



# MODE2D

A fast, and large scale simulator to explore a large number of scenario types and autonomous controllers

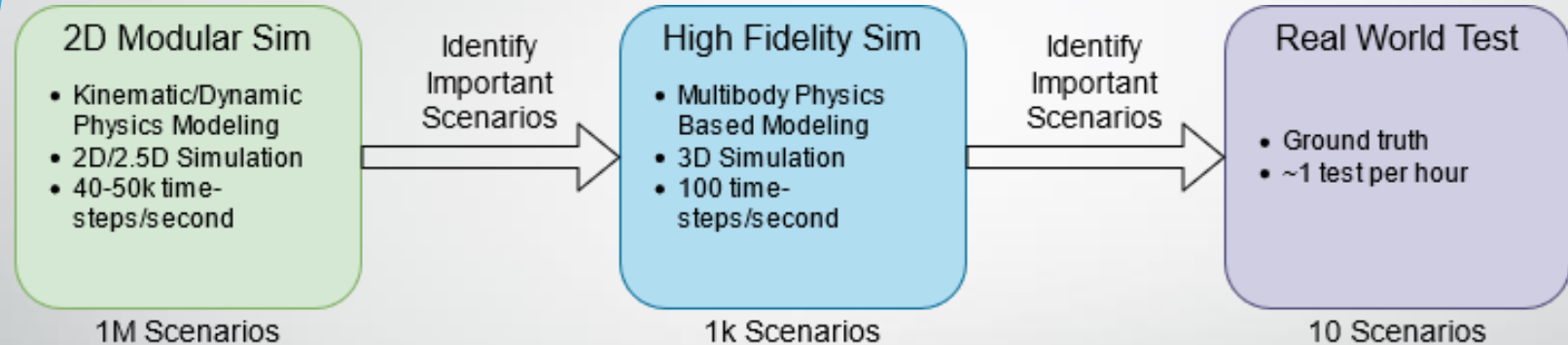


## Goals

- Reducing the execution time per scenario is crucial for the high-level planning modules of AVs, since they require a large number of scenarios testing, including corner cases, to ensure safety and functionality.
- However, choosing only a low-fidelity simulator to reduce execution time is not sufficient since low-level motion and perception modules require a high-fidelity simulator to match the real-world characteristics
- Therefore, a combination of low-fidelity and high-fidelity simulators can capture real-world characteristics required for the low-level modules, and also explore the scenario space comprehensively for the high-level modules.



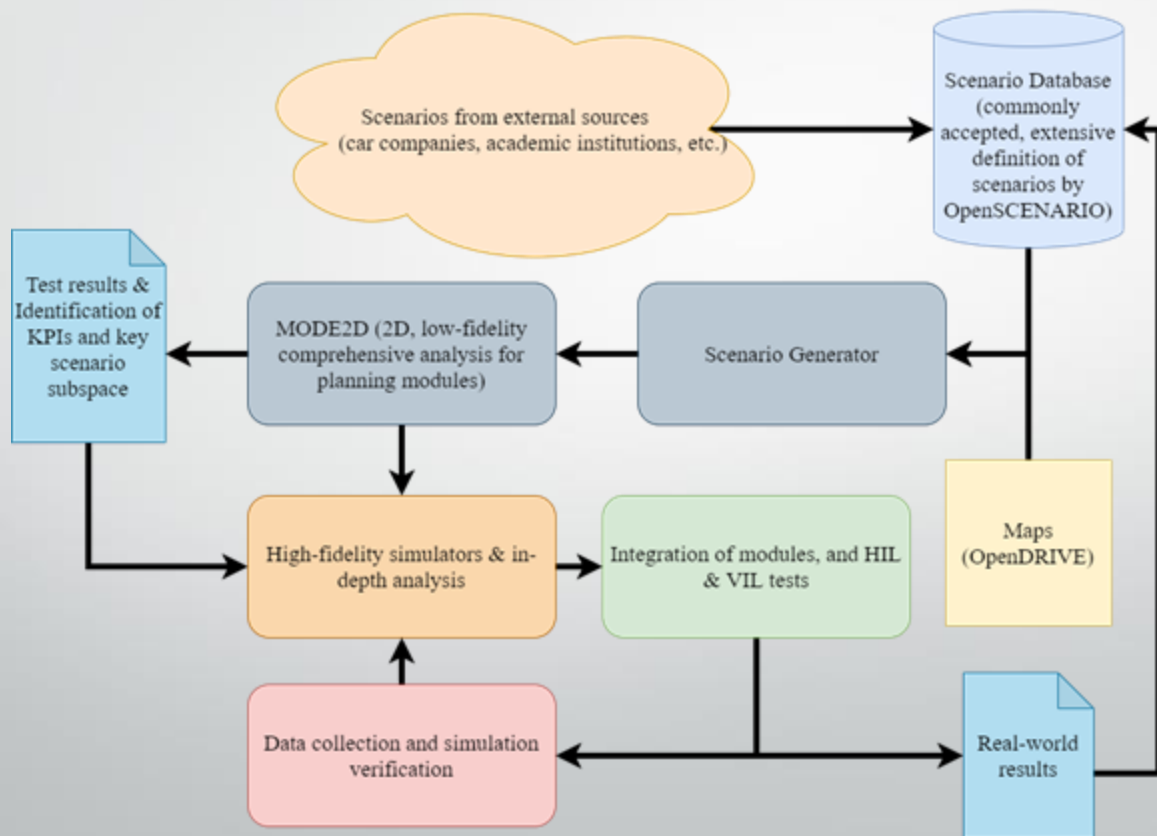
## Diagram of Low Fidelity to High Fidelity Architecture



"Scenarios" refer to concrete scenarios in which all variables are pre-defined

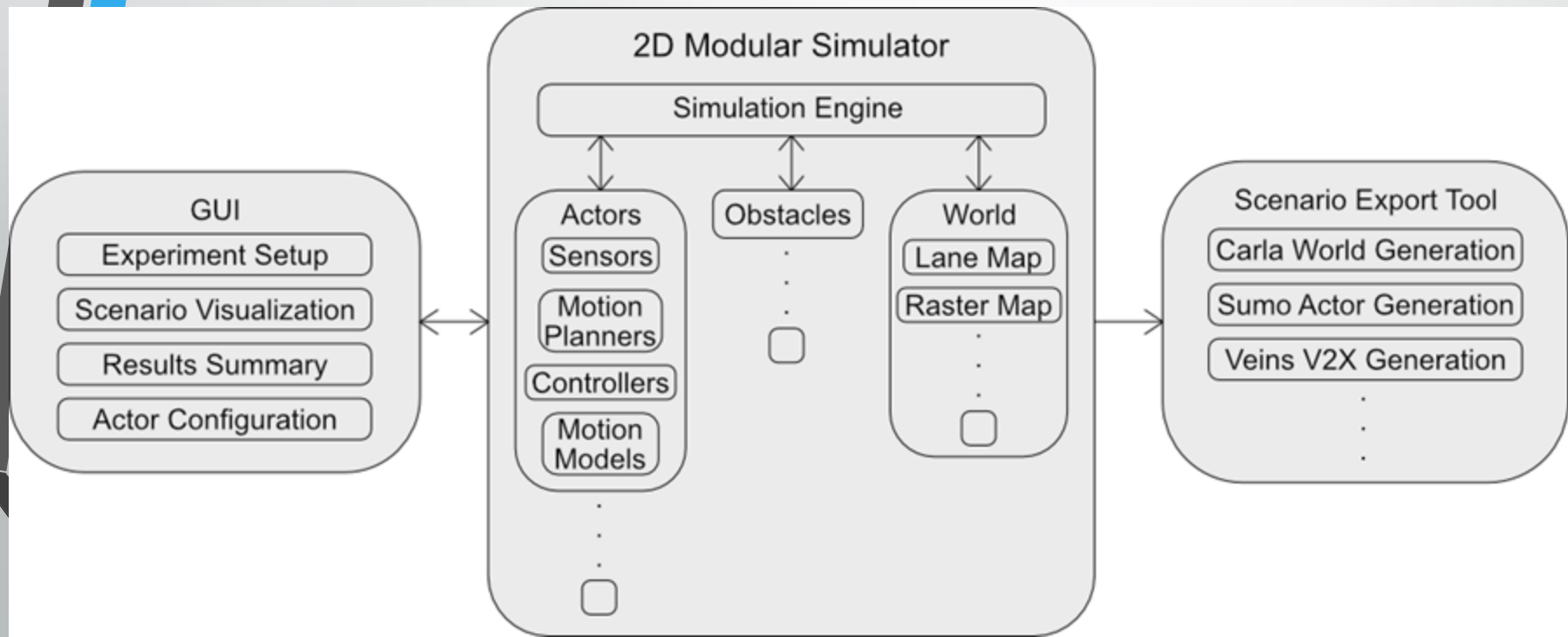


# MODE2D Ecosystem Overview





# Diagram of Layers of Architecture





# Modularity and Customization

- **Agent capabilities**
  - Modular/customizable
  - Vehicles and pedestrians are available
- **Physics fidelity choice**
  - Kinematic/Dynamic models for the agents
    - Kinematic Bicycle model
    - Dynamic Bicycle model
    - Point-mass model
  - Available models for the pedestrian agents
    - Social Force model
- **Sensors models**
  - Ray tracing, shape intersection, reflections, etc.