

# OpenADx – **x**celerate your **A**utonomous **D**riving development

# Open Source has arrived in automotive

THE AUTWARE FOUNDATION

Audi Electronics Venture

nucleus7  
nucleus7 library  
deep-learning  
Python

ncgenes7  
ncgenes7 library  
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

# CARIAD

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

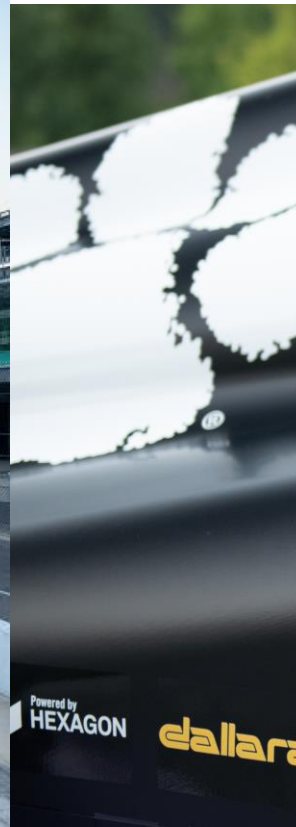
ch Mobility :form

innovate

open source mobility

... and competition

OpenADx in action – Autonomy at 180 mph



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

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



# The OpenADx community provides a platform which ...

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

### Reason Why

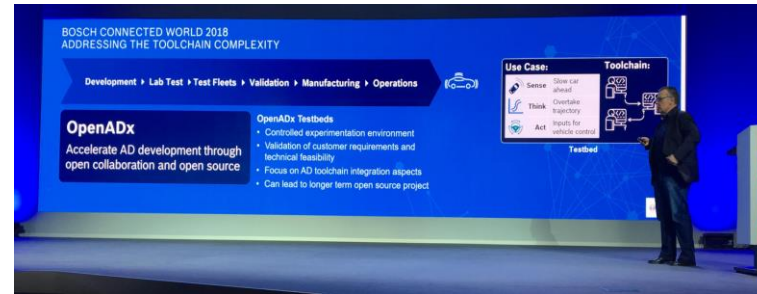
AD requires a multifaceted process incorporating a variety of software tools

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

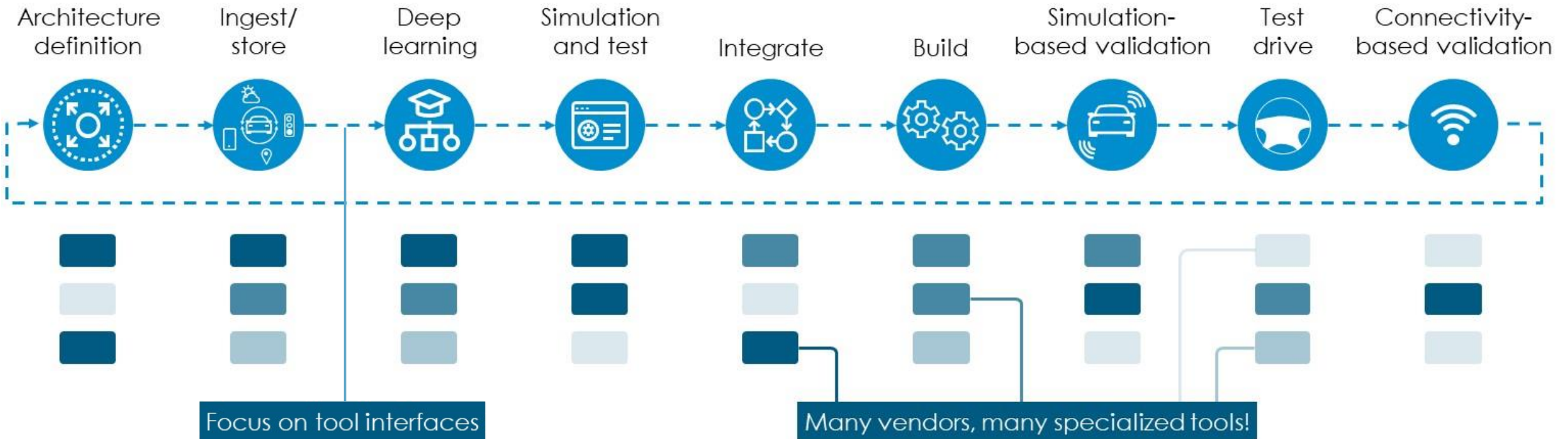


- ▶ Define Industry-wide AD toolchain
- ▶ Ensure high interoperability
- ▶ Provide easy access
- ▶ Establish basis for reference arch.



# OpenADx targets reference architecture and ...

a wide ranging interoperable toolchain for PoV\* and commercial applications



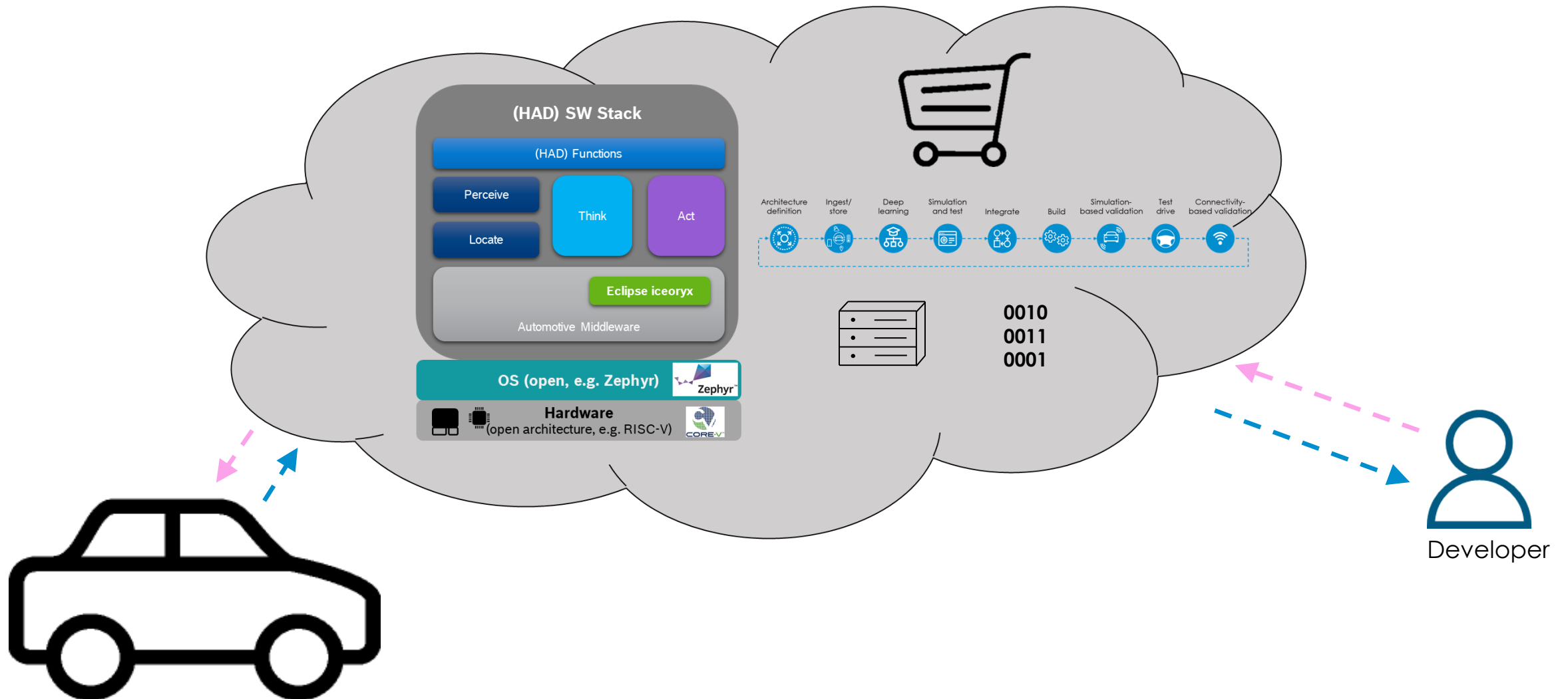
## GOALS

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

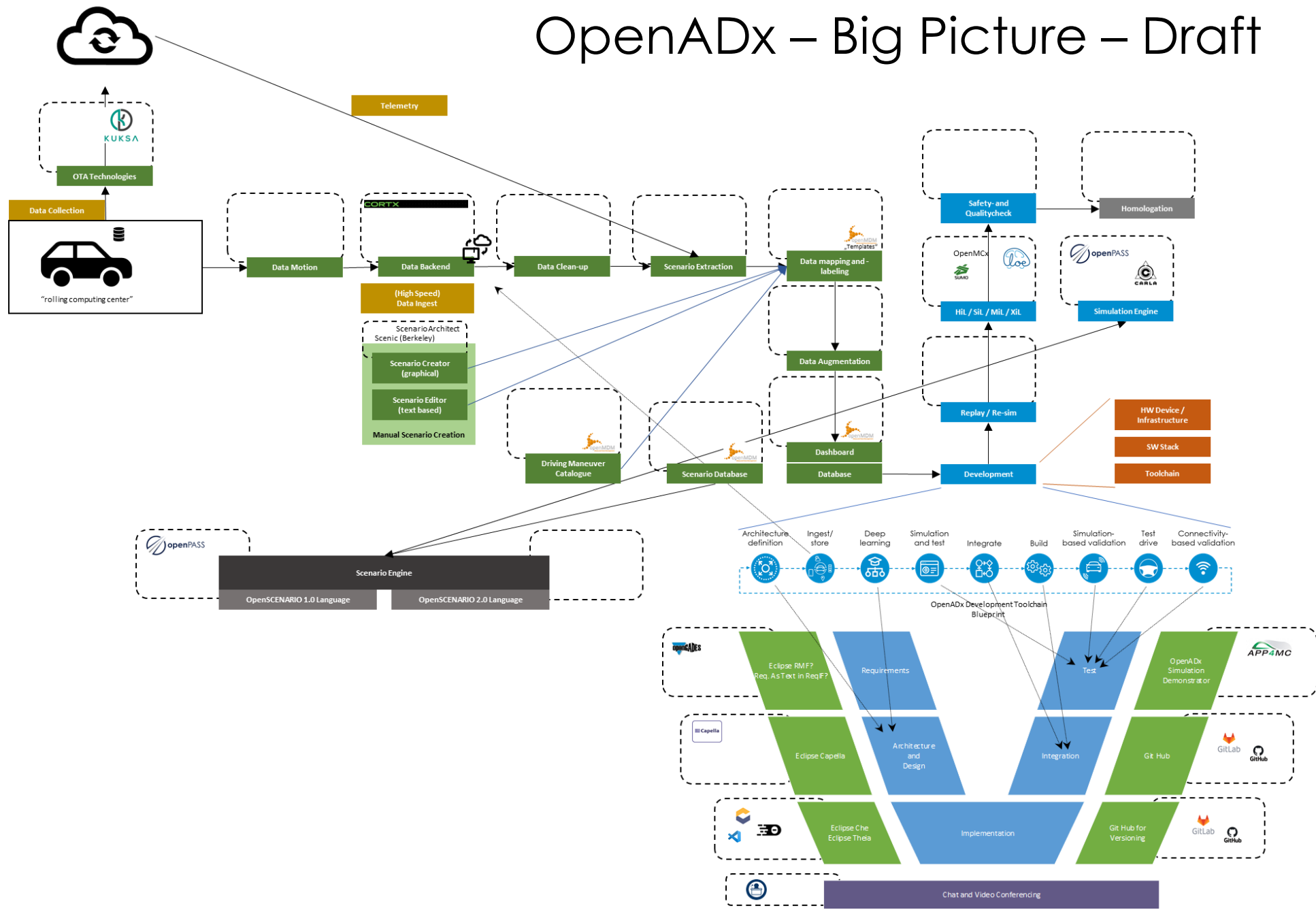
Make a complex tool landscape more accessible for enterprise users

# OpenADx: Leading to holistic functional approaches

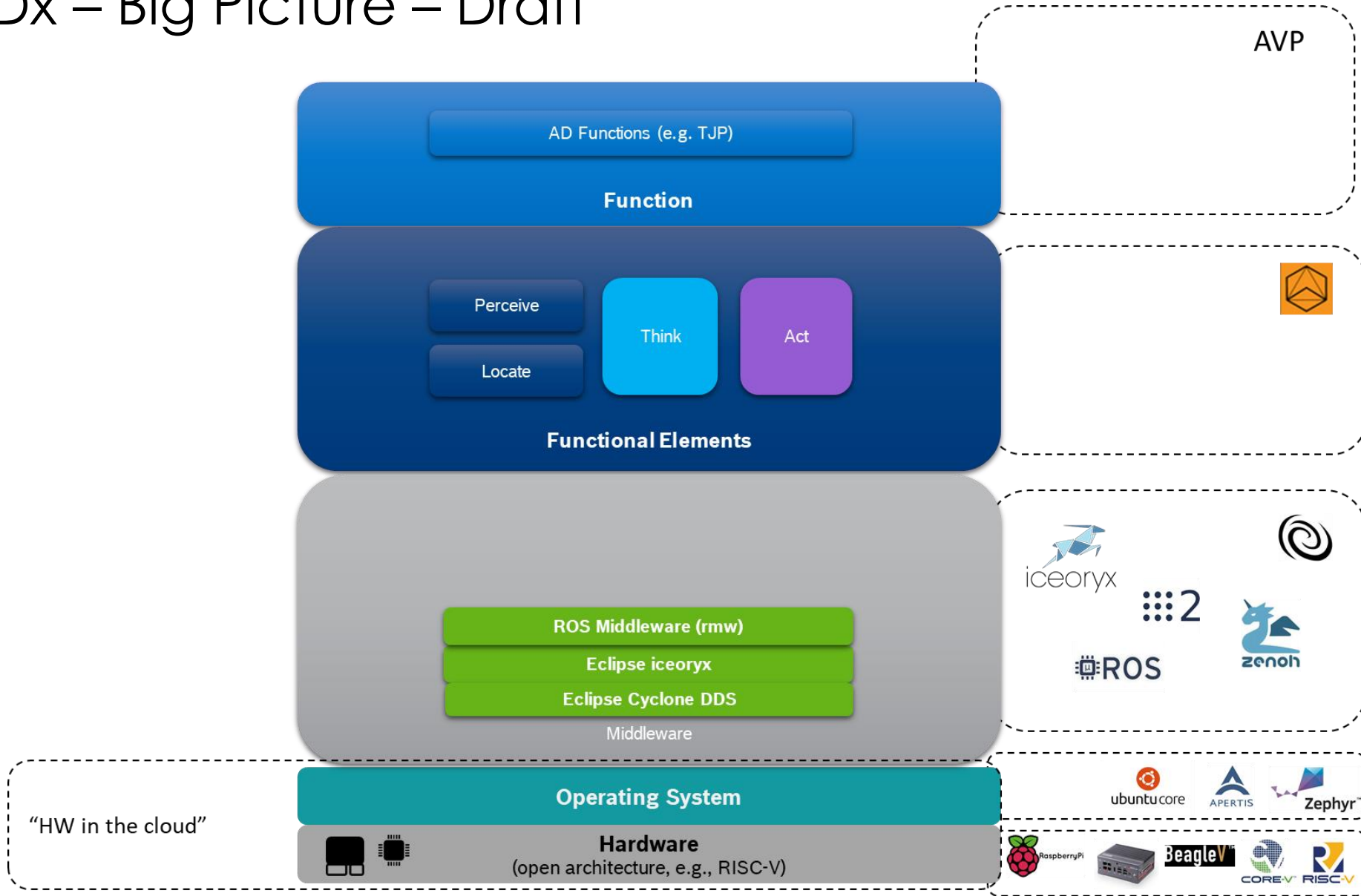
Use Case: Leverage OpenADx to develop end-to-end solutions (with the community)



# OpenADx – Big Picture – Draft

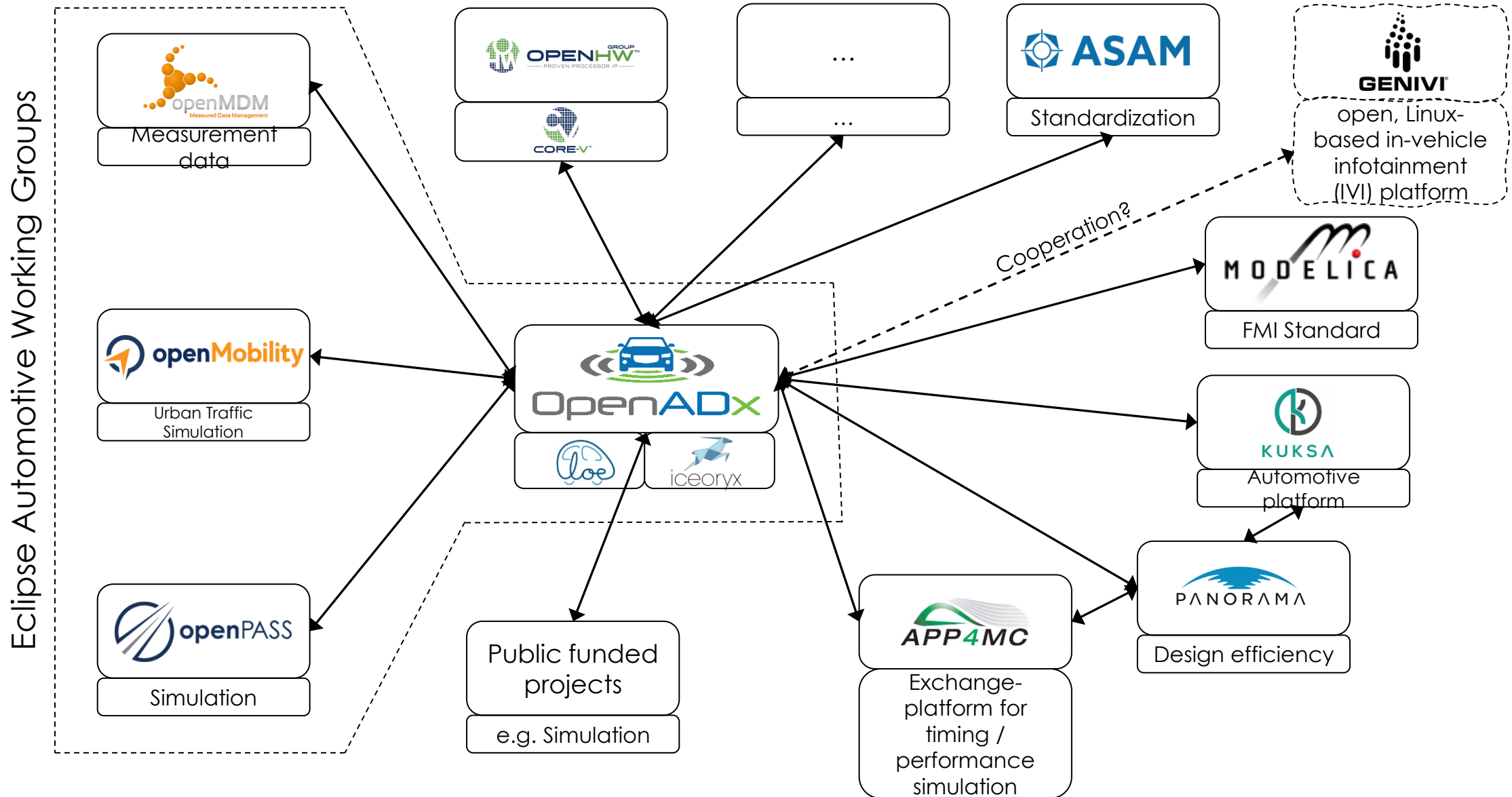


# OpenADx – Big Picture – Draft

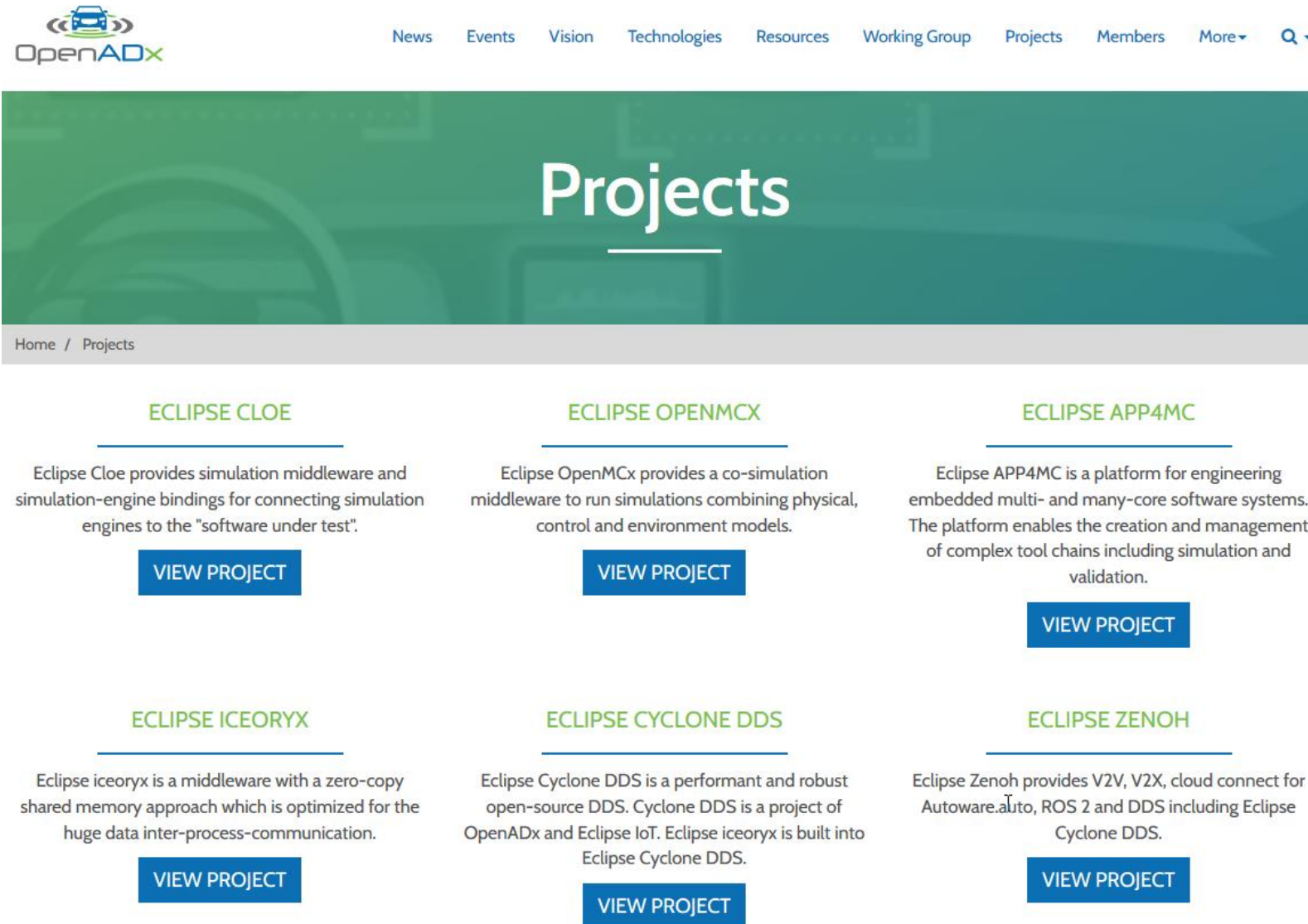




# OpenADx lays the foundation for safety and standardization



# OpenADx: hosted projects



The screenshot shows the OpenADx website's 'Projects' page. At the top, there is a navigation menu with links for News, Events, Vision, Technologies, Resources, Working Group, Projects, Members, and More. A search icon is also present. Below the navigation is a large green banner with the word 'Projects' in white. Underneath the banner is a breadcrumb trail: 'Home / Projects'. The main content area features six project cards arranged in a 2x3 grid. Each card has a title in green, a brief description, and a blue 'VIEW PROJECT' button.

OpenADx

News Events Vision Technologies Resources Working Group Projects Members More Q

## Projects

Home / Projects

### ECLIPSE CLOE

Eclipse Cloe provides simulation middleware and simulation-engine bindings for connecting simulation engines to the "software under test".

[VIEW PROJECT](#)

### ECLIPSE OPENMCX

Eclipse OpenMCx provides a co-simulation middleware to run simulations combining physical, control and environment models.

[VIEW PROJECT](#)

### ECLIPSE APP4MC

Eclipse APP4MC is a platform for engineering embedded multi- and many-core software systems. The platform enables the creation and management of complex tool chains including simulation and validation.

[VIEW PROJECT](#)

### ECLIPSE ICEORYX

Eclipse iceoryx is a middleware with a zero-copy shared memory approach which is optimized for the huge data inter-process-communication.

[VIEW PROJECT](#)

### ECLIPSE CYCLONE DDS

Eclipse Cyclone DDS is a performant and robust open-source DDS. Cyclone DDS is a project of OpenADx and Eclipse IoT. Eclipse iceoryx is built into Eclipse Cyclone DDS.

[VIEW PROJECT](#)

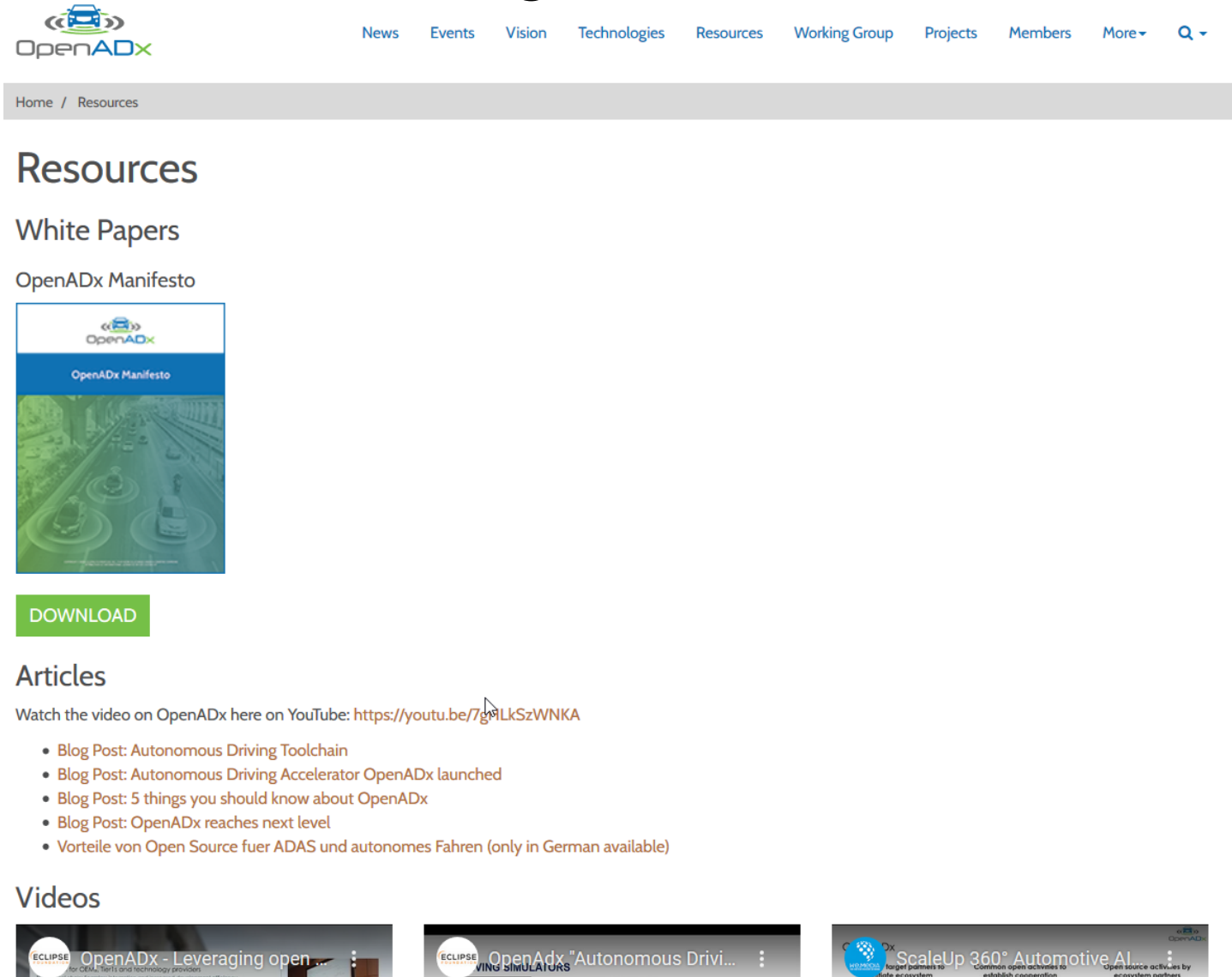
### ECLIPSE ZENOH

Eclipse Zenoh provides V2V, V2X, cloud connect for Autware.auto, ROS 2 and DDS including Eclipse Cyclone DDS.

[VIEW PROJECT](#)

# OpenADx – THE Portal for Autonomous Driving

- › OpenADx targets realization of open solutions
  - › Eclipse-based open projects
  
- › The [OpenADx AD Portal](https://openadx.eclipse.org/) is focused primarily on Autonomous Driving:
  - › Toolchain proposals
  - › Cookbooks
  - › HowTos
  - › ...
  
- › But non-proprietary solutions and initiatives can come from anywhere



The screenshot shows the OpenADx website's 'Resources' page. At the top, there is a navigation menu with links for News, Events, Vision, Technologies, Resources, Working Group, Projects, Members, and a search icon. Below the navigation is a breadcrumb trail: Home / Resources. The main heading is 'Resources', followed by 'White Papers' and 'OpenADx Manifesto'. A thumbnail for the 'OpenADx Manifesto' is displayed, featuring a green-tinted image of a road with cars and sensor waves. Below the thumbnail is a green 'DOWNLOAD' button. Underneath is an 'Articles' section with a video link: 'Watch the video on OpenADx here on YouTube: <https://youtu.be/7g4iLkSzWNKA>'. A list of five blog posts follows, including 'Blog Post: Autonomous Driving Toolchain', 'Blog Post: Autonomous Driving Accelerator OpenADx launched', 'Blog Post: 5 things you should know about OpenADx', 'Blog Post: OpenADx reaches next level', and 'Vorteile von Open Source fuer ADAS und autonomes Fahren (only in German available)'. At the bottom, there is a 'Videos' section with three video thumbnails: 'OpenADx - Leveraging open...', 'OpenADx "Autonomous Drivi...', and 'ScaleUp 360° Automotive AI...'. The thumbnails contain text about OEMs, technology providers, and ecosystem partners.

<https://openadx.eclipse.org/>

# OpenADx – Outlook

Eclipse OpenADx Working Group



## PROGRAM PLAN 2021

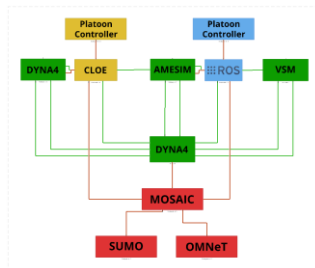


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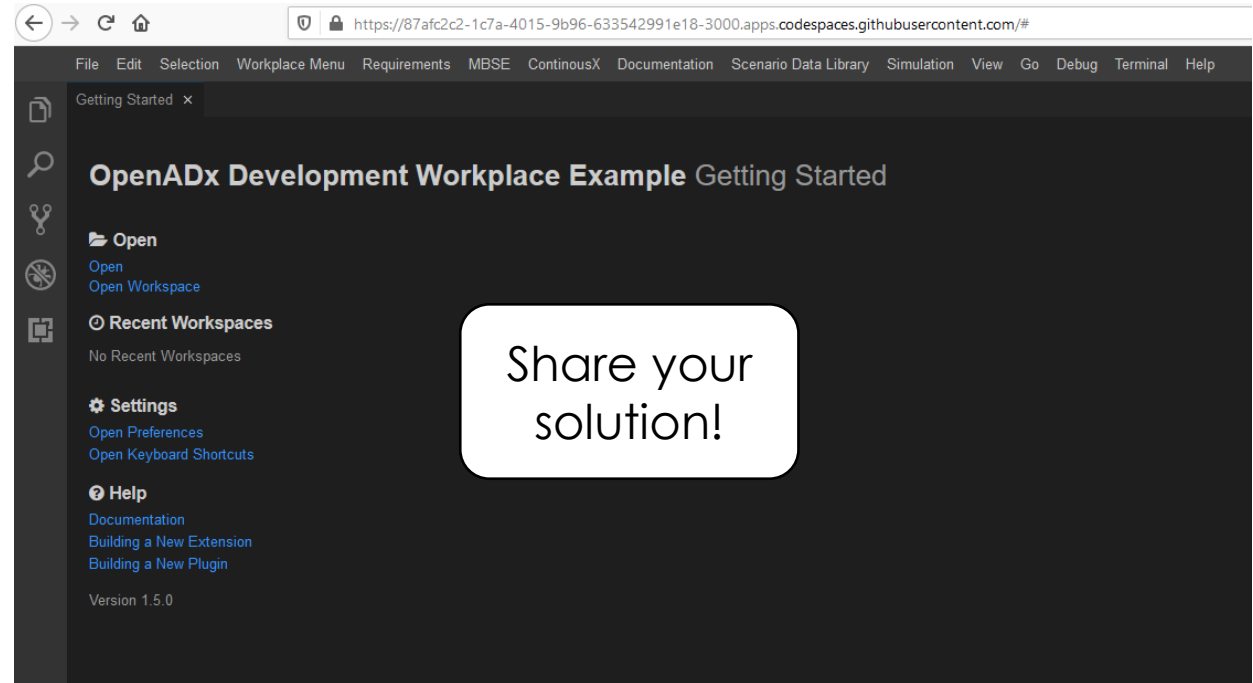
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## Demonstrator



## Development Workplace

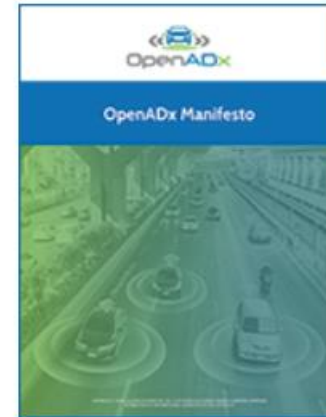


# Useful Links

- › 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!

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**Find out more and join us**

<https://openadx.eclipse.org/>

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