Eclipse Foundation & openADx Automotive Tools & Infrastructure

Mike Milinkovich
Executive Director
2018-04-13

The Eclipse Foundation

350+
Projects

275+
Corporate Members

1500+
Committers

30
Professional Staff
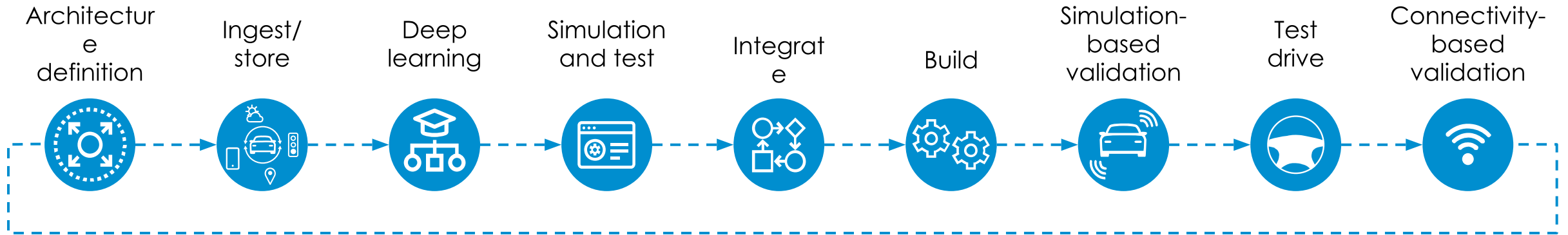
By the Numbers

Trust Across the Lifecycle

- Software provenance
  - What is actually running on your device
- Software safety
  - Knowing what the software will do
- Data provenance
  - We use data to teach our machine learning systems
  - Data poisoning

OpenADx

Focus: AD Toolchain

Architecture definition	Ingest/store	Deep learning	Simulation and test	Integrate	Build	Simulation-based validation	Test drive	Connectivity-based validation

GOAL

> › Industry-wide accepted definition of the AD toolchain
> › Foundation for reference architecture
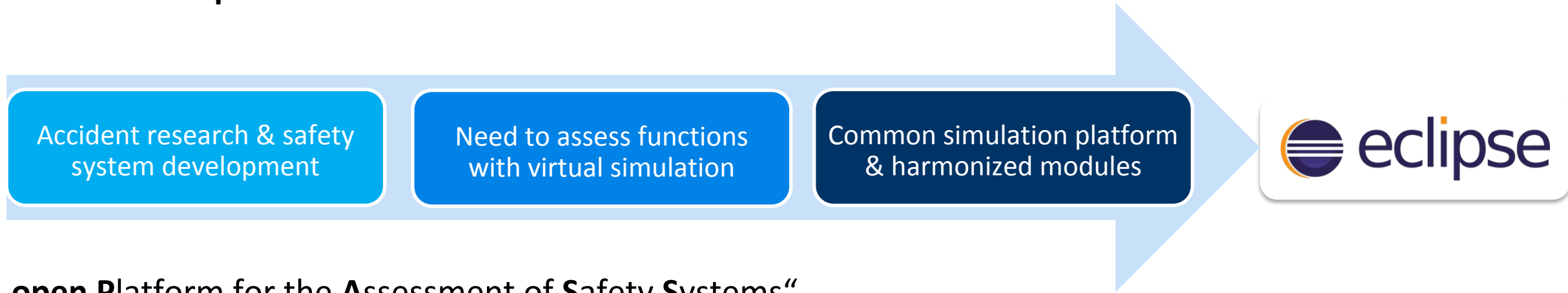> › Key to ensure efficient implementation and interoperability

Eclipse openPASS – an open source approach to safety impact assessment via simulation

Jan Dobberstein, Jörg Bakker (Daimler AG), Lei Wang, Timo Vogt (BMW AG), Michael Düring, Lukas Stark (Volkswagen AG), Jason Gainey (VW GoA), Alexander Prahl (ITK Engineering GmbH), Ralph Müller, Gaëlle Blondelle (Eclipse)

ESV Conference, Detroit, 08.06.2017

What is openPASS?

Accident research & safety system development → Need to assess functions with virtual simulation → Common simulation platform & harmonized modules → eclipse

„**open P**latform for the **A**ssessment of **S**afety **S**ystems"

"The openPASS Working group wants to foster and support an open and innovative eco-system providing tools, systems, and adapters for standardized, openly-available and vendor-neutral platform for simulation of traffic scenarios."

openPASS

Prospective evaluation of safety systems

Goal of prospective evaluation of safety systems – independent of methods, data and tools:

What are the effects of safety systems and automated driving functions with regard to safety?

- „True positives": reduction of **conflicts and accidents, reduction of accident severity**

- „False negatives": which accidents cannot be addressed / detected early enough?

- „False positives / true negatives": how to achieve high specificity e. g. by avoiding false positives?

openPASS aims to unify various virtual assessment approaches on **one platform**:

| **Accident re-simulation**	**Traffic simulation**	**Scenario variation**
+ only relevant situations	+ full scope of scenario	+ controllable variation
+ fewer models needed	+ arbitrary variation/runs	+ combine various models
- missing information	- traffic model validation	- harmonization efforts

Eclipse SUMO – what is it?

- DLR's open source microscopic transportation system simulation software

- Current version 0.30.0

- Under development since 2001, with the explicit goal to simulate even large cities / areas in real-time

- Current limitation: the city of Berlin

- SUMO comes with a full-fledged suite of helper programs that do setting up, running, and controlling such a simulation

- Most important of those tools is TraCI which allows to control a running SUMO simulation from outside via programs in various languages

- Active community with roughly 30,000 downloads annually, and about 1,000 requests on the mailing list.
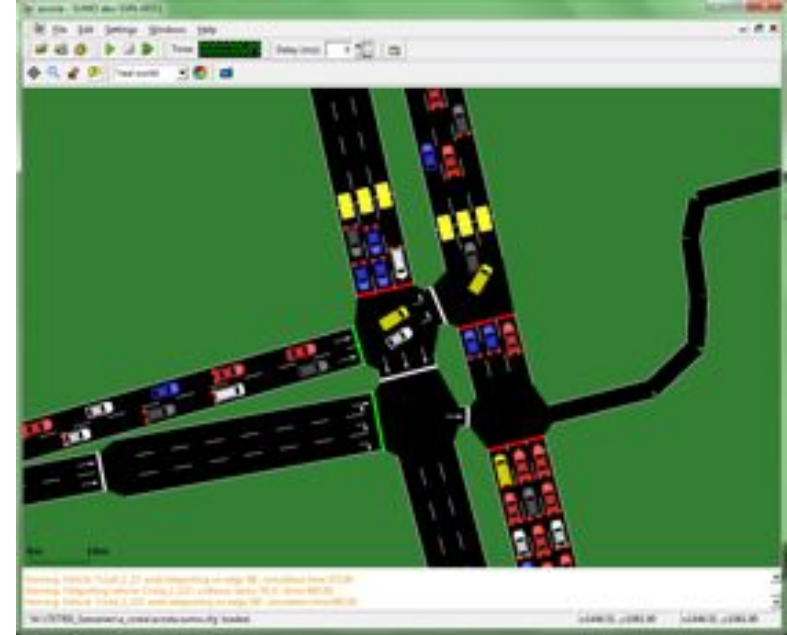
Eclipse SUMO – components
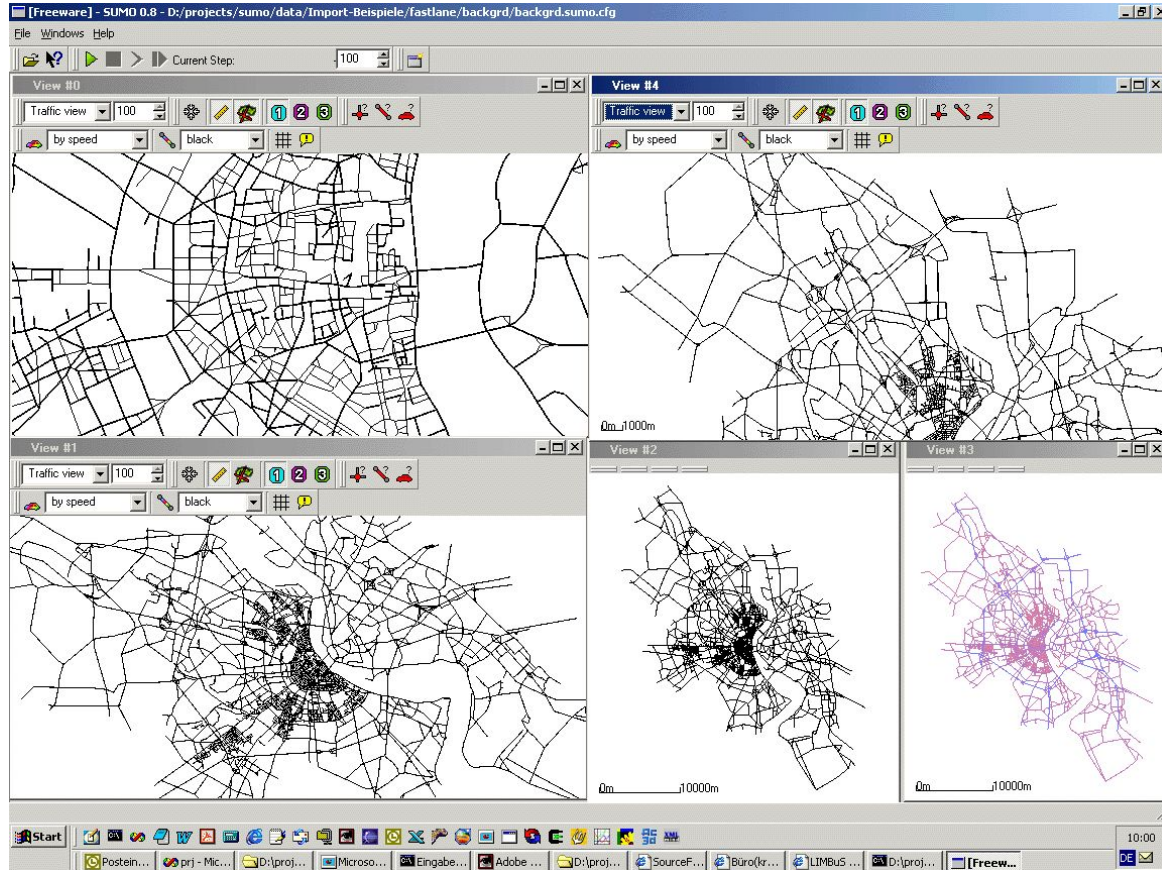
- SUMO: Simulation without graphical Interface
- SUMO-GUI: Simulation with graphical Interface
- NETCONVERT: Importer for road networks
- OD2TRIPS: Importer for O/D matrices
- JTRROUTER: Router based on junction turning percentages
- DUAROUTER: Router based on dynamic user assignment

Eclipse Kuksa
Open Source Connected Car Platform

- Establishment of **standardized vehicle IoT and Cloud interfaces** to and from the vehicle

- Eclipse-Che-based **App IDE** to simplify & speed-up development activities
  - Use & enhance Automotive Grade Linux (AGL) App development SDK
  - Full-blown IDE for **Kuksa-AGL App & Springboot Cloud App development**
  - Simplify the usage of automotive APIs integrated through IDE support

- Service enablers for **car-to-cloud connectivity**
  - Network infrastructure considerations
  - Next generation mobile networks

- Open source **in-vehicle platform**
  - Safe and secure gateway to the cloud
  - In-vehicle data access mechanism and application platform
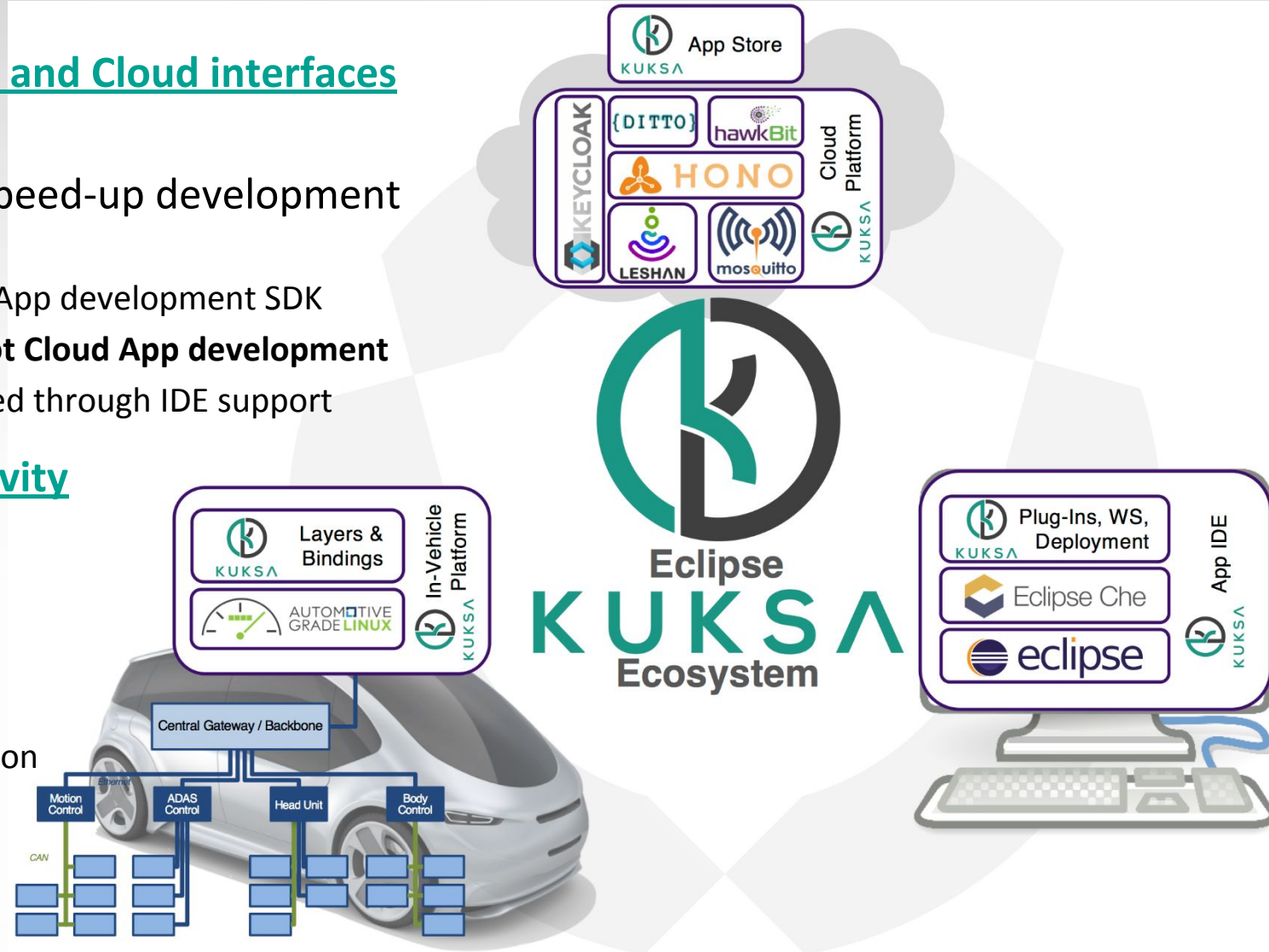
Automated driving is a complex challenge

› AD requires a multifaceted development process incorporating a variety of software tools

› But none of these tools were ever designed to work together

› This costs us all time and money

› We oppose this by creating the leading automated driving ecosystem ➢ OpenADx

› Thereby, we leverage open collaboration and open source to
  • Accelerate time to market
  • Increase efficiency
  • Focus on customers

OpenADx
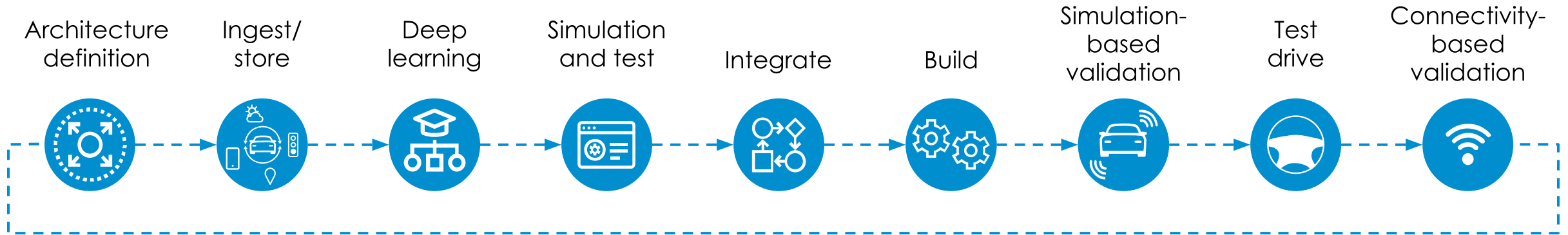# Beneficial for OEMs, Tier1s and technology providers
The AD tool chain: Seamless integration and increased development efficiency
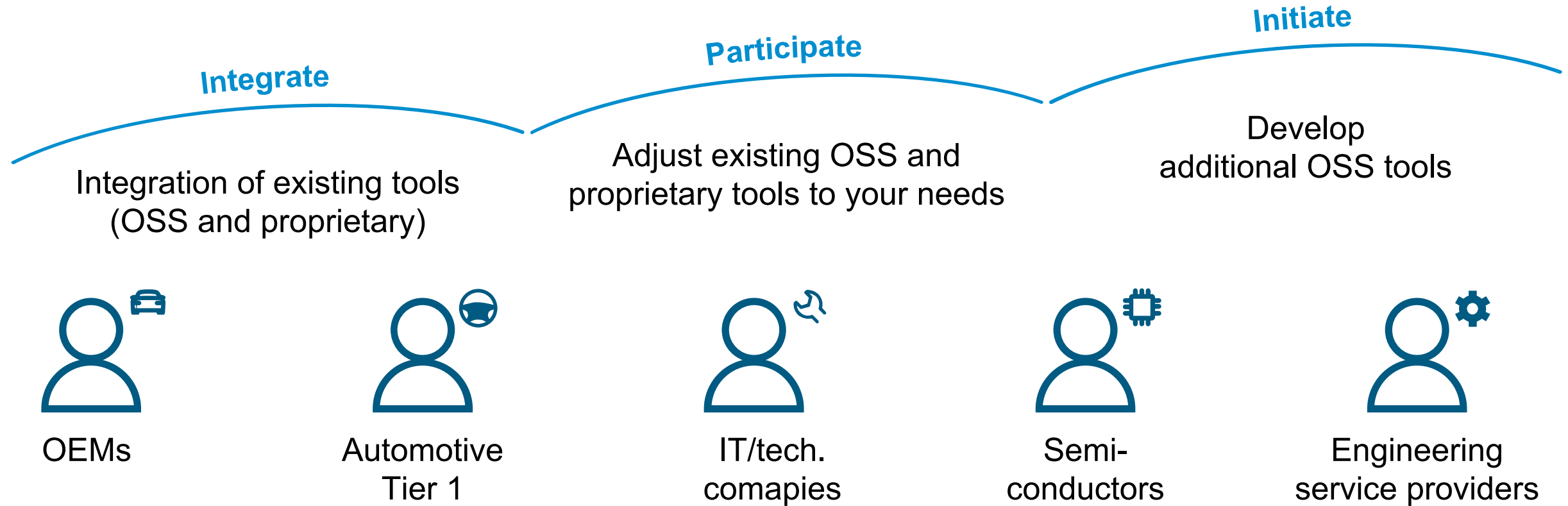
Initiate

Participate

Integrate

Integration of existing tools
(OSS and proprietary)

Adjust existing OSS and
proprietary tools to your needs

Develop
additional OSS tools

OEMs

Automotive
Tier 1

IT/tech.
comapies

Semi-
conductors

Engineering
service providers

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Focus: AD Toolchain

Architecture definition	Ingest/ store	Deep learning	Simulation and test	Integrate	Build	Simulation-based validation	Test drive	Connectivity-based validation

GOAL

› Industry-wide accepted definition of the AD toolchain

› Foundation for reference architecture

› Key to ensure efficient implementation and interoperability

OpenADx

From testbed to open source and standardization

Testbeds

› Validation of solution blueprint, often combination of exiting products/technologies
› Small, loosely coupled ecosystem of partners who play well together
› Usually strong Go-To-Market focus (example: IIC Track & Trace, first customer in <12 months)
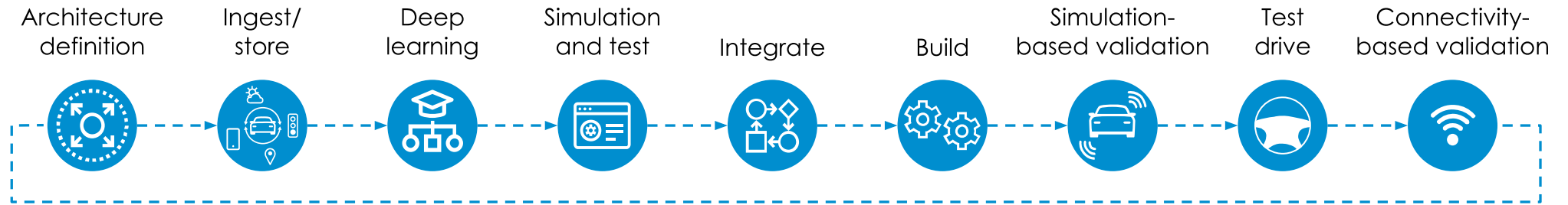
Open Source Project

› Result of a testbed can be a joint open source project
› Sometimes new solutions
› Sometimes the "glue" required to tie together existing solutions

Standardization

› Often focusing on the APIs developed in the OSS project
› Usually slower moving

OpenADx

Testbed/incubator portfolio

Architecture definition	Ingest/ store	Deep learning	Simulation and test	Integrate	Build	Simulation-based validation	Test drive	Connectivity-based validation

1 Focus on simulation

2 Focus on data
Capturing and management

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Timeline

Architecture definition → Ingest/store → Deep learning → Simulation and test → Integrate → Build → Simulation-based validation → Test drive → Connectivity-based validation

eclipsecon Europe 2017

>>IAA

Bosch CONNECTED WORLD
THE INTERNET OF THINGS CONFERENCE
BERLIN FEBRUARY 21-22
2018

Partner acquisition

Testbed

OpenADx in action at Bosch Connected Experience

Results

Demonstrator: DDS based simulation tool connector

Q2 '17   Q3   Q4   Q1 '18   Q2   Q3   Q4

Thank-you!

Thank you!

Find out more and join us

https://wiki.eclipse.org/OpenADx

Charles Degutis

Charles.Degutis@de.bosch.com
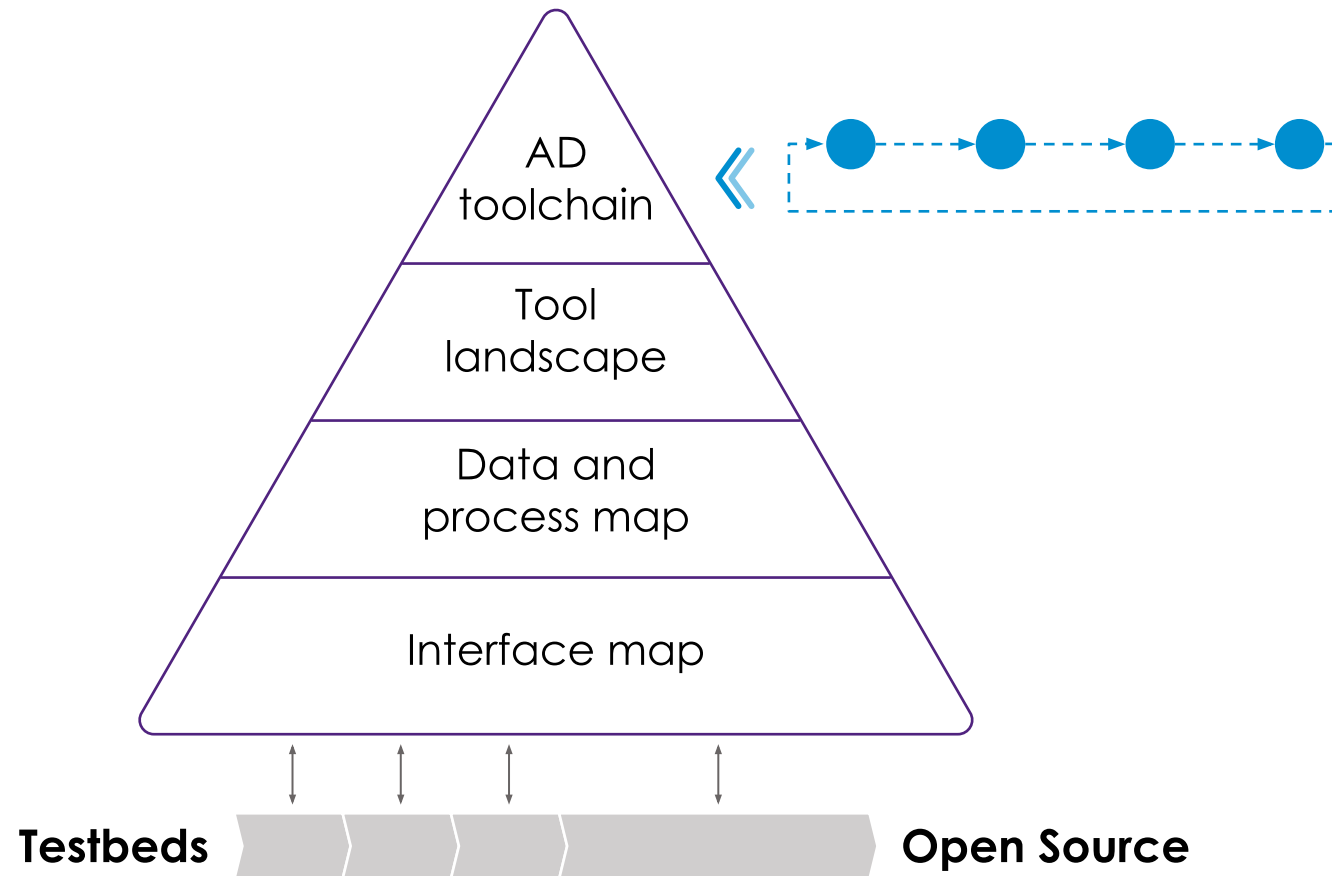
Andreas Riexinger

Andreas.Riexinger@de.bosch.com
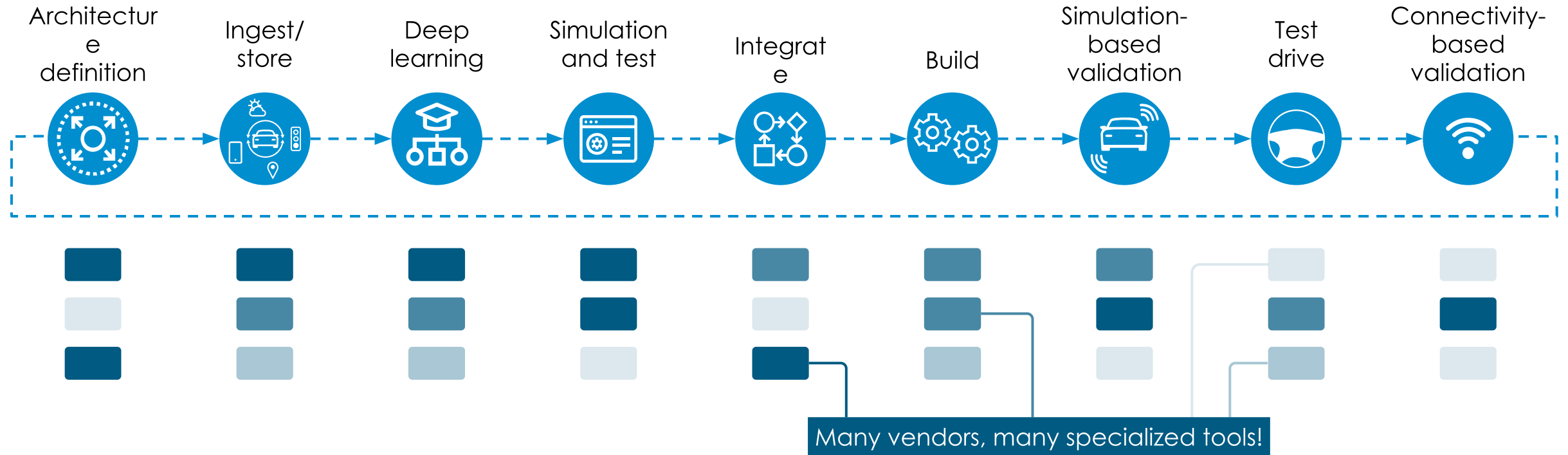
BACKUP

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Focus: AD Toolchain Framework

GOAL

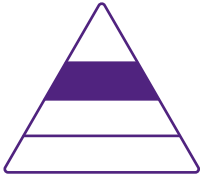Ensure interoperability and openness along the AD toolchain

AD toolchain

Tool landscape

Data and process map

Interface map

Testbeds

Open Source

OpenADx

Focus: Tool Landscape

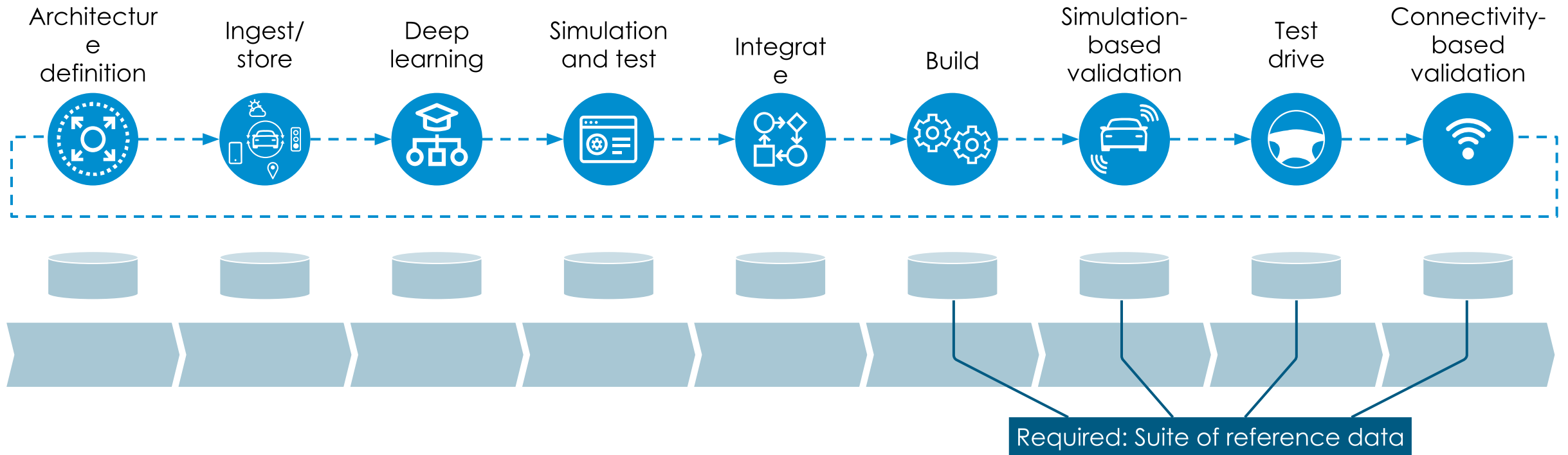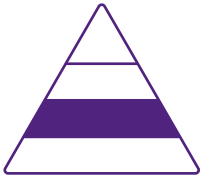| Architecture definition	Ingest/ store	Deep learning	Simulation and test	Integrate	Build	Simulation-based validation	Test drive	Connectivity-based validation

Many vendors, many specialized tools!

GOAL

› Ensure transparency and make complex tool landscape more easily accessible for enterprise users

OpenADx

Focus: Data and Process Map

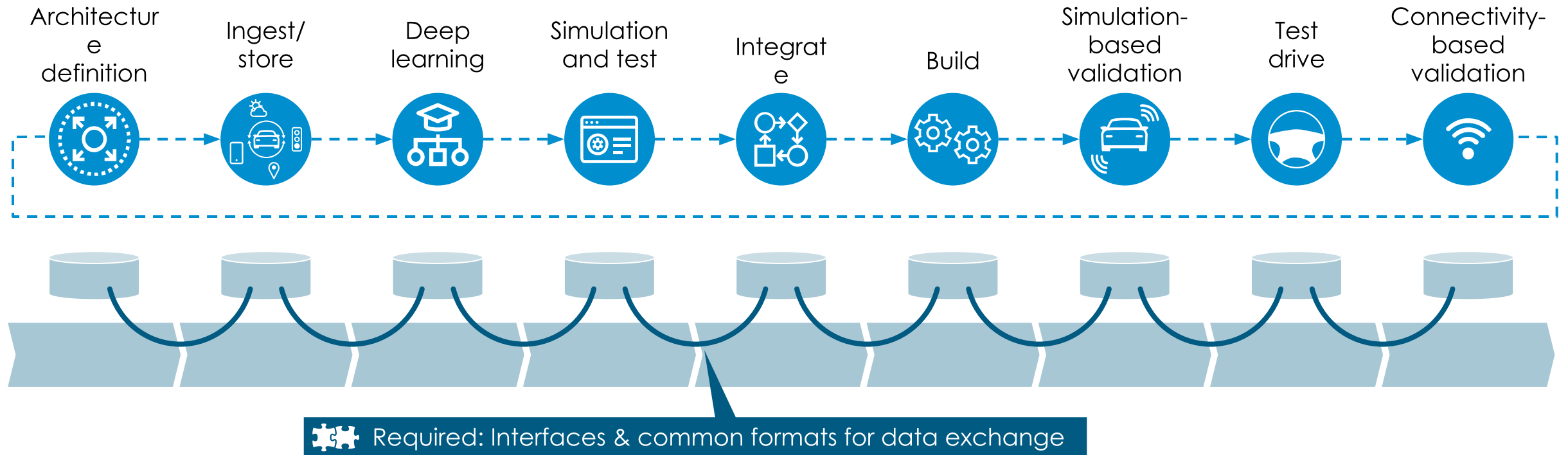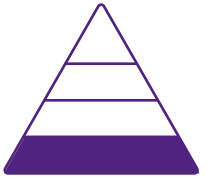| Architecture definition	Ingest/ store	Deep learning	Simulation and test	Integrate	Build	Simulation-based validation	Test drive	Connectivity-based validation

Required: Suite of reference data

GOAL	› Prepare for easy data exchange and process interoperability between different tools

OpenADx

Focus: Interface Map

Architecture definition — Ingest/store — Deep learning — Simulation and test — Integrate — Build — Simulation-based validation — Test drive — Connectivity-based validation

Required: Interfaces & common formats for data exchange

GOAL
› Enable easy data exchange and process interoperability between different tools

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Summary

AD toolchain

Tool landscape

Data and process map

Interface map

From testbeds to Open Source projects

Create transparency and common understanding

Interoperability through interface harmonization

Validation and open community