Integration of DYNA4 Car Professional with SUMO to perform virtual testing of automated vehicles in complex surrounding traffic

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Motivation

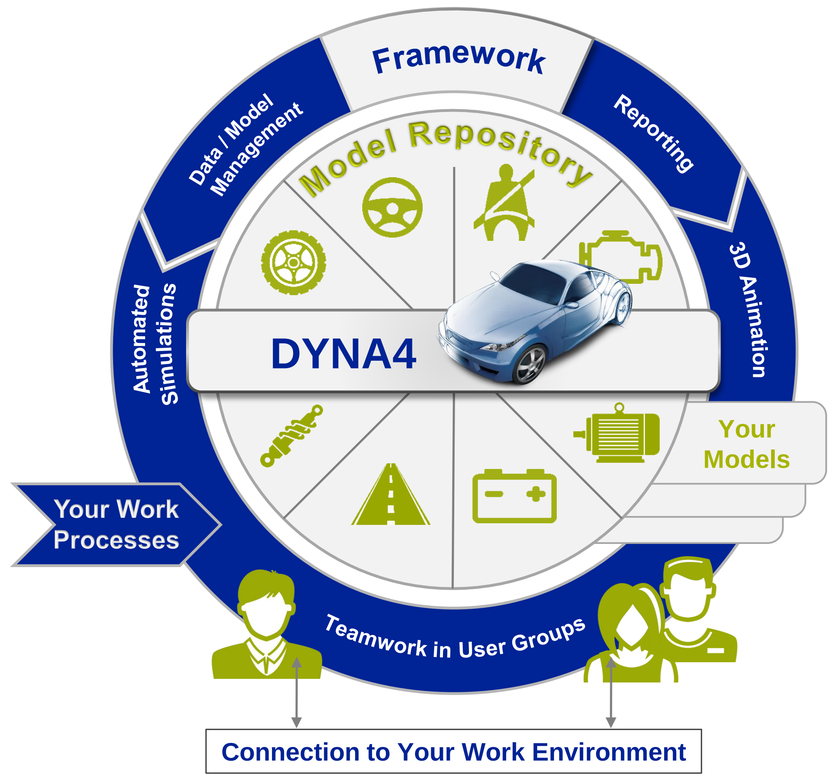
- Trends towards **autonomous driving**, resulting in stronger interaction of individual vehicles with surrounding traffic and traffic infrastructure
- **Simulation as integral part of test strategies**
- Detailed full vehicle simulation required
- Modelling of complex traffic scenarios required

Real-time capable co-simulation of **DYNA4 Car Professional** and **SUMO** to combine the strenghts of both tools for virtual development and testing of ADAS and autonomous vehicles

Technology & Tools

TESIS DYNAware
DYNA4 Car Professional

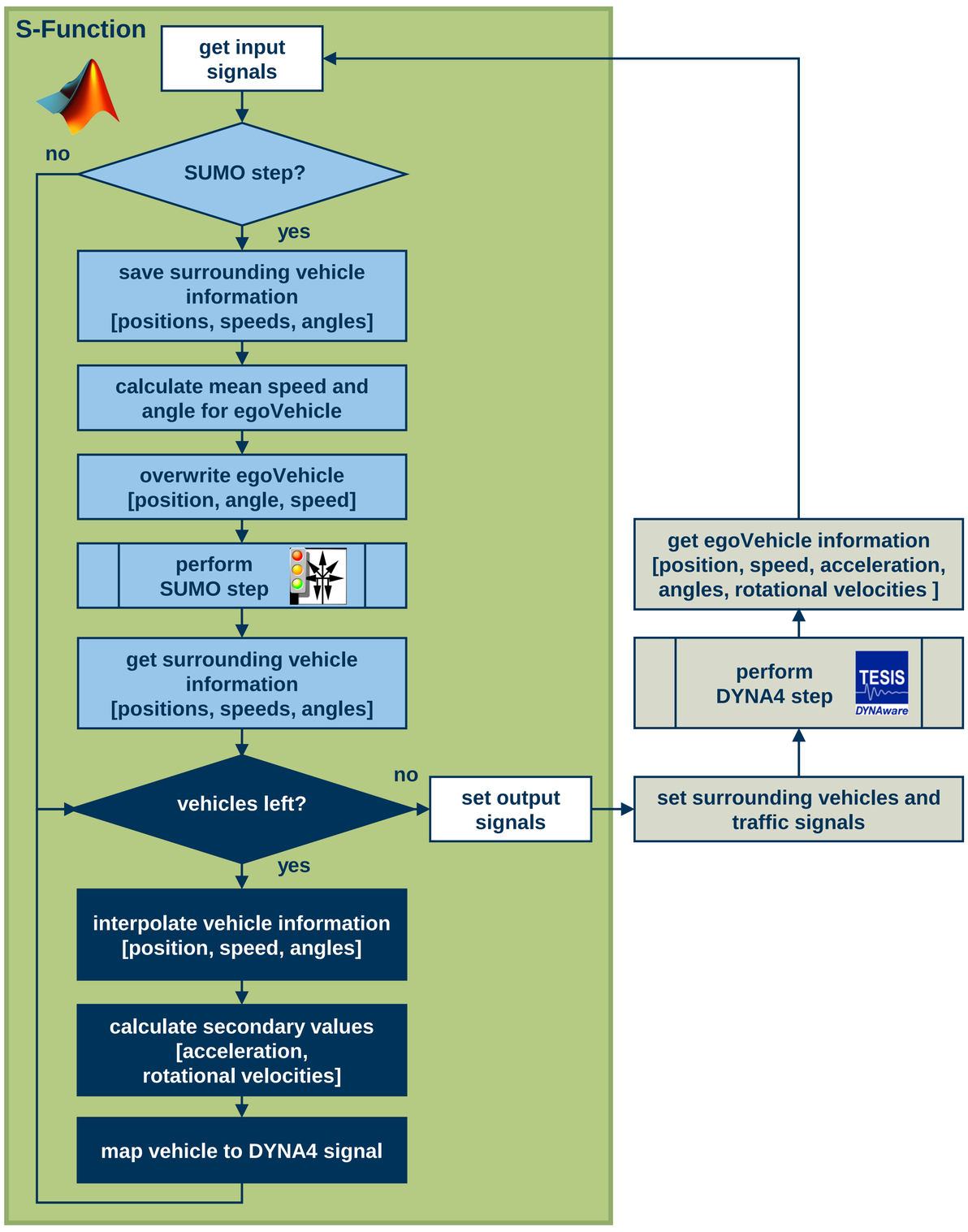
- Detailed models of full vehicle incl. driving dynamics, ADAS sensors, 3D-Roads and maneuver control
- Open vehicle model structure in **Matlab/Simulink**
- **OpenDRIVE** format for road network definition
- Powerful **3D visualization with DYNAanimation** for presentation, image generation and sensor simulation for driver assistance systems



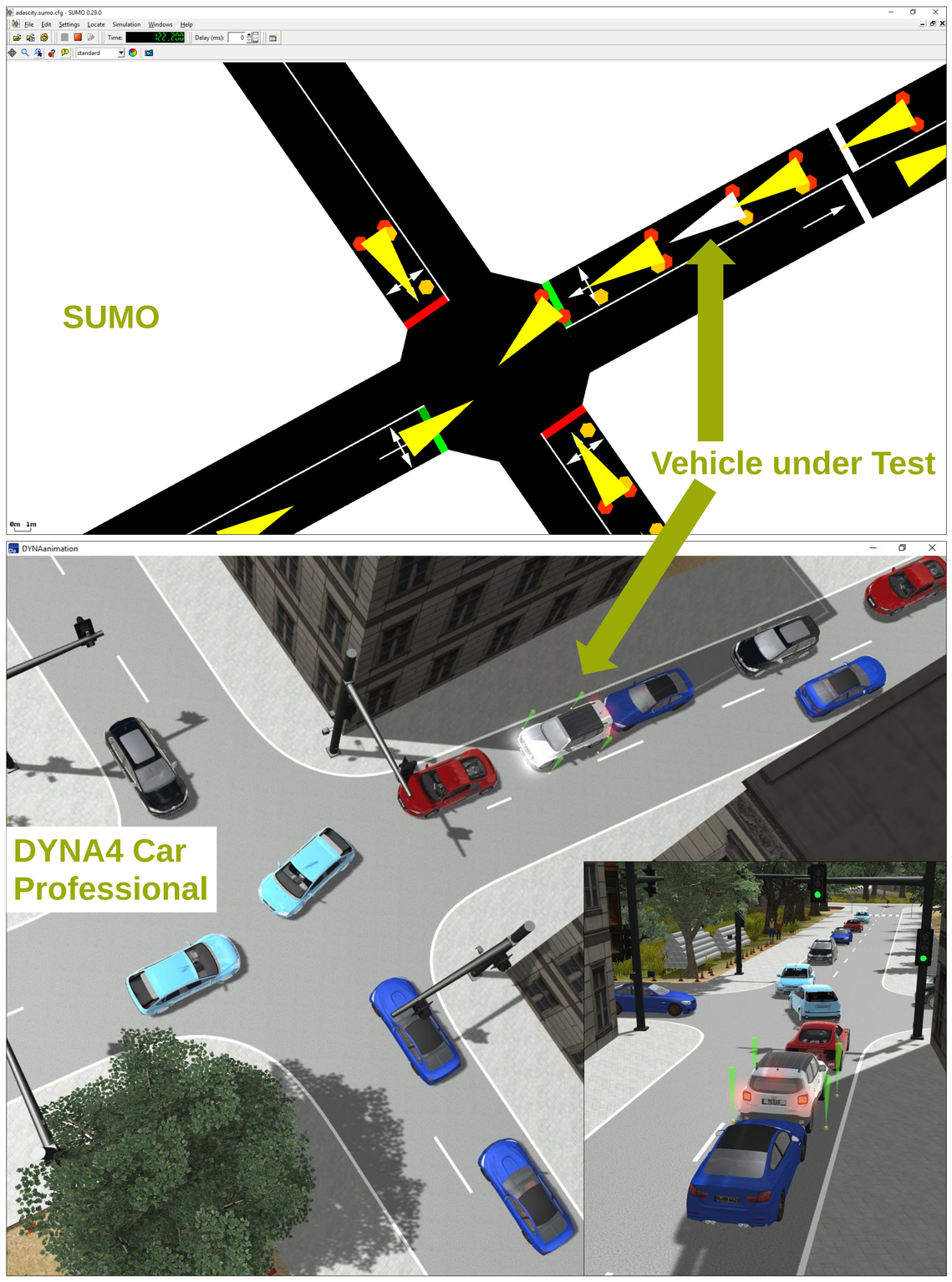
SUMO

- Microscopic traffic flow simulation
- Traffic control and traffic management
- Conversion of **OpenDRIVE** to SUMO network
- Interaction with **C++ TraCI API**
- Level-2 C++ **S-Function** for integration of SUMO in Simulink environment

Methodology



Example



Conclusion

Develop control units for **driver assistance systems** and **autonomous driving** with:

- complex traffic situations
- realistic traffic control
- reduced effort for scenario planning
- stochastic occurrences of traffic events

Develop **intelligent transportation systems** with:

- dynamic vehicle simulation
- in-the-loop simulation with vehicle control software
- high quality 3D visualization

Outlook

- Transfer **traffic control measures from OpenDRIVE to SUMO**
  - Traffic signals: matching of SUMO internal lanes to OpenDRIVE signal heads
  - Automated conversion from signs to priorities
- More complex traffic with **pedestrians and bicycles**
- **Multiple vehicles under test** for investigation of Car-to-Car functions

SUMO Conference
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