openMDM in an Automotive Open Source Ecosystem

openMDM Annual Summit 2022
May 24th 2022

This presentation is published under the EPL 2.0 license
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

**FEP – Functional Engineering Platform**

launched to face the upcoming complexity in function development, considering all relevant aspects in simulation (MiL, SiL, HiL) and testing.
Autonomous driving accelerator “OpenADx” launched

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.

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.

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**

Target

➢ 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

"Many vendors, many specialized tools!"

Focus on tool interfaces

Make a complex tool landscape more accessible for enterprise users

*PoV – privately owned vehicle
OpenADx: Leading to holistic functional approaches

Use Case: Leverage OpenADx to develop end-to-end solutions (with the community)
OpenADx – Big Picture – Draft

[Diagram showing various processes and components related to automated driving development, with labels for data collection, data cleaning, data integration, and other stages involving tools and technologies.]
OpenADx lays the foundation for safety and standardization

- **OpenMDM**
  - Measurement data

- **openMobility**
  - Urban Traffic Simulation

- **openPASS**
  - Simulation

- **OpenADx**
  - Software Defined Vehicle

- **ASAM**
  - Standardization

- **COVESA**
  - open, Linux-based in-vehicle infotainment (IVI) platform

- **FMI Standard**
  - Modeling / simulation

- **MODELICA**
  - Automotive platform

- **KUKSA**
  - Automotive platform

- **PANORAMA**
  - Design efficiency

- **APP4MC**
  - Exchange-platform for timing / performance simulation

- **SOAFEE**
  - Exchange-platform for timing / performance simulation

- **Eclipse Automotive Working Groups**
  - Measurement data
  - Urban Traffic Simulation
  - Simulation

NEW!

Ended in March 2022
Eclipse Automotive

Eclipse Automotive Working Groups
- openMDM: Measurement data
- openMobility: Urban Traffic Simulation
- openPASS: Simulation
- OpenADx: Toolchain and Middleware
- Software Defined Vehicle

Eclipse Automotive Projects
- APP4MC: Exchange-platform for timing/performance simulation
- ADORe: Automated Driving Open Research
- OpenMCx: Co-Simulation Middleware
- sim@openPASS: Simulation
- KUKSA: Automotive platform

Eclipse Automotive Projects
- openMDM: MDM | BL
- ECLIPSE MOSAIC: Simulation Framework
- SUMO: Simulation of Urban Mobility
- Tractus-X: Traceability

Bringing it all together
OpenADx in action

Autonomy at 180 mph

https://cuicardeeprange.com/project/deep-orange-12/
https://www.indyautonomouschallenge.com/
IAC Broadcast
OpenADx in action
OpenADx – Outlook

Eclipse OpenADx Working Group

PROGRAM PLAN 2022

OpenADx

Demonstrator

Share your solution!

Development Workplace

What else? ... let us know!
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
  - Website: [https://openadx.eclipse.org/](https://openadx.eclipse.org/)
  - Wiki: [https://wiki.eclipse.org/OpenADx](https://wiki.eclipse.org/OpenADx)
  - Mailing List: [https://accounts.eclipse.org/mailing-list/openadx](https://accounts.eclipse.org/mailing-list/openadx)
  - OpenADx in Blogs: [https://blog.bosch-si.com/developer/5-things-you-should-know-about-openadx](https://blog.bosch-si.com/developer/5-things-you-should-know-about-openadx)
- Eclipse icoryx
  - [https://github.com/eclipse-icoryx/icoryx](https://github.com/eclipse-icoryx/icoryx)
  - [https://projects.eclipse.org/projects/technology.icoryx](https://projects.eclipse.org/projects/technology.icoryx)
- Eclipse Cloe:
  - [https://github.com/eclipse/cloe](https://github.com/eclipse/cloe)
  - [https://projects.eclipse.org/projects/automotive.cloe](https://projects.eclipse.org/projects/automotive.cloe)
- Eclipse OpenMCX: [https://projects.eclipse.org/projects/automotive.openmcx](https://projects.eclipse.org/projects/automotive.openmcx)
- Eclipse APP4MC: [https://www.eclipse.org/app4mc/](https://www.eclipse.org/app4mc/)
- Eclipse Cyclone DDS: [https://projects.eclipse.org/projects/iot.cyclonedds](https://projects.eclipse.org/projects/iot.cyclonedds)
- Eclipse Kuksa: [https://www.eclipse.org/kuksa/](https://www.eclipse.org/kuksa/)
- Panorama: [https://panorama-research.org/](https://panorama-research.org/)
- openMDM: [https://www.openmdm.org/](https://www.openmdm.org/)
- openPASS: [https://wiki.eclipse.org/OpenPASS-WG](https://wiki.eclipse.org/OpenPASS-WG)
- openMobility: [https://openmobility.eclipse.org/](https://openmobility.eclipse.org/)
Thank you!

Andreas Riexinger
Andreas.Riexinger@de.bosch.com

Find out more and join us
https://openadx.eclipse.org/
https://wiki.eclipse.org/OpenADx

https://wiki.eclipse.org/OpenADx