

Fraunhofer FOKUS  
Institute for Open Communication Systems



ECLIPSE  
**MOSAIC**

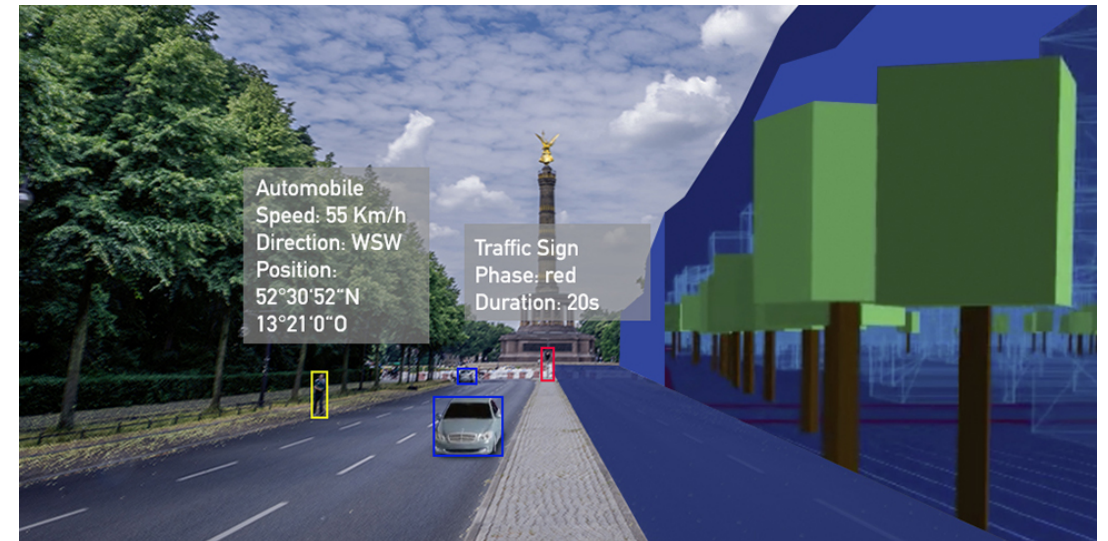
**Eclipse MOSAIC**

**SUMO User Conference 2020**

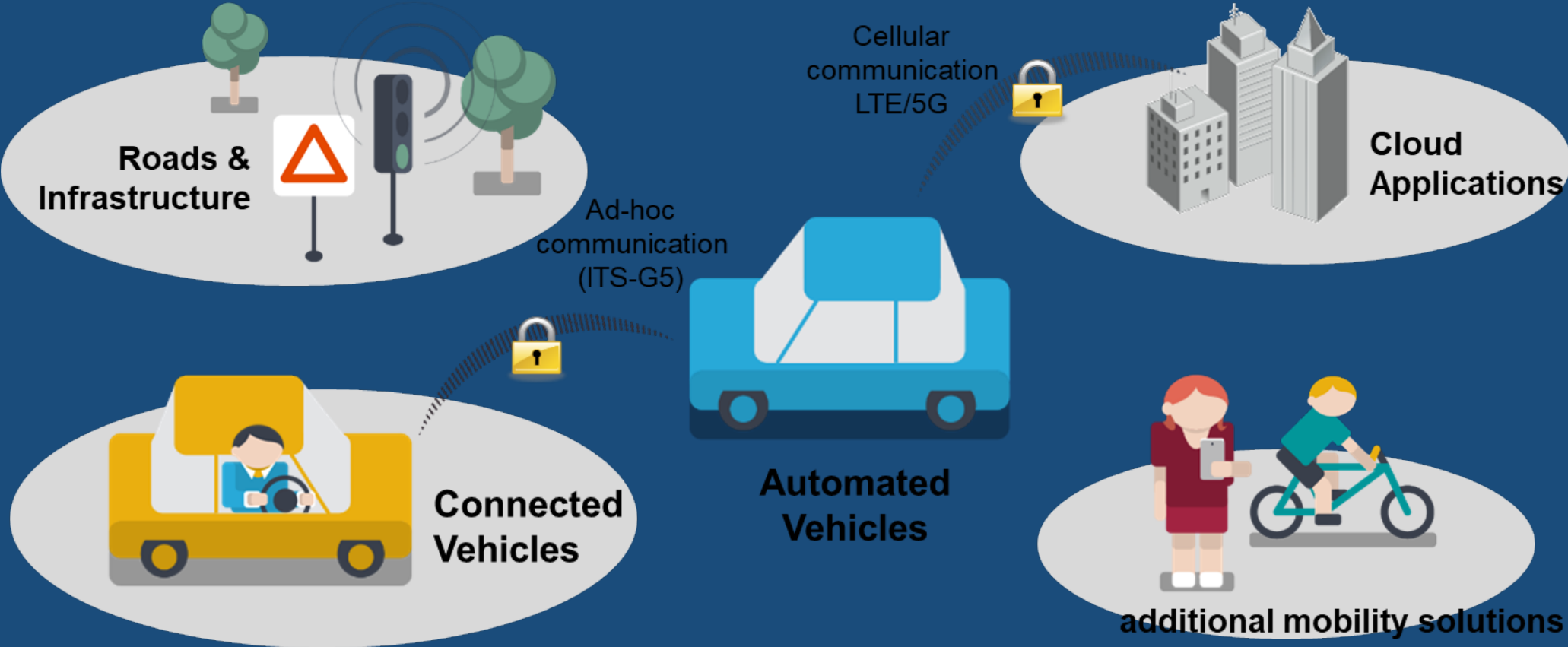
Robert Protzmann | 26.10.2020 | Berlin:online

# Testing mobility scenarios with the Open-Source simulation environment Eclipse MOSAIC

On the occasion of EclipseCon 2020, Fraunhofer FOKUS launches its simulation environment **Eclipse MOSAIC**. This solution is based on VSimRTI (Vehicle-2-X Simulation Runtime Infrastructure), which has been developed over the last 12 years in close cooperation with the DCAITI of the TU Berlin and has already been used by more than 600 partners to test mobility services and traffic scenarios. Eclipse MOSAIC is now partially available as open-source.



# Our view of mobility scenarios



# Eclipse MOSAIC

A Multi-Domain and Multi-Scale Simulation Framework for Connected and Automated Mobility.

## MOSAIC as Co-Simulation Framework

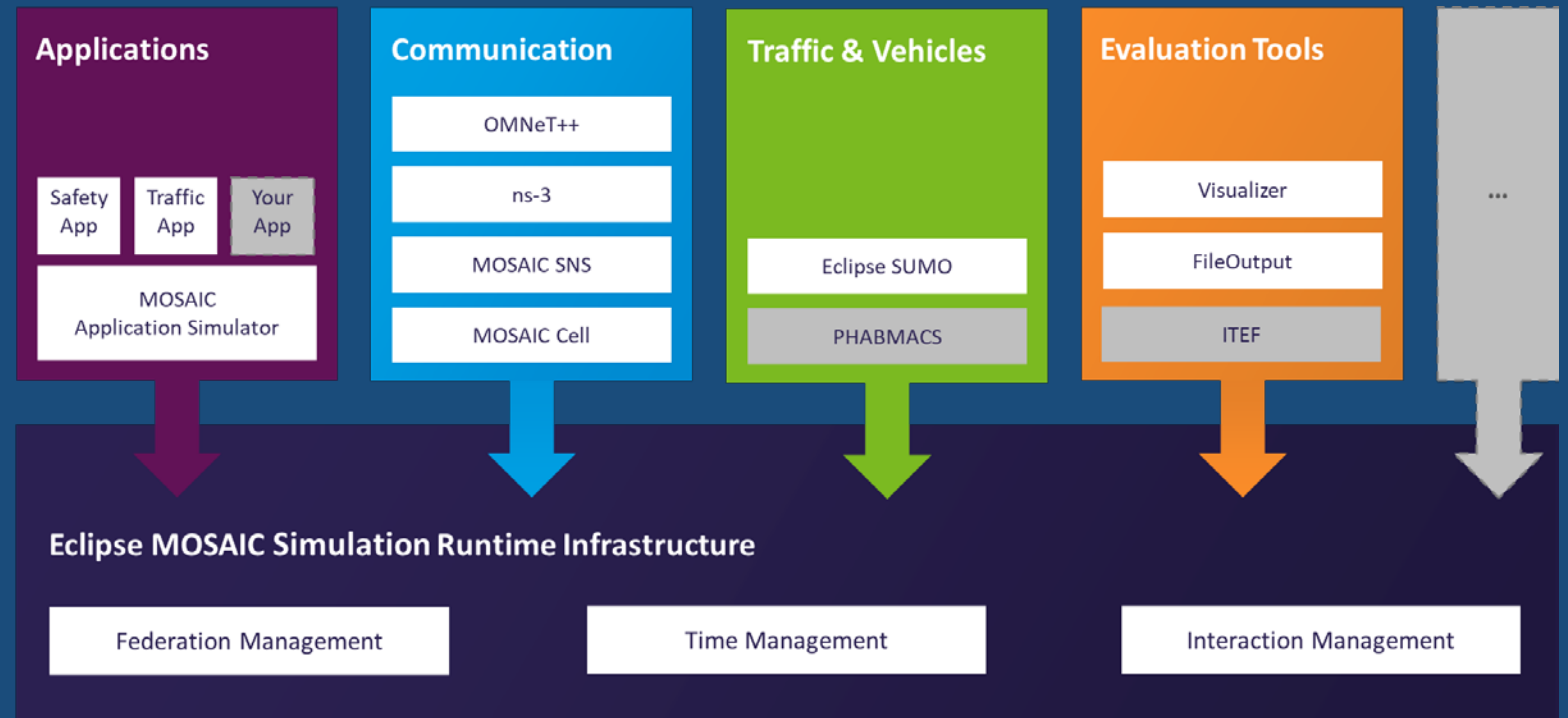
- All management tasks for simulation, synchronization and interactions are done by the RTI

## MOSAIC as collection of models / modelling approaches

- Application logic
- Traffic pattern (vehicles, bicycles, pedestrians)
- Vehicle models (dynamics, sensors and controllers)
- Communication technologies
- Electric mobility aspects
- ...

## Additional tools for

- scenario generation and evaluation



# PHABMACS Scope

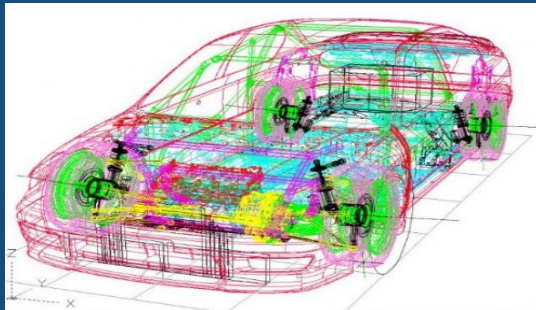
## Prototyping of Cooperative ADAS, e.g. for

- Solving hazardous situations by a coordinated safety intervention

## Mapping physics realistically

- Below the limits of driving dynamics, no highly detailed models of body, chassis, powertrain
- Calibration and Validation of vehicle dynamics against real world vehicles

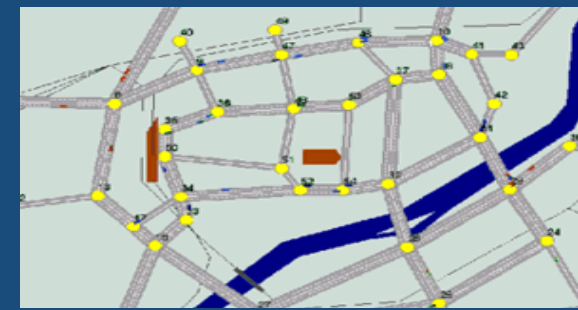
Full Vehicle Detail Sim



PHABMACS



Traffic Simulation



Level of detail

# Vehicles



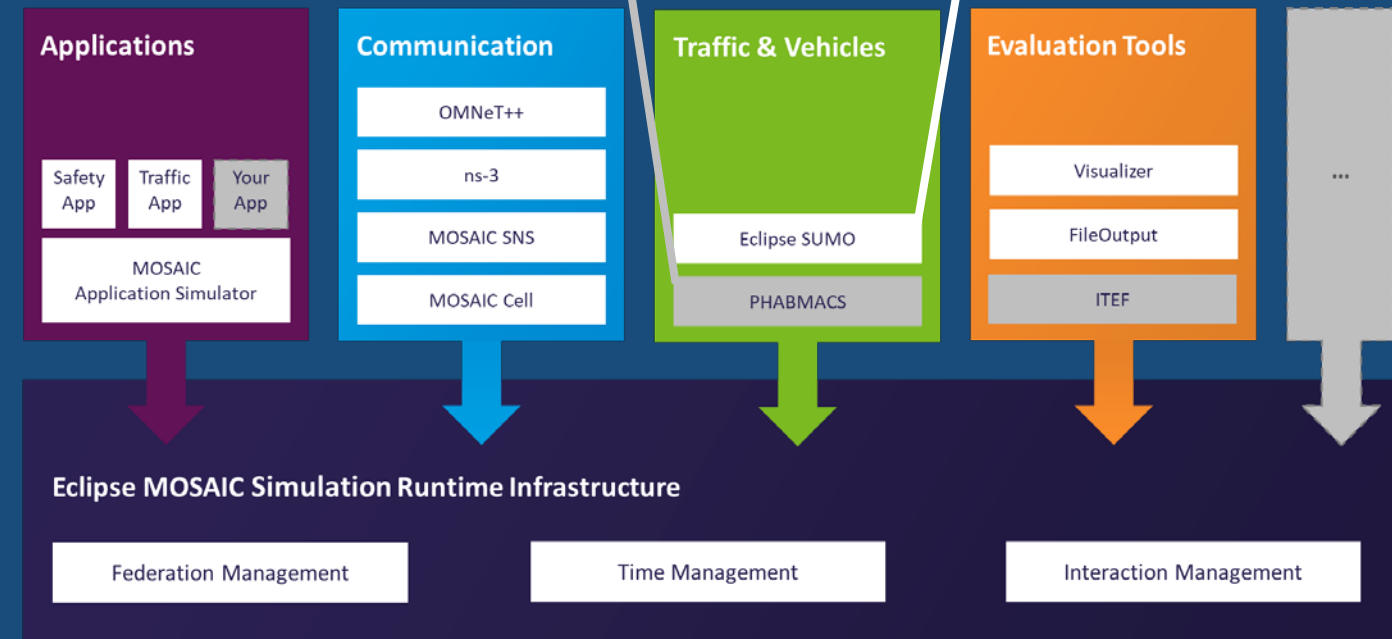
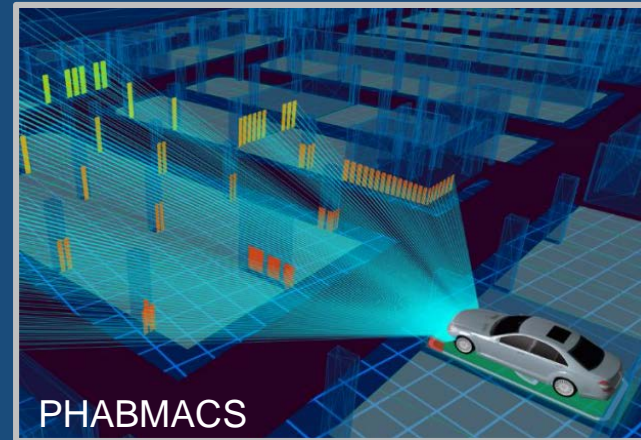
# The Multi-Scale Approach

Use different simulators according to your needs and required level of detail

**Vehicles:** Use traffic simulation or vehicle dynamic simulation, or both!

**Communication:** Simple heuristics, or detailed communication/network simulation (all layers in ETSI / 3GPP stacks)

Exchange simulators easily without touching the simulation scenarios



# Facts and Figures

## Current Release of MOSAIC

- Eclipse MOSAIC 20.0 (October 2020)

## Duration of development

- More than 12 years

## Scientific input

- 2 PhDs, 22 Masters, 8 Bachelors
- About 40 papers, articles and book chapters

## Number of users / partners

- More than 600 (ca. 250 from Germany)

## Projects and success stories

- *PRE-DRIVE-C2X, DRIVE-C2X simTD* (support of V2X field trials)
- *STREETLIFE* (bicycle mobility)
- *eMERGE, eMERGE2, eBaseCamp* (electric mobility)
- *TEAM* (holistic mobility solutions)
- *IMAGinE* (collaborative driving maneuvers)
- *SENDATE-TANDEM* (Internet and cloud)
- *INFRAMIX* (automated driving on highways)
- Several projects for industry partners

# Selected Success Story

## Traffic Management on Highway Scenario

Digital map with e.g. roadwork zones

Traffic with different vehicle types and behavior

Road infrastructure with sensors and signs

Communication infrastructure with C-ITS and 5G links and additional nodes (RSUs)

Management Applications with


- Dynamic speed limits
- Lane closures (Roadworks)
- Dedicated lanes for automated vehicles






# Eclipse MOSAIC Versions

3D Visualization	Statistics Output	ITEF
Battery / Charging	Variable Message Signs	PHABMACS



Browser Visualization	File Output	CMD Starter	
Application	Eclipse SUMO	Environment	
Cellular	ns-3	OMNeT++	SNS
Runtime Infrastructure	Interactions Library	Tutorials	



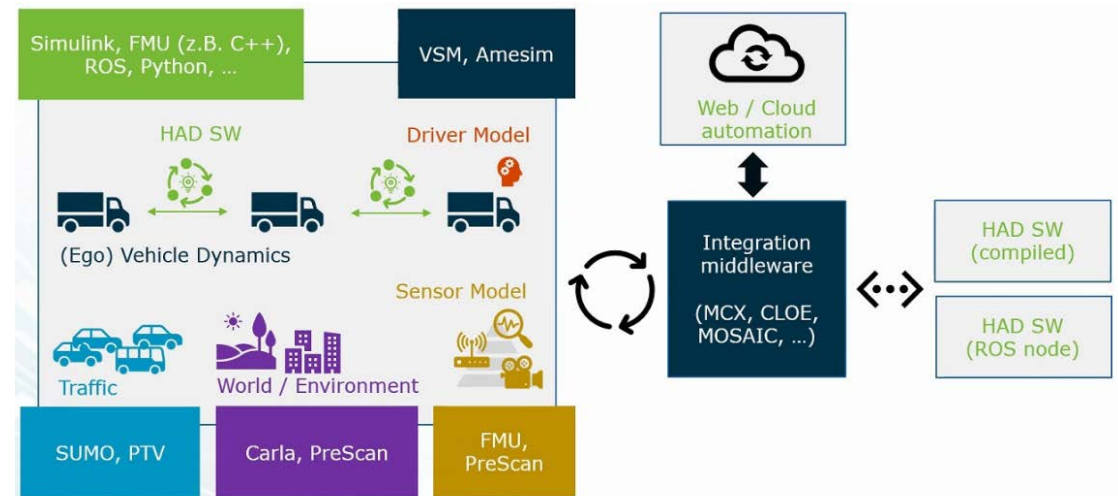
# MOSAIC @ Eclipse



Strategic development as an associated project



Part of the OpenADx demonstrator



# Thank you!

**Eclipse MOSAIC Website**

<https://www.eclipse.org/mosaic/>

**Eclipse MOSAIC GitHub**

<https://github.com/eclipse/mosaic>

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