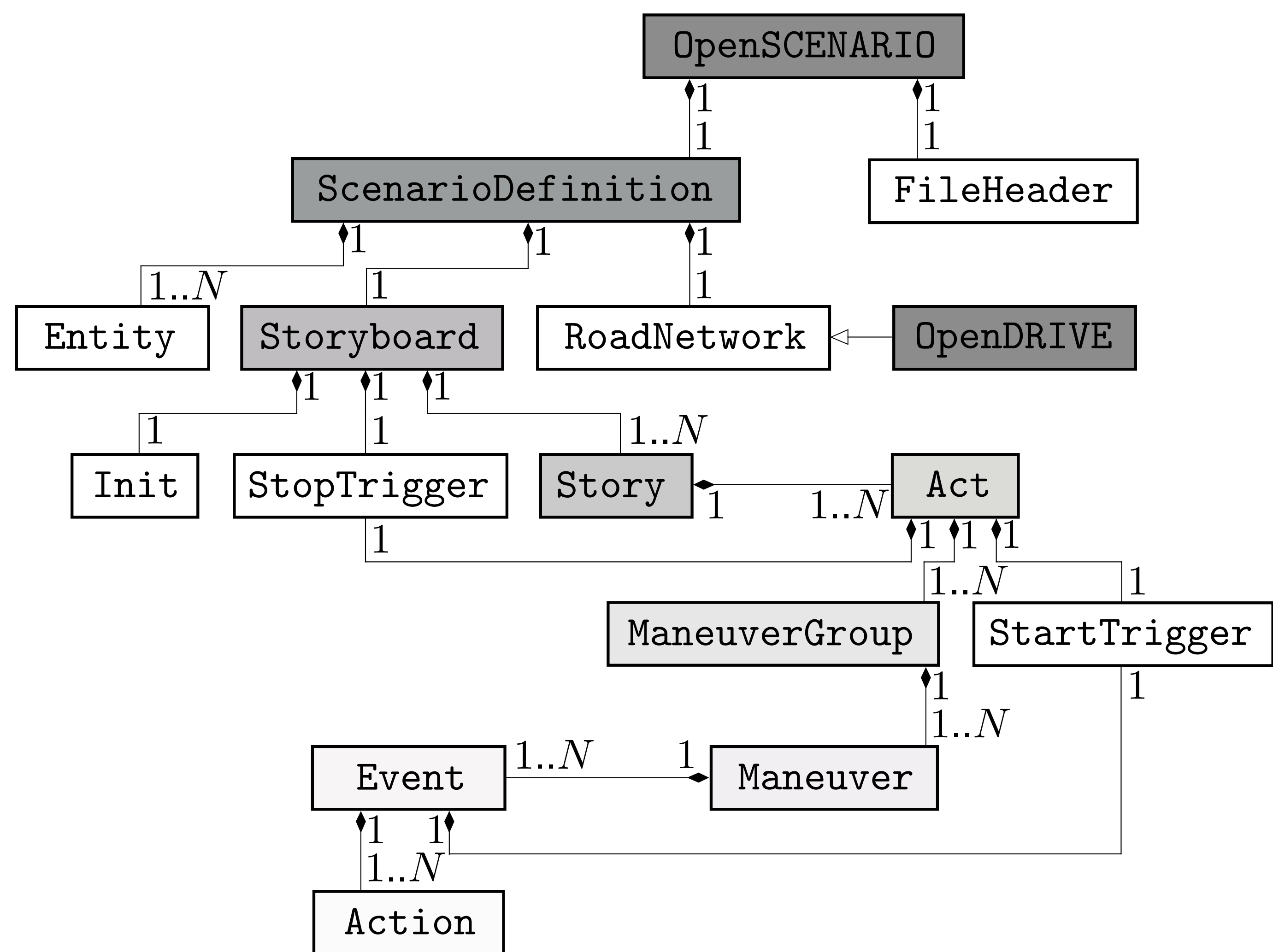
<https://commonroad.in.tum.de/tools/openscenario-converter>
`pip install commonroad-openscenario-converter`

I. Scenario Representation

Scenarios play a significant role in the *development, testing, and validation* of autonomous driving systems. However, there is a shortage of both open-source and commonly-used scenarios. Various representation formats for scenarios are supported by different applications, depending on their specific purposes. In this work, we present the **first** open-source converter from **OpenSCENARIO** to **CommonRoad**, two widely-used formats in the field of autonomous driving.

I. OpenSCENARIO

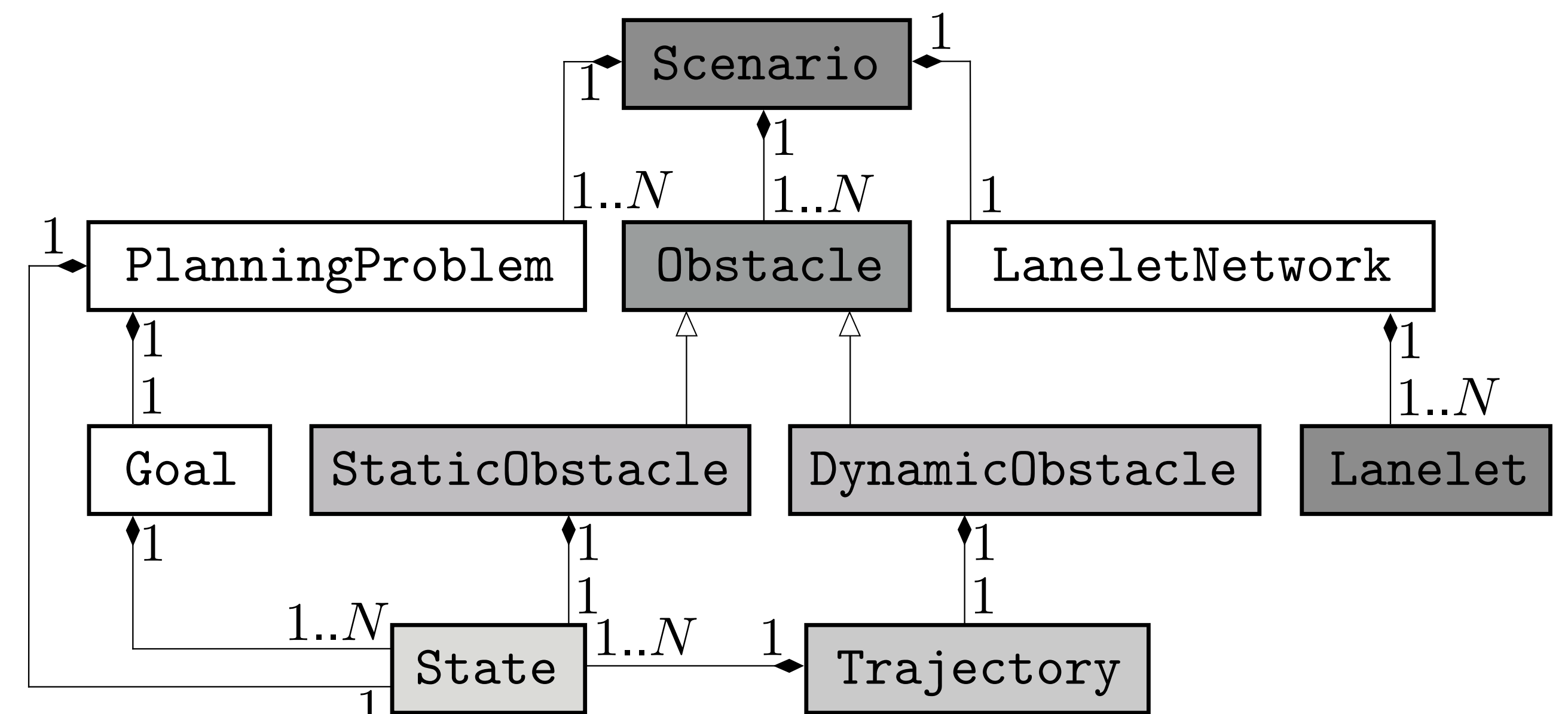
OpenSCENARIO employs a logical scenario description that consists of a parameterized set of variables. OpenDRIVE defines the road networks.



UML class diagram of the OpenSCENARIO format (v1.2.0).

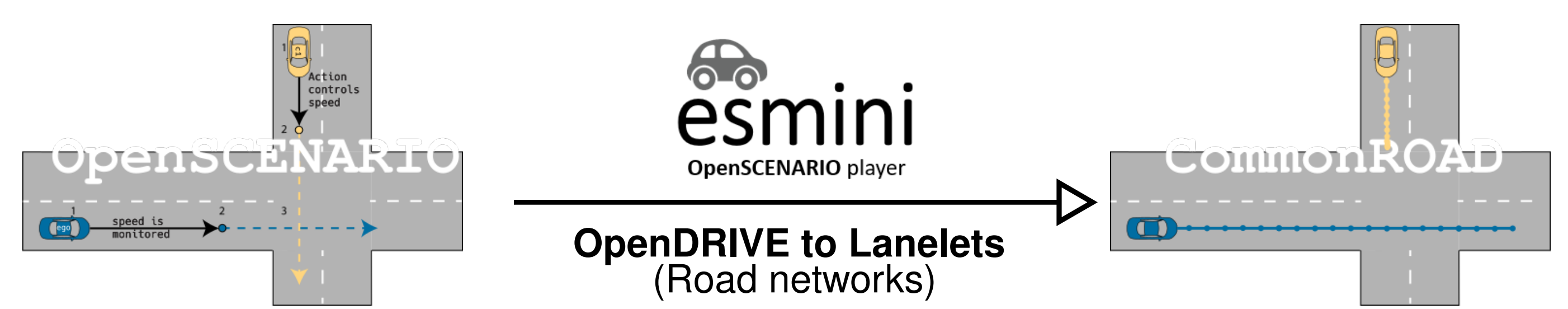
II. CommonRoad

CommonRoad defines concrete scenarios containing a description of the road network, traffic participant movements, and vehicle planning problems.



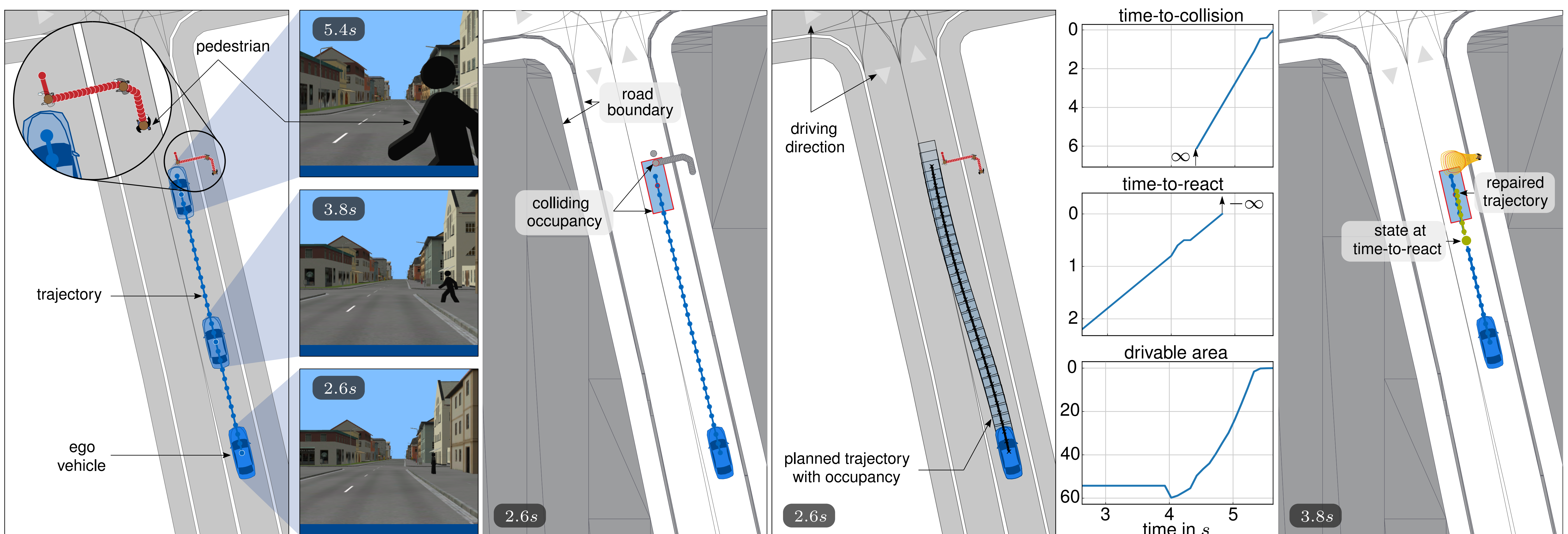
UML class diagram of the CommonRoad format (v2023.2).

III. Conversion Framework



IV. Exemplary Scenario and Evaluation on CommonRoad

OpenSCENARIO ID - pedestrian_collision.xosc: the ego vehicle and a pedestrian follow predefined routes, where the pedestrian jaywalks. ⇒ To obtain a deeper understanding, we use our converter to simulate the traffic and evaluate the scenario with **CommonRoad tools**:



Converted scenario's configuration*.

Collision checking.

Motion planning.

Criticality measures.

Safety verification.

* We only display the scenario information between 2.6s and 5.6s. The snapshots are captured from the inside view of the ego vehicle during esmini simulation at three time steps.

References

- [1] <https://www.asam.net/standards/detail/openscenario/>
- [2] <https://github.com/esmini/esmini>
- [3] <https://commonroad.in.tum.de/tools/scenario-designer>
- [4] <https://commonroad.in.tum.de/tools/drivability-checker>
- [5] <https://commonroad.in.tum.de/tools/spot>
- [6] <https://commonroad.in.tum.de/tools/commonroad-crime>

{yuanfei.lin, michael.ratzel, althoff}@tum.de

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