SET Level

Simulation-based Development and Testing of Automated Driving

Supported by:

Federal Ministry for Economic Affairs and Energy

on the basis of a decision by the German Bundestag

Efficient and modular integration of sensor models with OSI

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29.04.2021

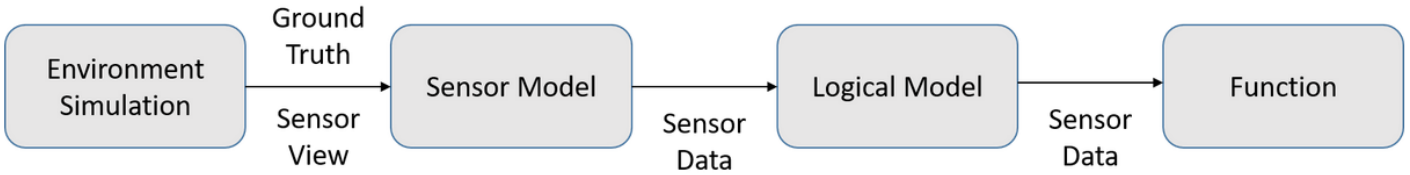
PROJECT of the PEGASUS FAMILY

Agenda

- Introduction to the Open Simulation Interface (OSI)
- Application in Camera Model
- Application in Lidar Models
- Conclusions & Outlook
- Q&A Session

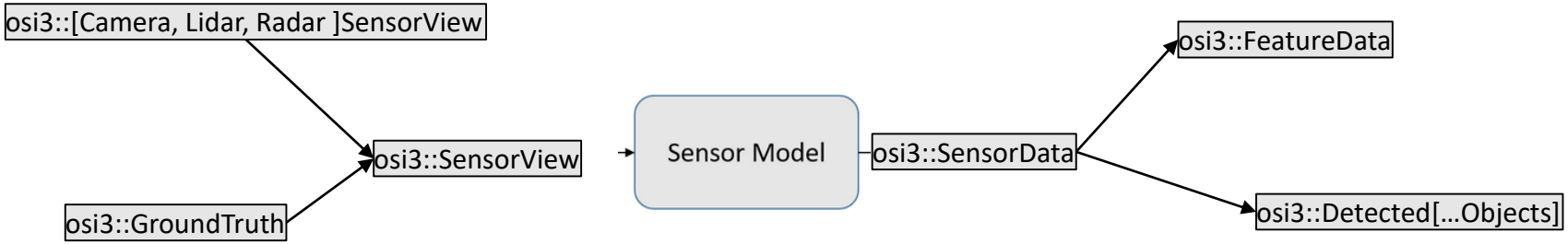
OSI

- Cost-effective and reliable simulation architectures need standardized interfaces:
  Open Simulation Interface (OSI)

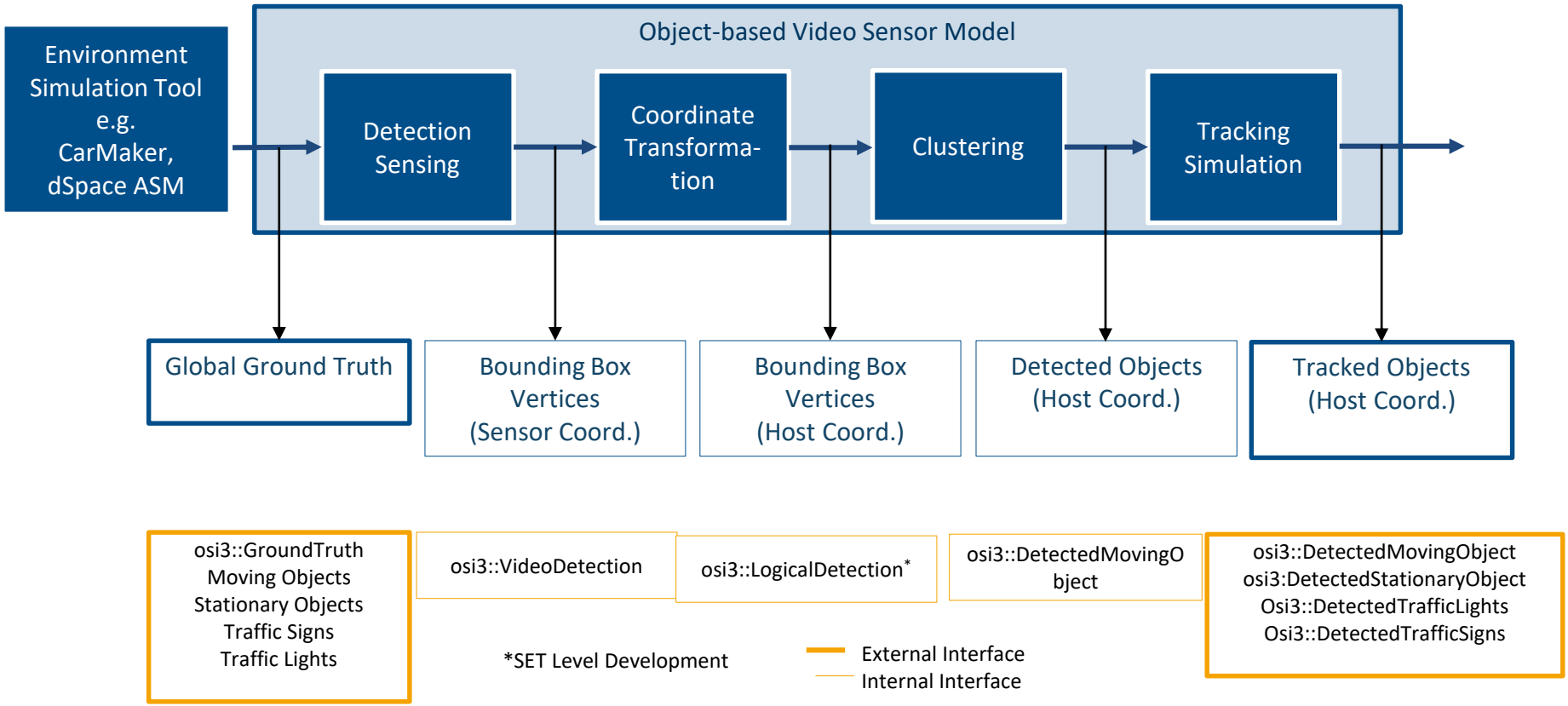


INPUT – Path

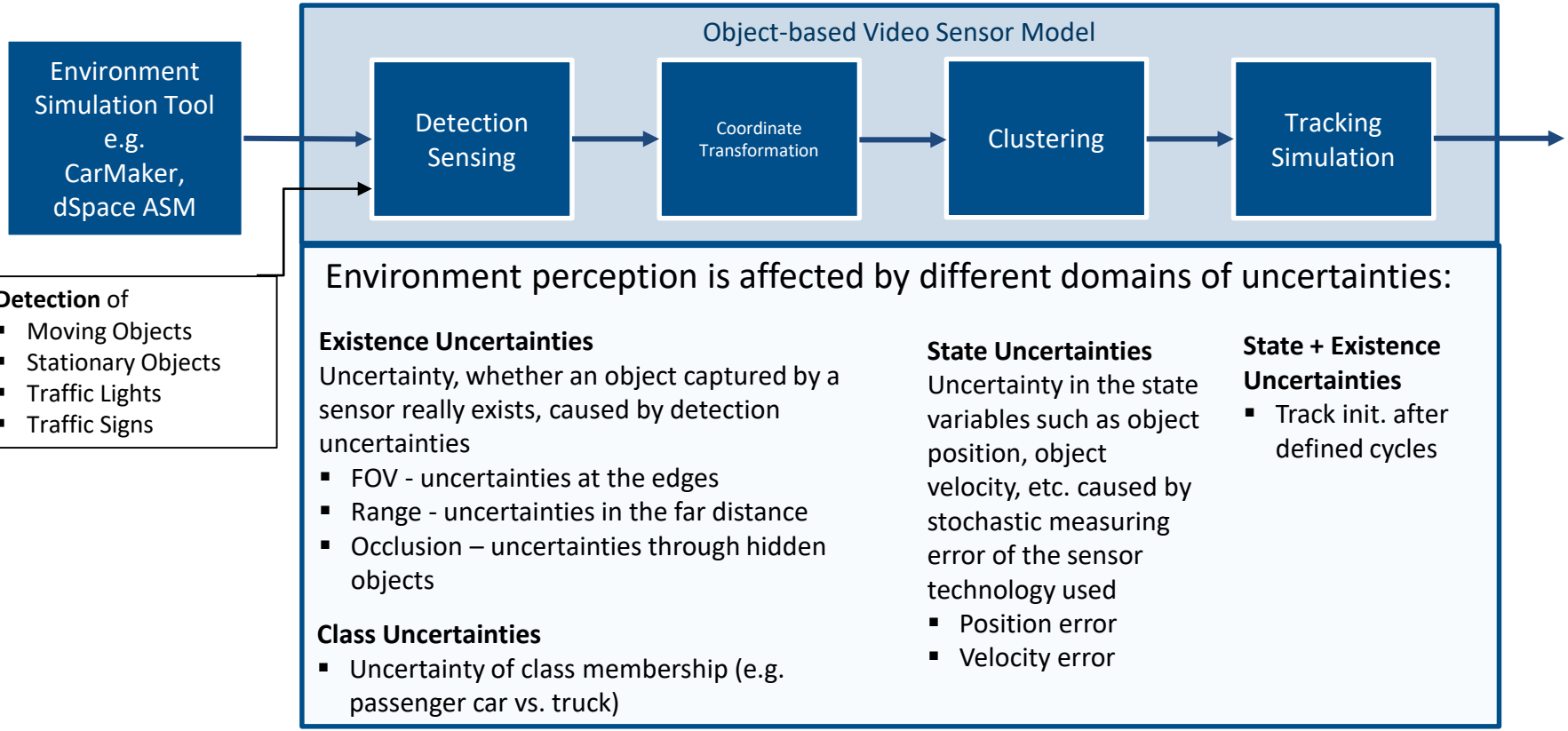
OUTPUT – Path



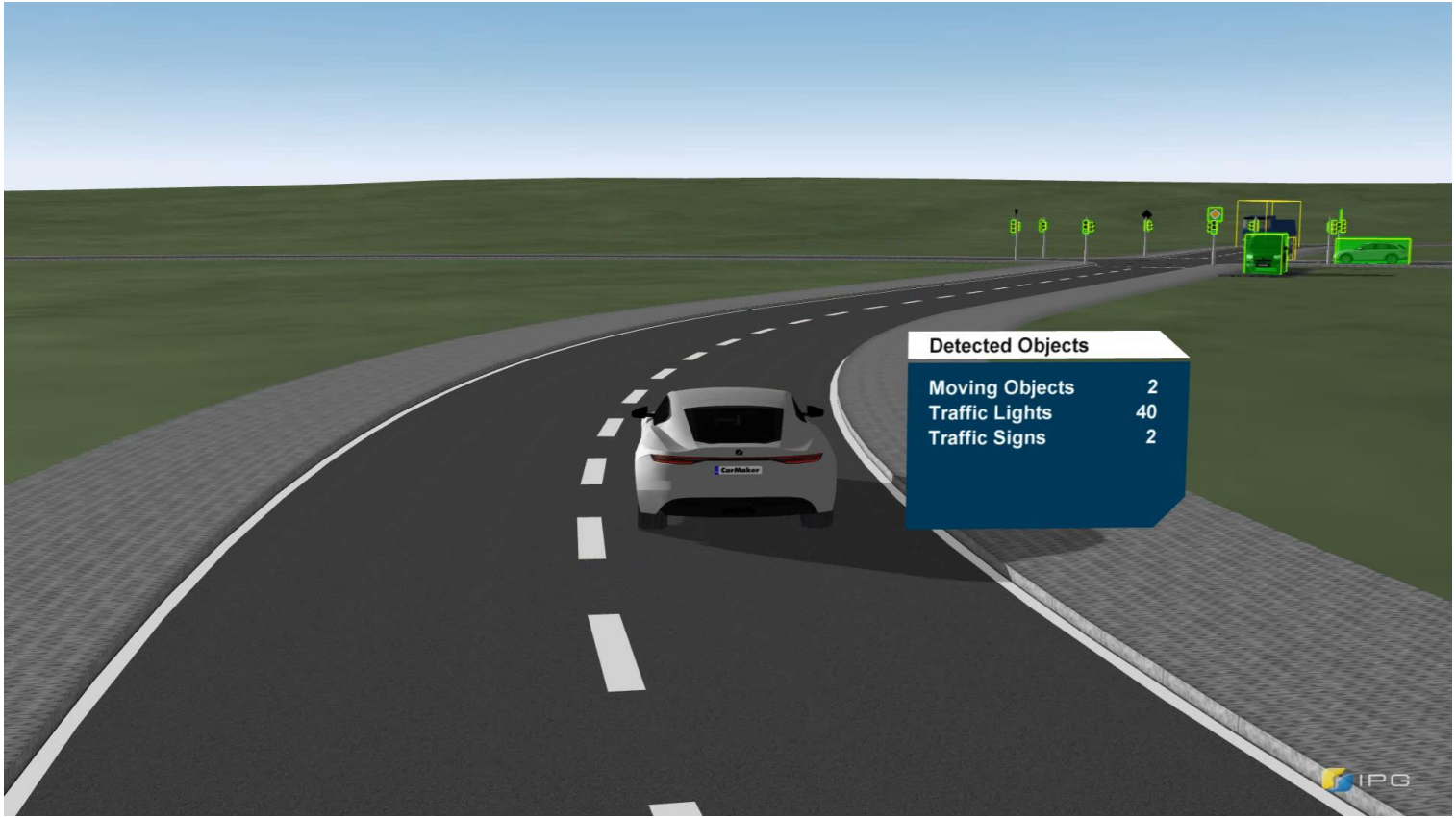
Model Structure and Interfaces



Contained Sensor Effects

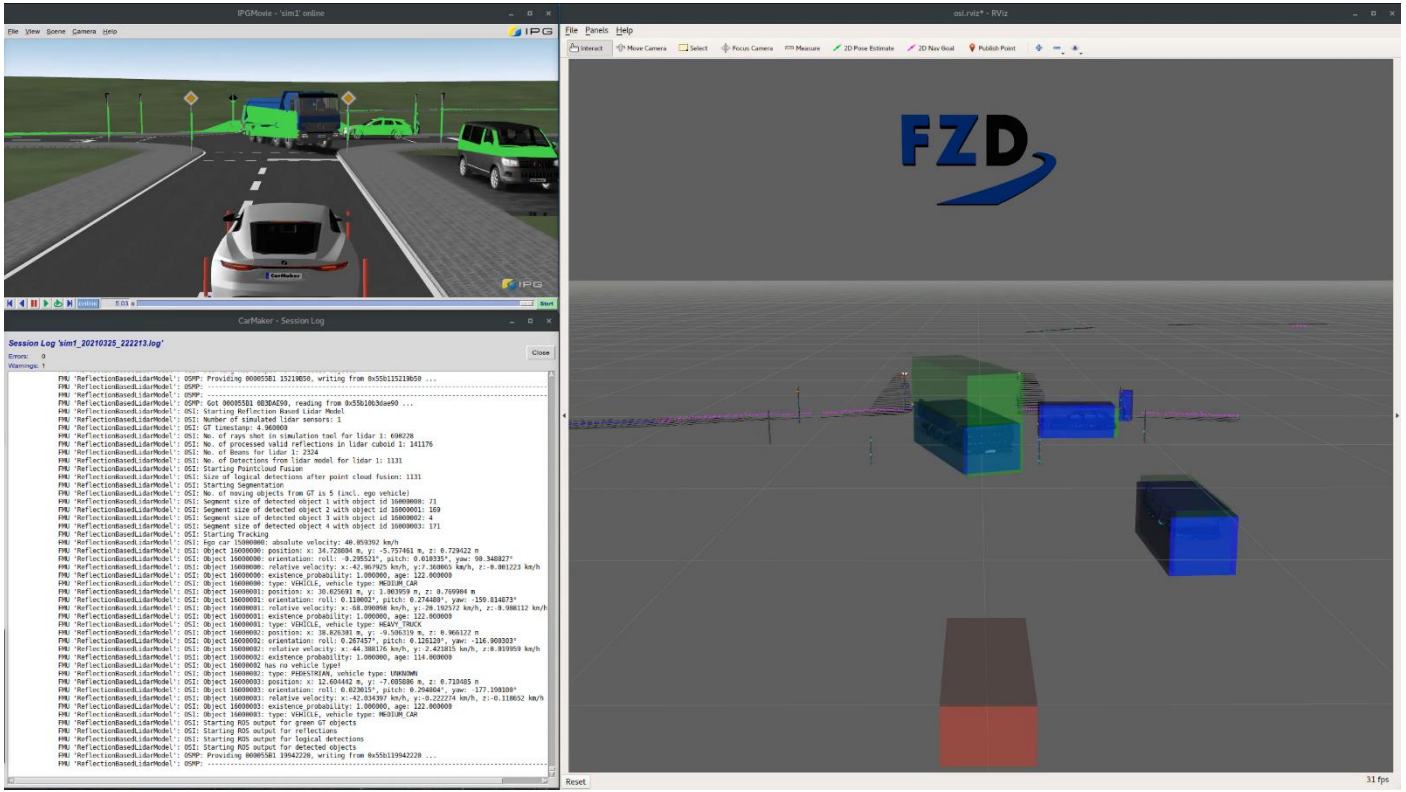


Sensor Model Integration – Video



Sensor Model Integration – Video

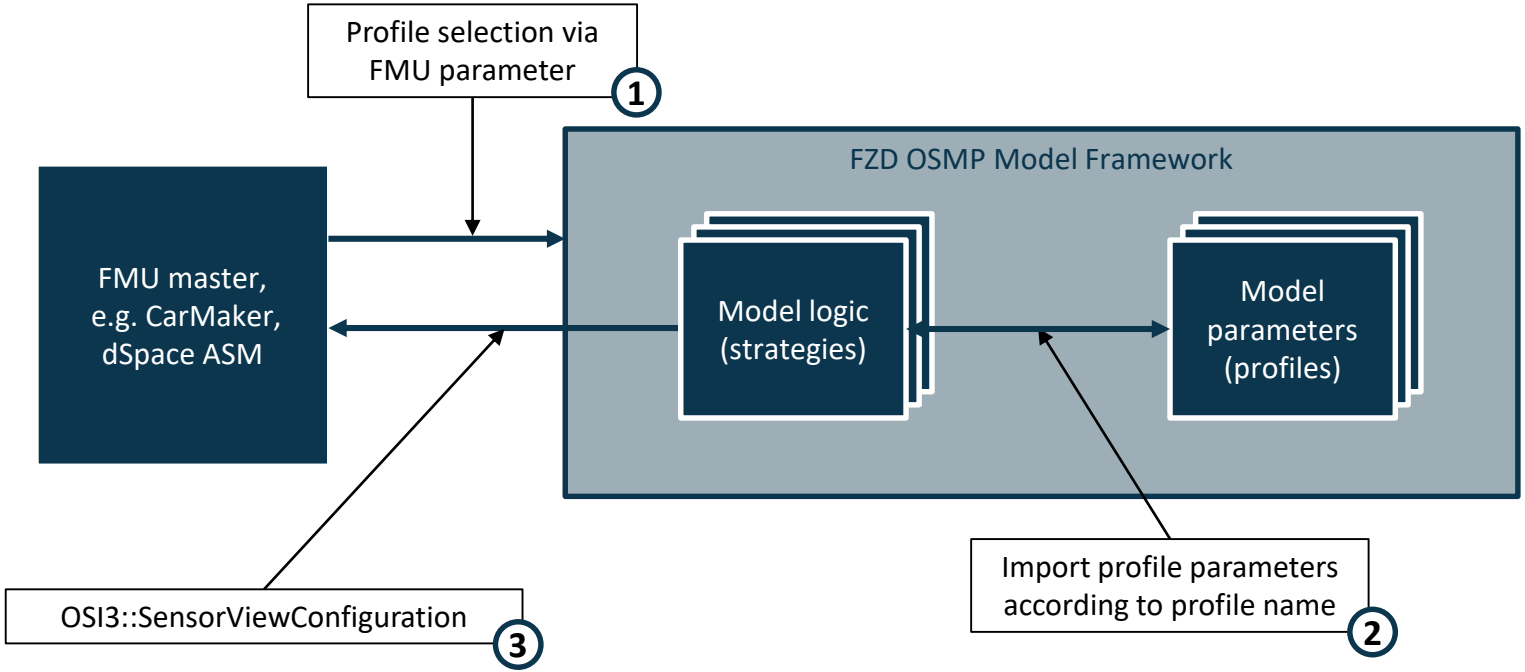
Sensor Model Integration



- Reflections from tool
- Detections from model
- Ego car
- GT objects
- Detected objects

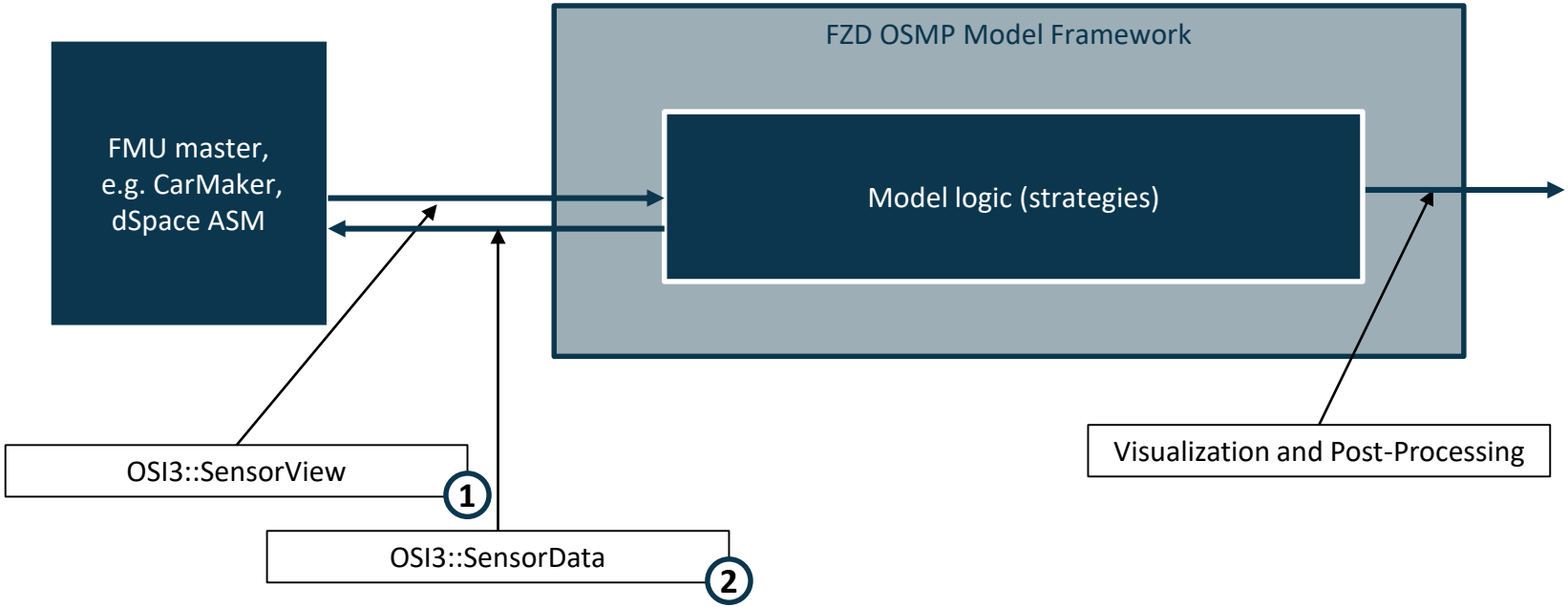
Sensor Model Integration

Model Parameterization Procedure (FMU-Init)



Sensor Model Integration

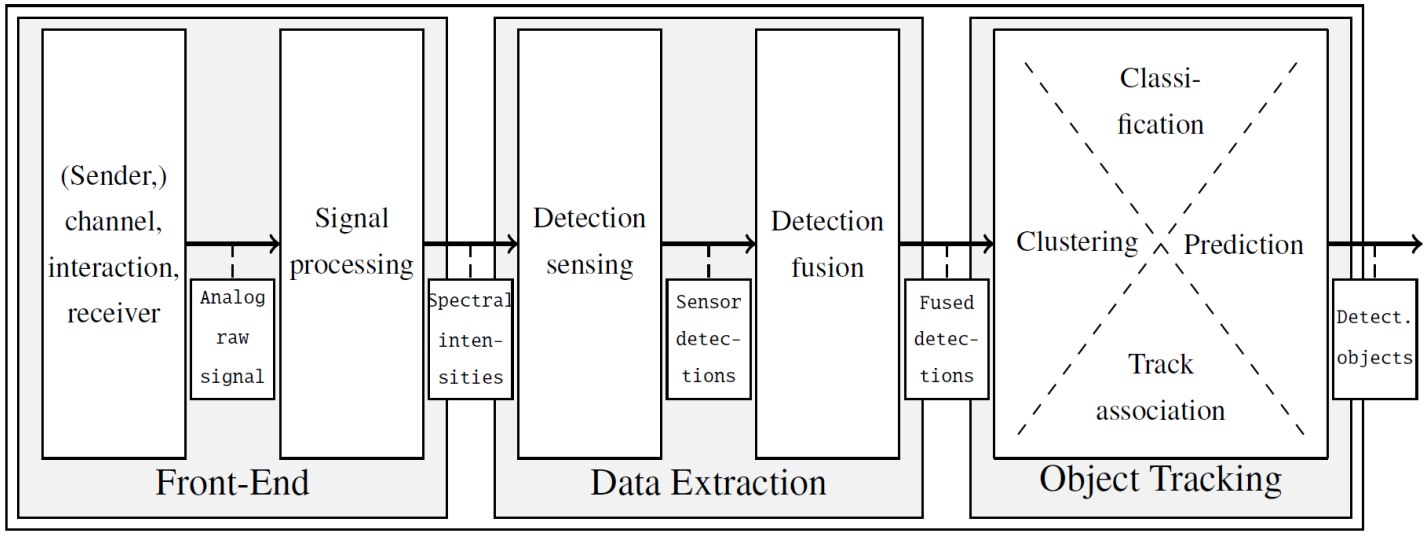
Model Running (FMU-DoStep)



Sensor Model Integration

Generic and Modular Architecture

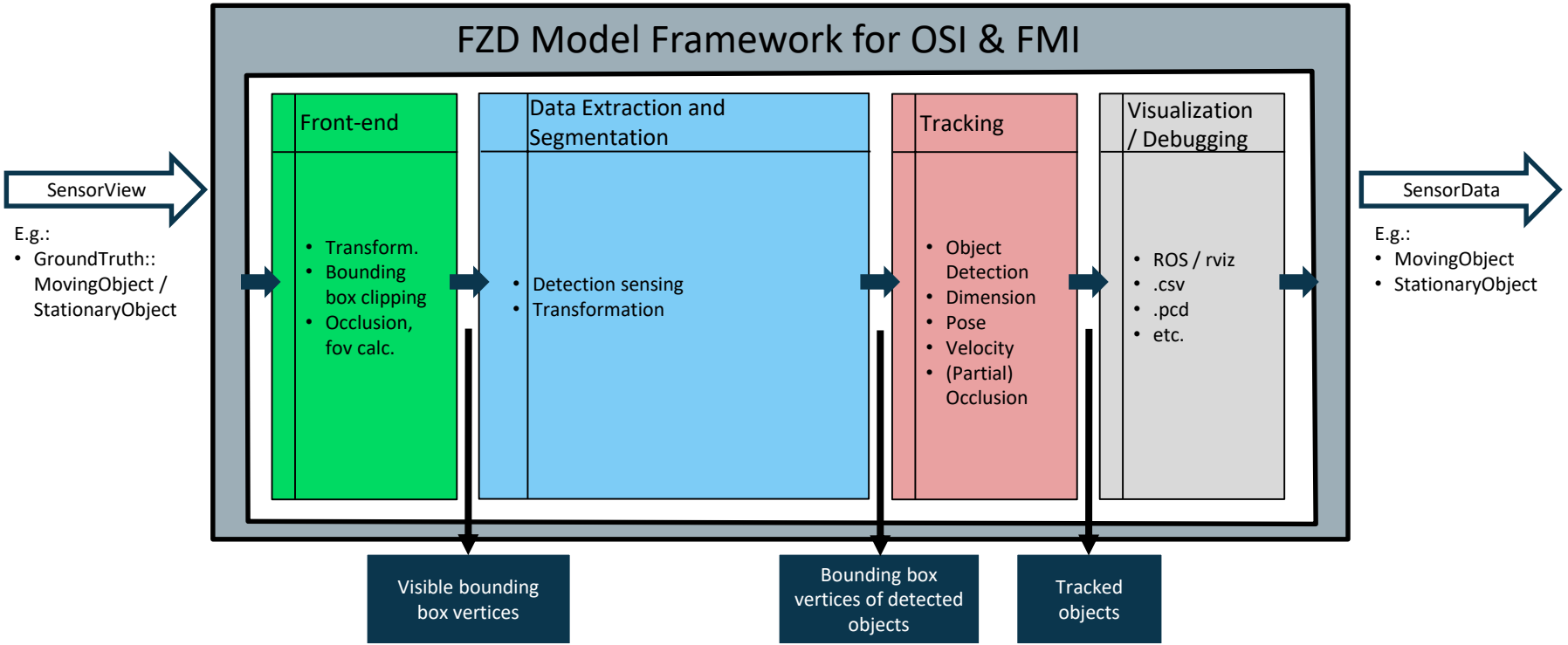
Generic functional decomposition of current automotive perception sensor systems for object detection:



C. Linnhoff, P. Rosenberger, M. F. Holder, N. Cianciaruso, and H. Winner, “Highly parameterizable and generic perception sensor model architecture”, in 6. Internationale ATZ-Fachtagung Automated Driving, 2020

Sensor Model Integration

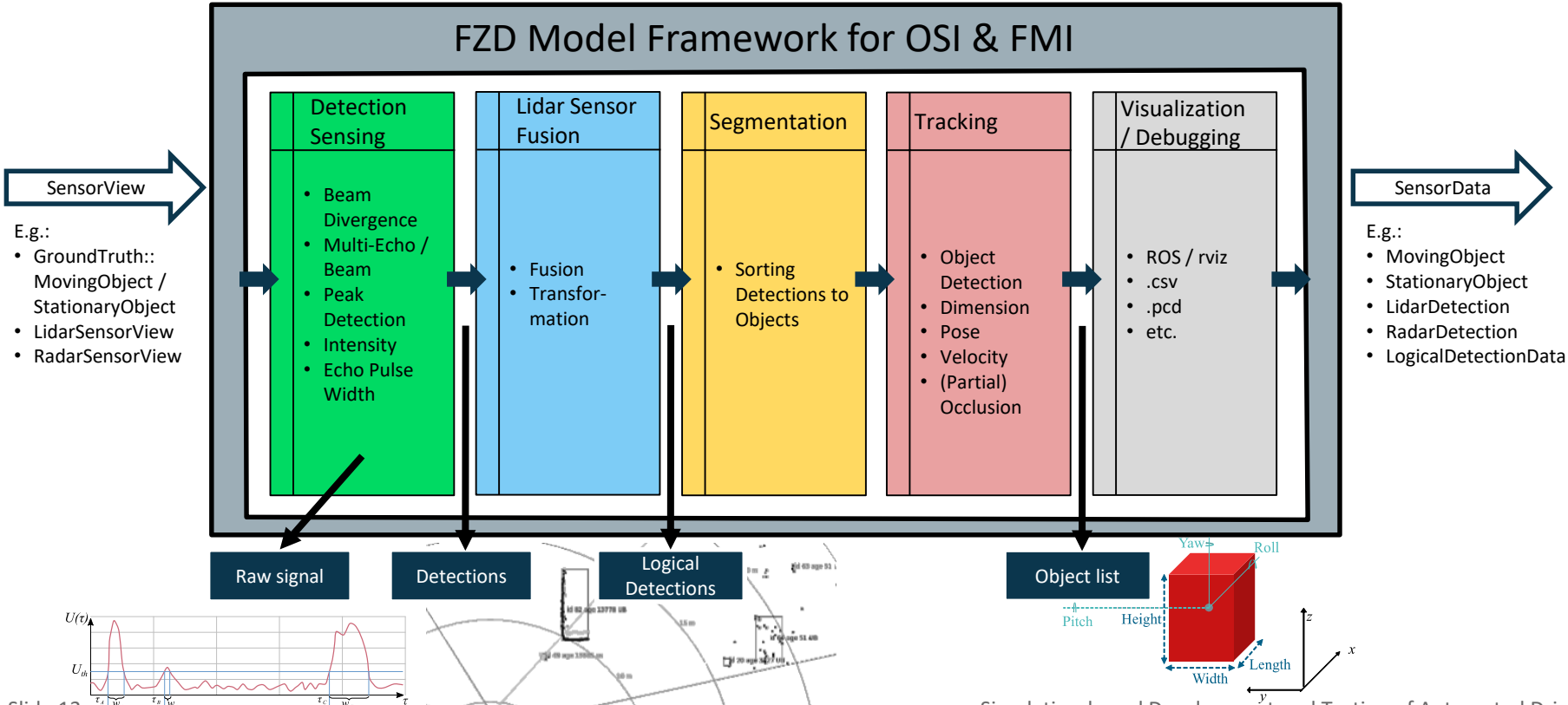
Exchangeable Strategies: Object Based Model



Sensor Model Integration

Exchangeable Strategies: Reflection Based Model

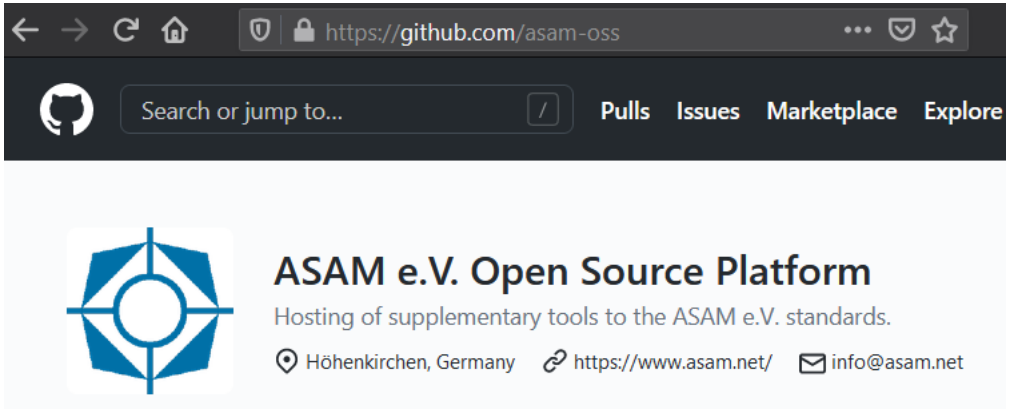
SET Level



Sensor Model Integration

Open Source Availability

- The FZD Model Framework for OSI & FMI will be made open source.
- It is subject to approval by ASAM CG:Sim for https://github.com/asam-oss.



OSI – Conclusion and Outlook

SET Level

- Contributions for perception sensor simulation to OSI by SET Level, so far:
  - FZD Model Framework for OSI & FMI
  - LogicalDetectionData
  - Documentation (e.g. GroundClearance, MountingPositions, etc.)

- Possible changes / additions in second half of SET Level:
  - Update of SensorViewConfiguration and the initialization process
    - LidarSensorViewConfiguration
    - RadarSensorViewConfiguration
  - More efficient LidarReflection and RadarReflection structures
  - ModelReference for 3D object data input to geometry-based radar model
  - GoogleFlatbuf instead of GoogleProtobuf for serialization
  - Documentation, wherever needed