

openMDM in an Automotive Open Source Ecosystem

openMDM Annual Summit 2022
May 24th 2022

Who am I?



Andy Riexinger

Robert Bosch GmbH

Cross-Domain Computing Solutions –
Automated Driving

OpenADx | Steering Committee Chair

- › Business Development Manager Open Source
- › ~25 years at Bosch
- › ~15 years experience in embedded software development
- › Pushing Open Source development and business
- › Interest in creating business with Open Source

Open Source has arrived in automotive

THE AUTWARE FOUNDATION

Audi Electronics Venture

ROS2 Multi-robot Simulator

simulator unity apollo autonon

reinforcement-learning carla-simulator deep-learning

1,235 commits 1 branch

CARIAD
Official github.com organizational account of CARIAD SE.
Germany https://cariad.technology @cariad_tech

Overview Repositories 17 Packages People Projects

README .md

C A R I A D

Welcome to the Open Source space of CARIAD SE a Volkswagen Group company. Please check our [legal notice](#) for further information.

Pinned

- fep3_sdk** (Public) Forked from audi/fep3_sdk. CMake
- fep3_base_utilities** (Public) Forked from audi/fep3_base_utilities. C++
- fep3_participant** (Public) Forked from audi/fep3_participant. C++
- fep3_system** (Public) Forked from audi/fep3_system. C++
- dev_essential** (Public) C++ 1

Email @ver_bloggt

FEP – Functional Engineering Platform launched to face the upcoming complexity in function development, considering all relevant aspects in simulation (MiL, Sil, HiL) and testing.

General Engineering Mobile Open Source Uber Data

Autonomous

February 19, 2019

Popular Articles

- ABOUT
- ing Data Platform: 100+ ... with Minute Latency
- ing Ludwig, a Code-Free ... Learning Toolbox
- helangelo: Uber's ... Learning Platform
- AresDB: Uber's GPU- ... Open Source, Real-time
- About FHWA
- ch Mobility ... :form
- innovate
- open source mobility



#DEVELOPER #MOBILITY

Bosch ConnectedWorld 2018

Autonomous driving accelerator “OpenADx” launched

FEB 21, 2018 0

Today at the Bosch ConnectedWorld conference in Berlin, a new open source autonomous driving accelerator was introduced. OpenADx focuses on the software development toolchain for autonomous driving, an enabling component in the landscape of highly autonomous driving.



BOSCH CONNECTED WORLD 2018 ADDRESSING THE TOOLCHAIN COMPLEXITY

Development ▶ Lab Test ▶ Test Fleets ▶ Validation ▶ Manufacturing ▶ Operations

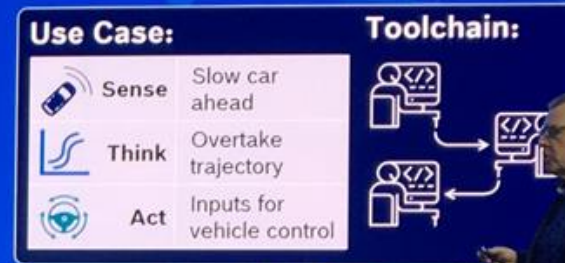


OpenADx

Accelerate AD development through open collaboration and open source

OpenADx Testbeds

- Controlled experimentation environment
- Validation of customer requirements and technical feasibility
- Focus on AD toolchain integration aspects
- Can lead to longer term open source project



Testbed



OpenADx – xcelerate your Autonomous Driving development

The OpenADx community provides a platform which ...

... leverages open source to increase efficiency and create standards

Reason Why

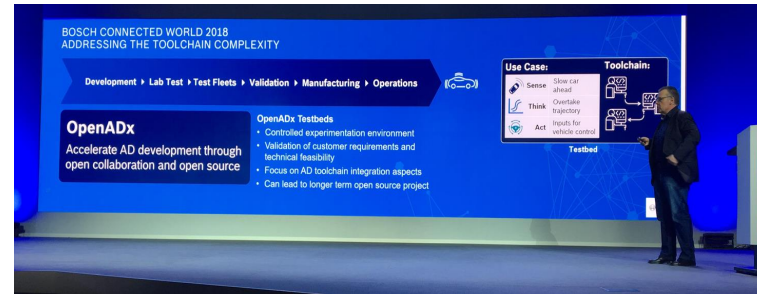
AD requires a multifaceted process incorporating a variety of software tools

But none of these tools were ever designed to work together

This costs the industry time and money

We are mitigating this problem by creating the leading automated driving ecosystem ➤ **OpenADx**

RB launched OpenADx at BCW 2018 ...



... and established an Eclipse hosted community

- ▶ 30 entities
- ▶ 60+ active contributors
- ▶ Initial projects:
 - Cloe (simulation kit for testing AD software components)
 - Standardized AI labeling
 - SiL standardization

Targets



- ▶ Accelerate time to market
- ▶ Share costs
- ▶ Free up resources to focus on customers

Approach

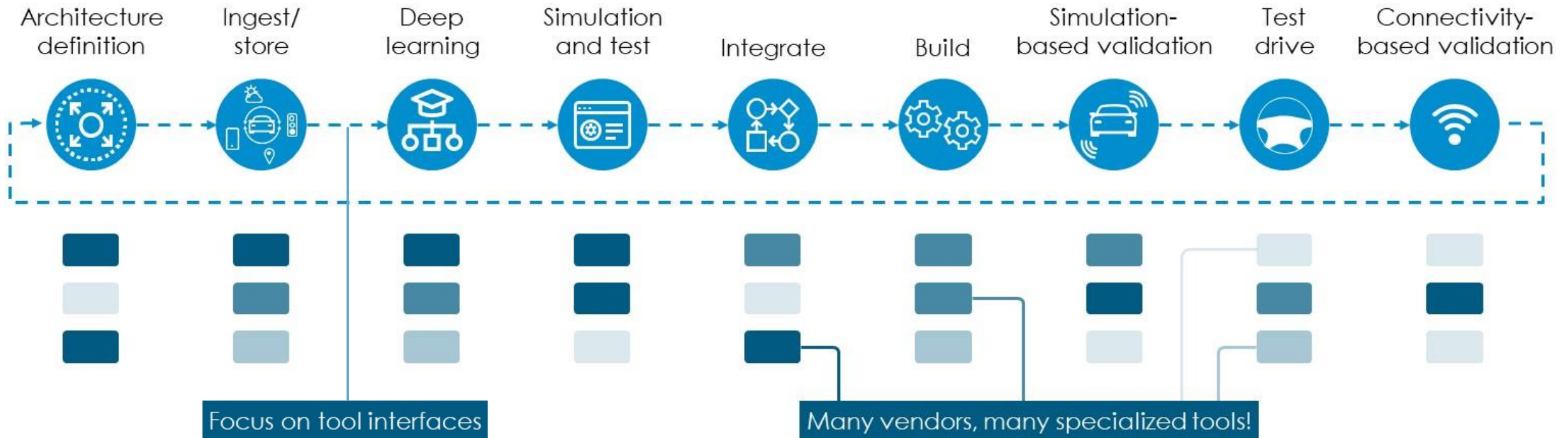


- ▶ Define Industry-wide AD toolchain
- ▶ Ensure high interoperability
- ▶ Provide easy access
- ▶ Establish basis for reference arch.



OpenADx targets reference architecture and ...

a wide ranging interoperable toolchain for PoV* and commercial applications



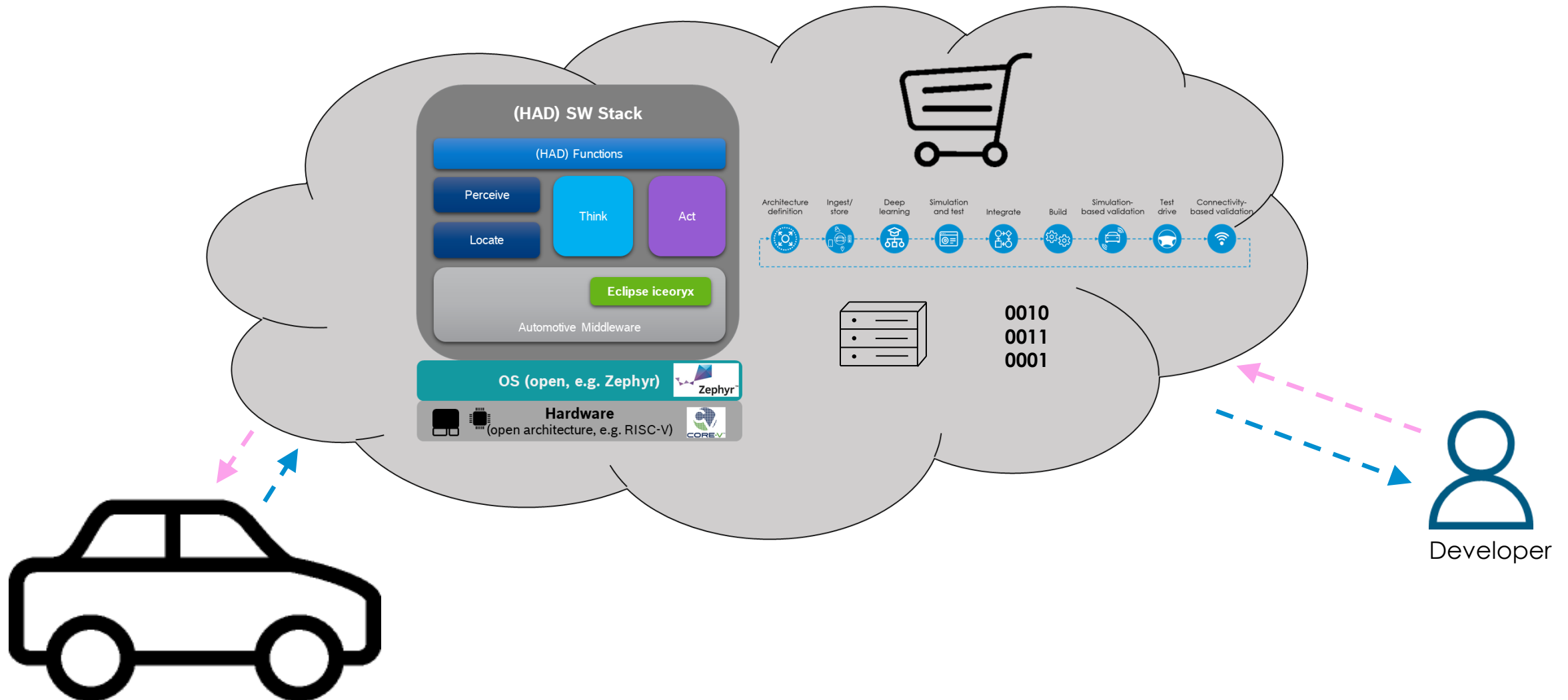
GOALS

- › Industry-wide accepted definition of the AD toolchain
- › Tool interface standardization
- › Ensure efficient implementation and interoperability
- › Foundation for reference architecture

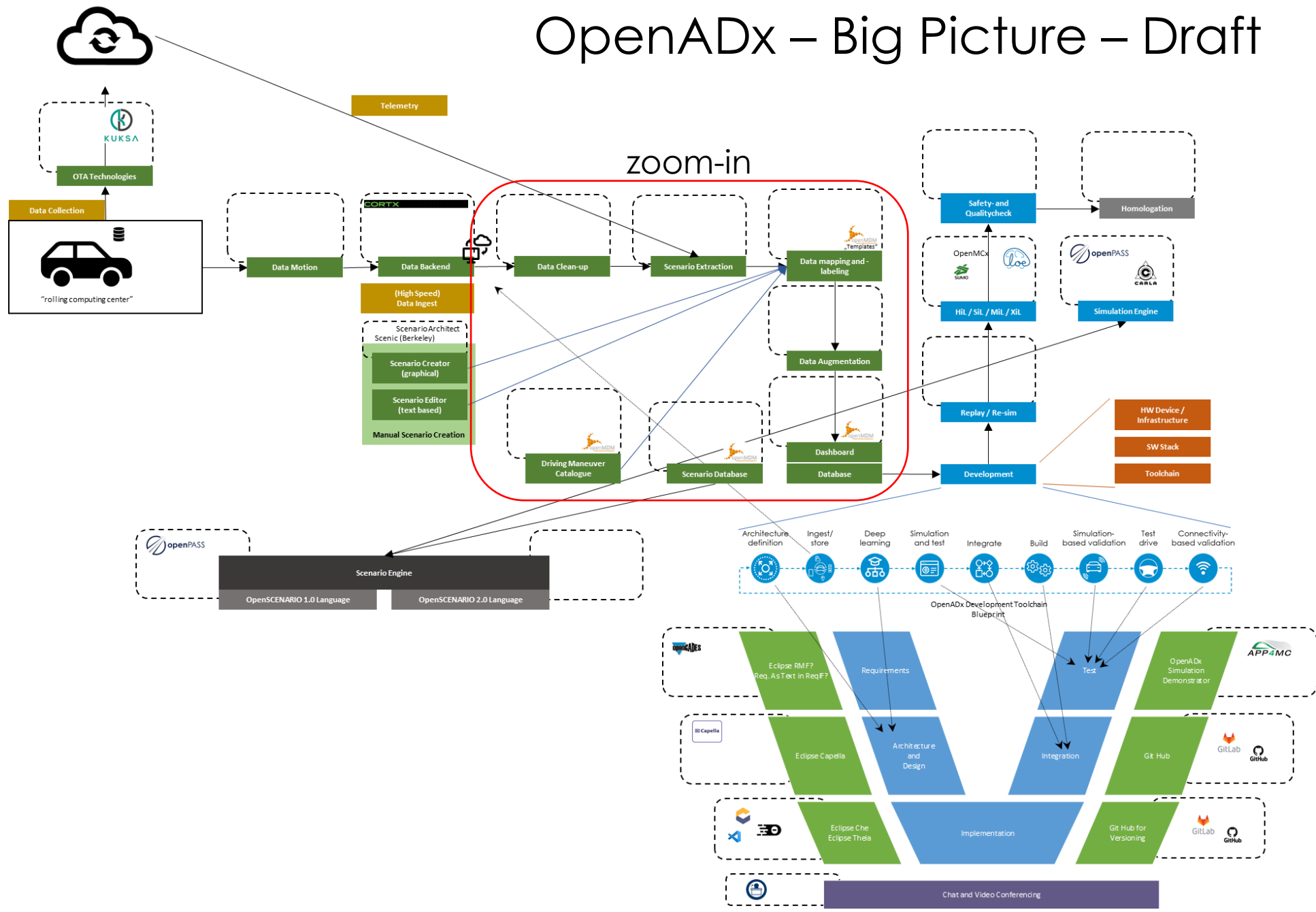
Make a complex tool landscape more accessible for enterprise users

OpenADx: Leading to holistic functional approaches

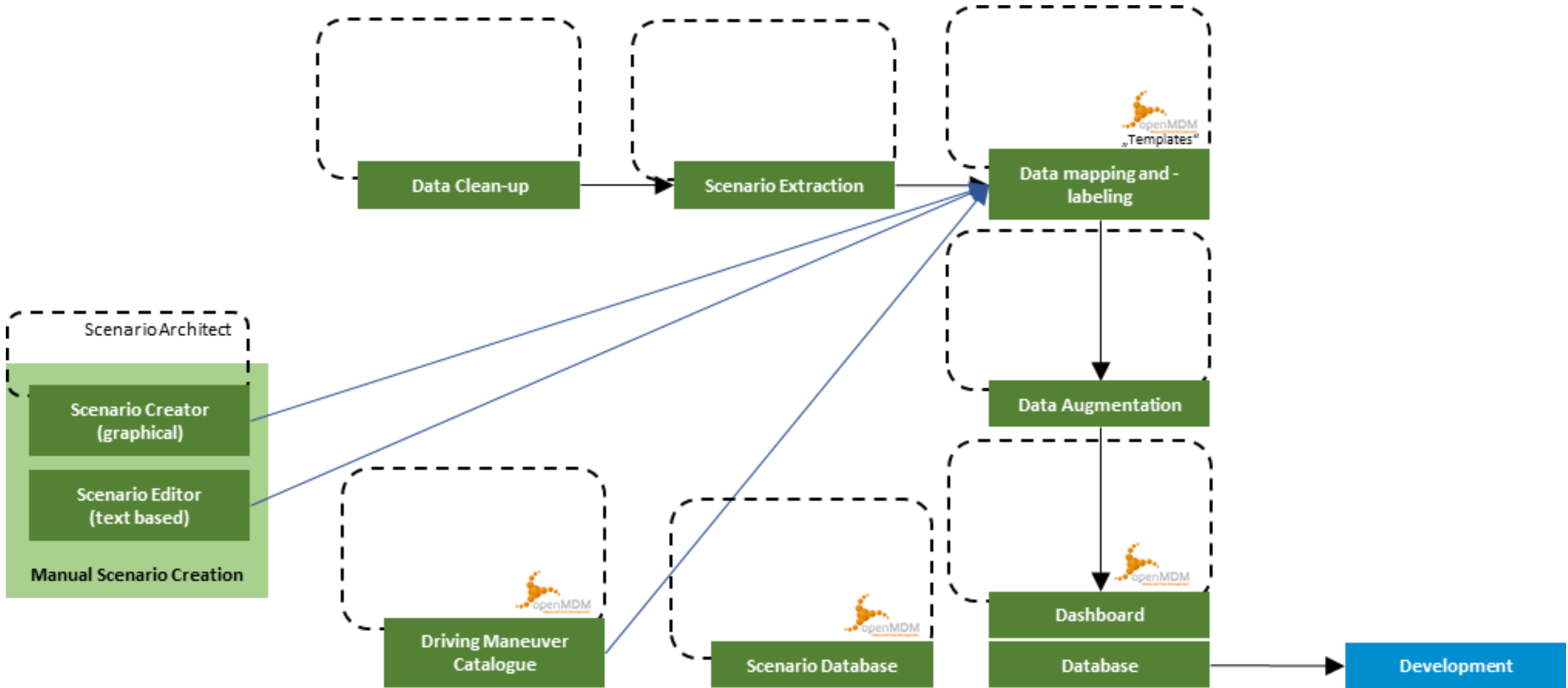
Use Case: Leverage OpenADx to develop end-to-end solutions (with the community)



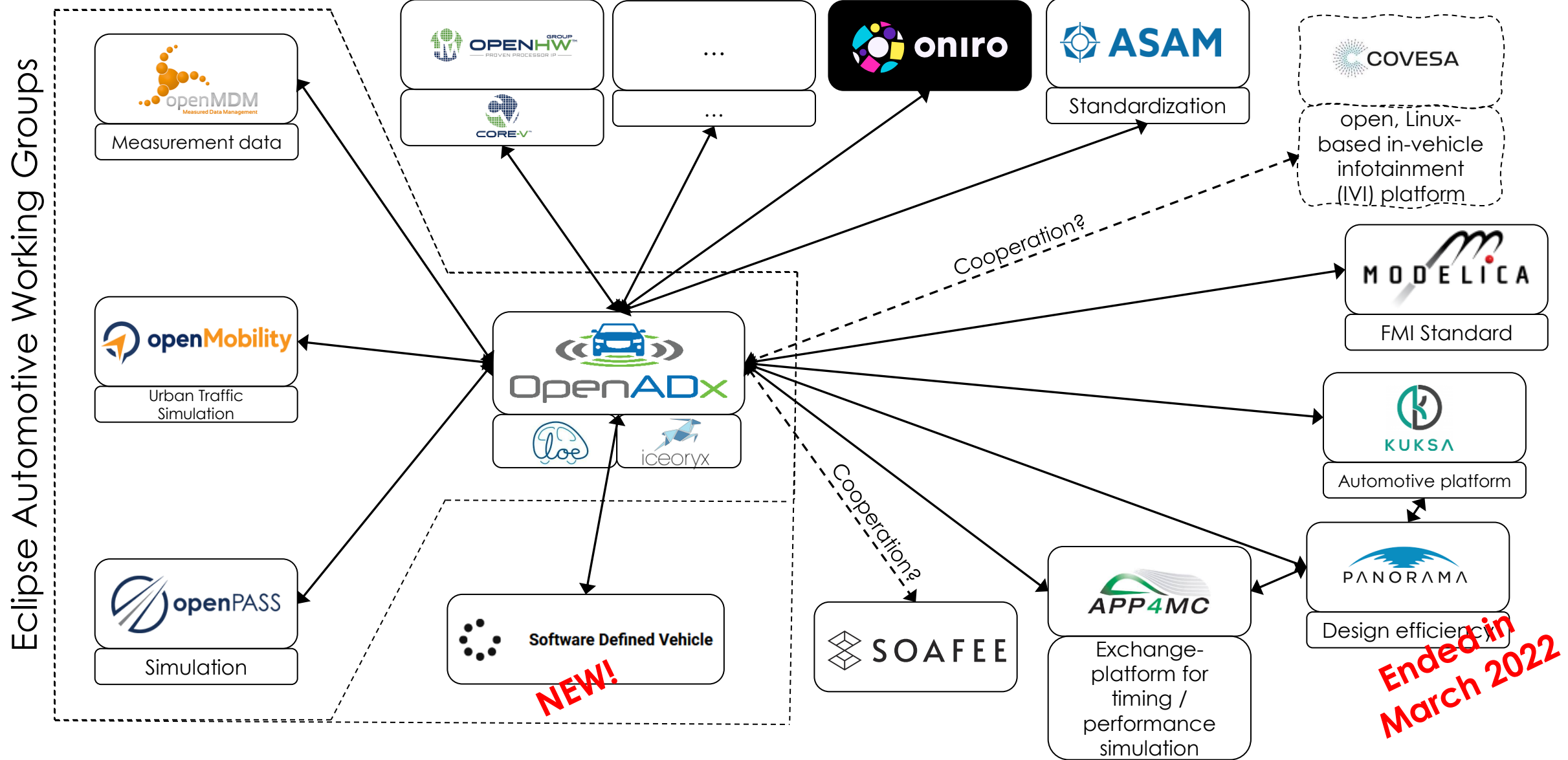
OpenADx – Big Picture – Draft



OpenADx – Big Picture – Draft



OpenADx lays the foundation for safety and standardization



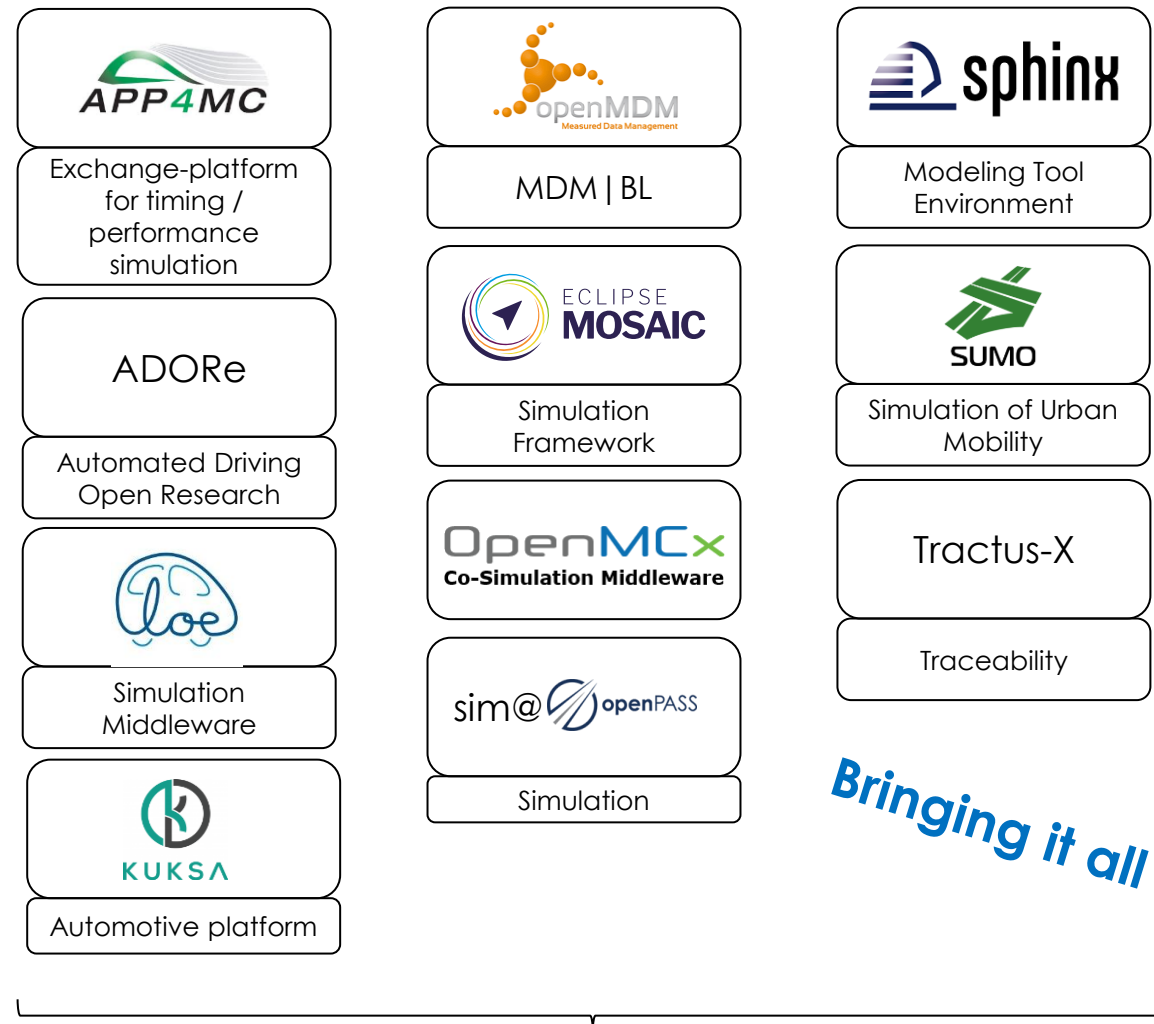
Ended in March 2022

Eclipse Automotive

eclipse AUTOMOTIVE



Eclipse Automotive Working Groups

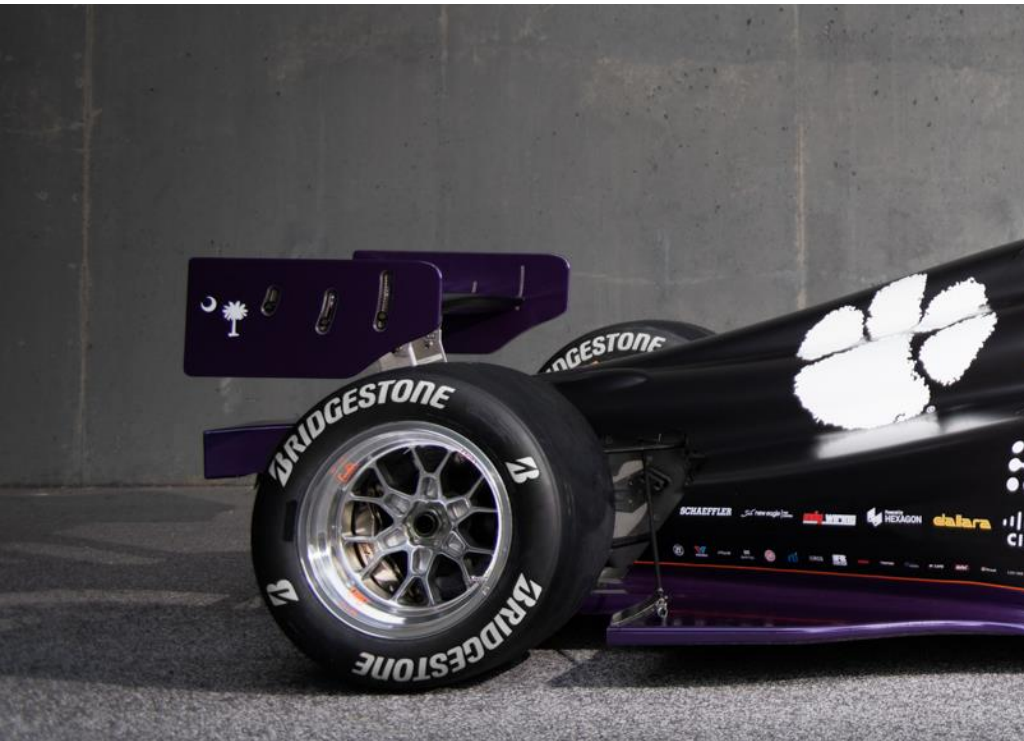


Eclipse Automotive Projects

Bringing it all together

OpenADx in action

Autonomy at 180 mph



<https://cuicardeeporange.com/project/deep-orange-12/>

<https://www.indyautonomouschallenge.com/>

IAC Broadcast

OpenADx in action



OpenADx – Outlook

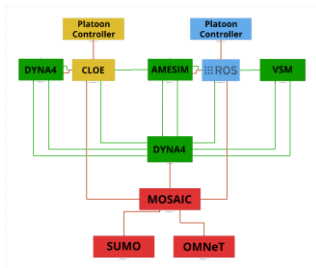
Eclipse OpenADx Working Group

PROGRAM PLAN 2022

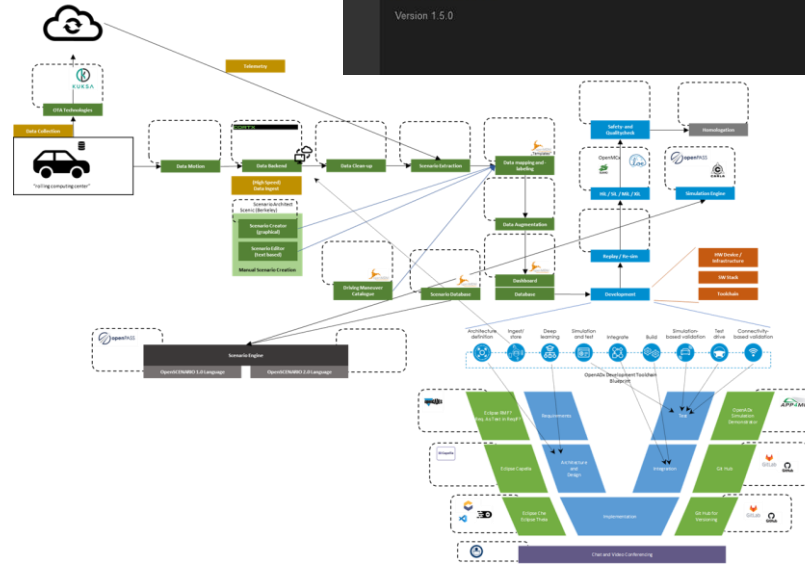
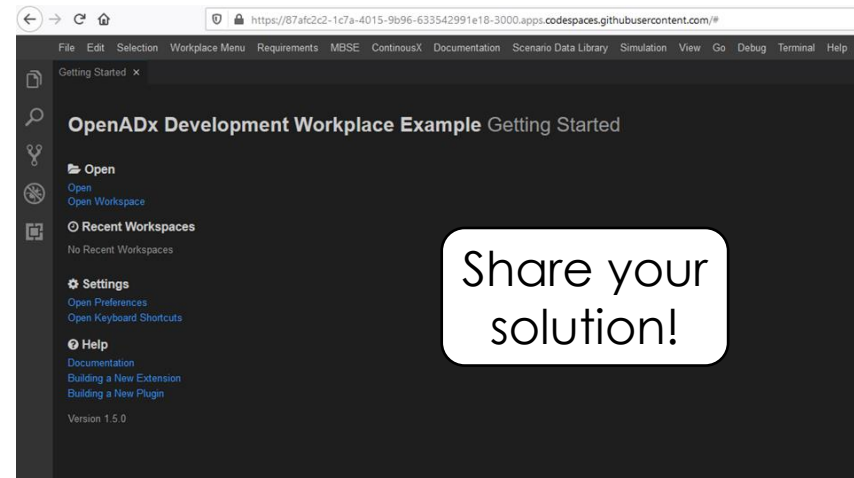


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OpenADx Demonstrator



OpenADx Development Workplace



Summary

› **Open source software...**

- › Is gaining traction in the automotive industry
- › Minimizes dependency on suppliers
- › Increases quality through broad testing reviews, skilled attention, broad expertise
- › Enables risk sharing and cost reduction
- › Will be essential to the success of partnerships and consortia

The future of mobility will be software defined!

Open Technologies and Open Source helps to Collaborate in a Changing Automotive Market!

I invite you!

Useful Links

- › OpenADx
 - › Whitepaper: <https://openadx.eclipse.org/resources/OpenADx-Manifesto-v07-2020.pdf>
 - › Website: <https://openadx.eclipse.org/>
 - › Wiki: <https://wiki.eclipse.org/OpenADx>
 - › Mailing List: <https://accounts.eclipse.org/mailling-list/openadx>
 - › OpenADx in Blogs: <https://blog.bosch-si.com/developer/5-things-you-should-know-about-openadx>
 - › Eclipse iceoryx
 - <https://github.com/eclipse-iceoryx/iceoryx>
 - <https://projects.eclipse.org/projects/technology.iceoryx>
 - › Eclipse Cloe:
 - <https://github.com/eclipse/cloe>
 - <https://projects.eclipse.org/projects/automotive.cloe>
 - › Eclipse OpenMCX: <https://projects.eclipse.org/projects/automotive.openmcx>
 - › Eclipse APP4MC: <https://www.eclipse.org/app4mc/>
 - › Eclipse Cyclone DDS: <https://projects.eclipse.org/projects/iot.cyclonedds>
 - › Eclipse Zenoh: <http://zenoh.io/>
 - › Eclipse Kuksa: <https://www.eclipse.org/kuksa/>
 - › Panorama: <https://panorama-research.org/>
- › openMDM: <https://www.openmdm.org/>
- › openPASS: <https://wiki.eclipse.org/OpenPASS-WG>
- › openMobility: <https://openmobility.eclipse.org/>

White Papers

OpenADx Manifesto



DOWNLOAD

Thank you!

Andreas Riexinger

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<https://wiki.eclipse.org/OpenADx>

Find out more and join us

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