

Towards Software-Defined Vehicle Development

A Joint Webinar of AVL, Microsoft and ZF



Today's Speakers



Dr. Michael Steindl

Department Manager
Engineering Environment worldwide
AVL Software and Functions GmbH

- Responsible for embedded software tool chain and infrastructure
- 10+ years of experience in SOP software development including safety



Ricardo Gonzalez-Ramos

Senior Manager
Infrastructure Germany (DISYG)

- Responsible project manager for ZF DevOps Platform
- 19 years of experience in software development for embedded functions



Dr. Daniel Lueddecke

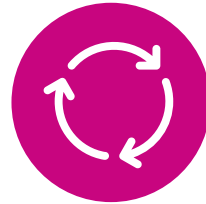
Senior SDV Ecosystem Manager
Microsoft

- Shaping Microsoft's efforts in the Software-defined Vehicle Ecosystem
- 12+ years automotive industry experience

Webinar Series on Software-defined Vehicles



Development



Testing and
Validation

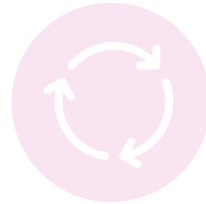


Operations

Webinar Series on Software-defined Vehicles



Development



Testing and
Validation



Operations

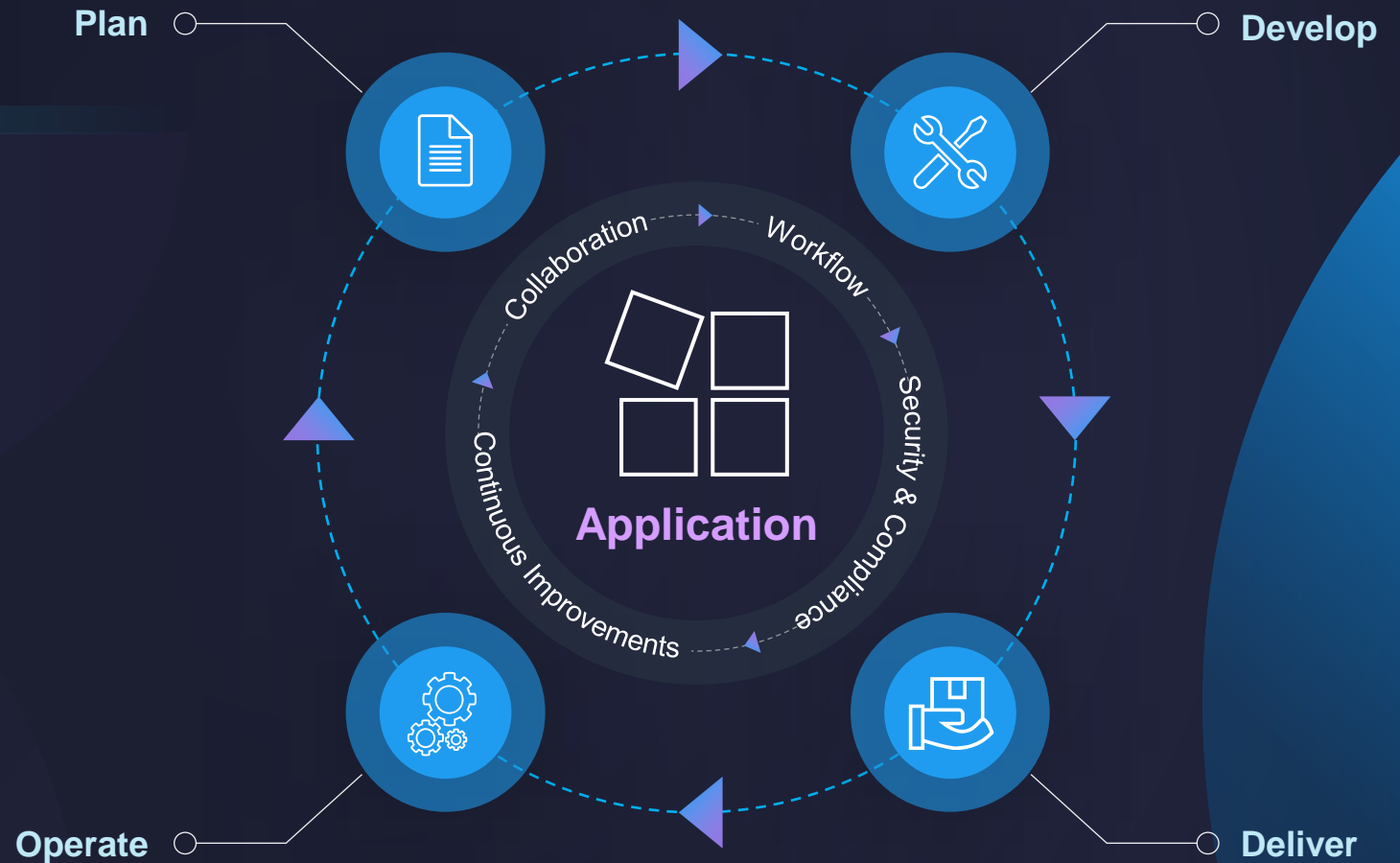
Today's Agenda

- 1 What are the biggest challenges when developing software-defined vehicles?**
- 2 What are central elements to overcome these challenges?**
- 3 How can virtualization and automation help?**
- 4 Are there tools for developing SDVs and are they interoperable?**

What is DevOps?

Development + Operations

DevOps is the union of *people, processes, and technologies* to deliver continuous value to users.



DevOps accelerates business

4x

higher revenue
growth for
organizations that
have widely adopted
DevOps¹

¹ McKinsey Developer Velocity Research

Becoming cloud-centric

Microsoft's Developer Velocity evolution



1990's

We ship software every few years on CDs



Today

We ship software **every few weeks with the cloud**

The result: **Increased agility to deliver innovations more frequently with high quality, secure products**

DevOps across Microsoft 2022

Visit aka.ms/DevOps-Stories to learn more



6.5M
Releases in Aug, 2022

5.5M
Git commits per month

2.2M
Work items created per month

185K
Monthly Engaged Users (MEU)

457k
Pull Requests completed per month

27k+
Repos: GitHub and Azure Repos

15.4M
Builds per month

Internal Microsoft Engineering System Activity, September 22, 2022

Today's Agenda

1 What are the biggest challenges when developing software-defined vehicles?

2 What are central elements to overcome these challenges?

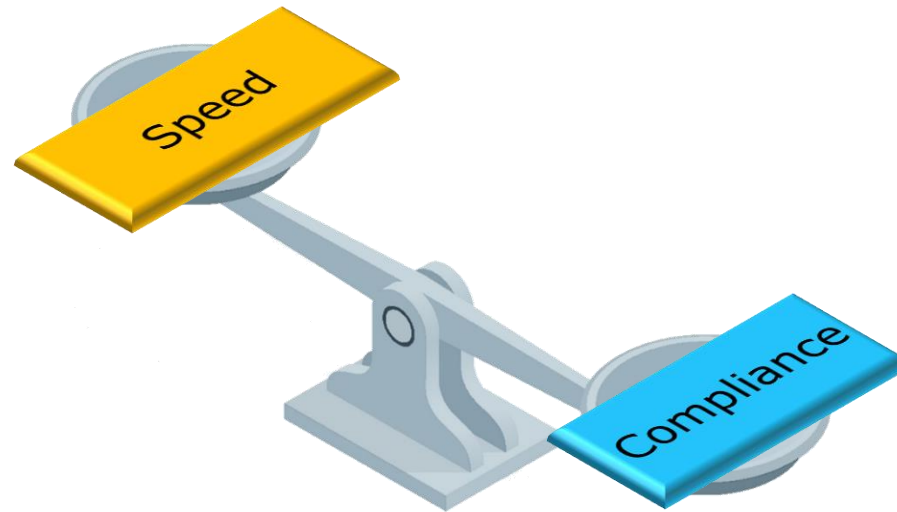
3 How can virtualization and automation help?

4 Are there tools for developing SDVs and are they interoperable?

Software Development Challenges

➤ **Short development cycles**

➤ **Incomplete requirements**



➤ **Automotive SPICE**

➤ **Safety ISO 26262**

➤ **Security ISO 21434**

Today's Agenda

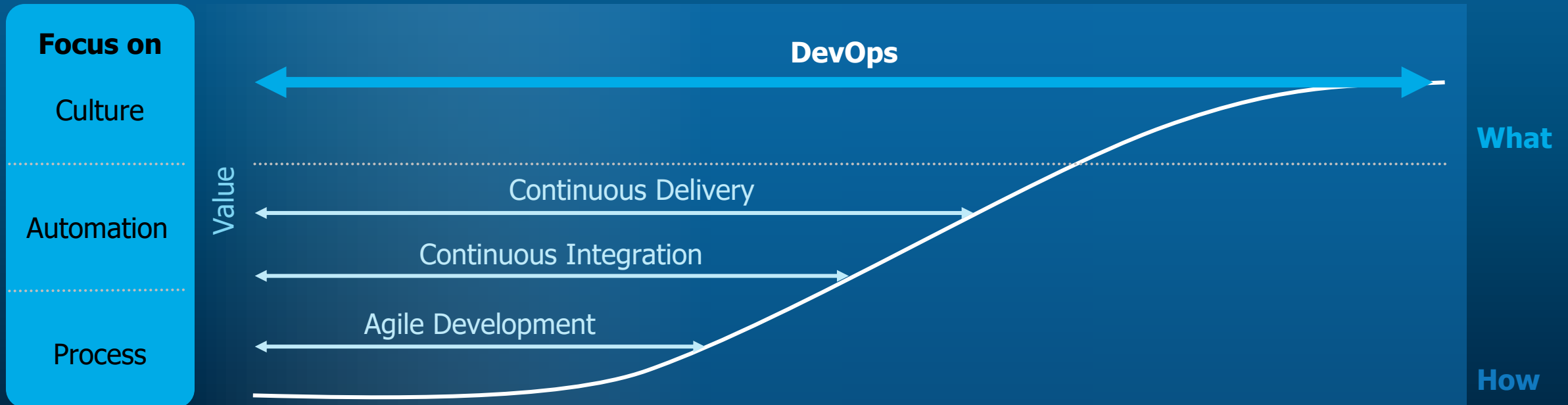
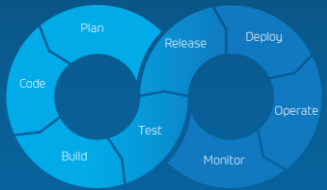
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DevOps Extends the Agile Journey with CI and CD as Intermediate Steps



"DevOps is the union of people, process, and products to enable continuous delivery of value to our end users."

Donovan Brown, Principal DevOps Manager - Microsoft

Today's Agenda

1 What are the biggest challenges when developing software-defined vehicles?

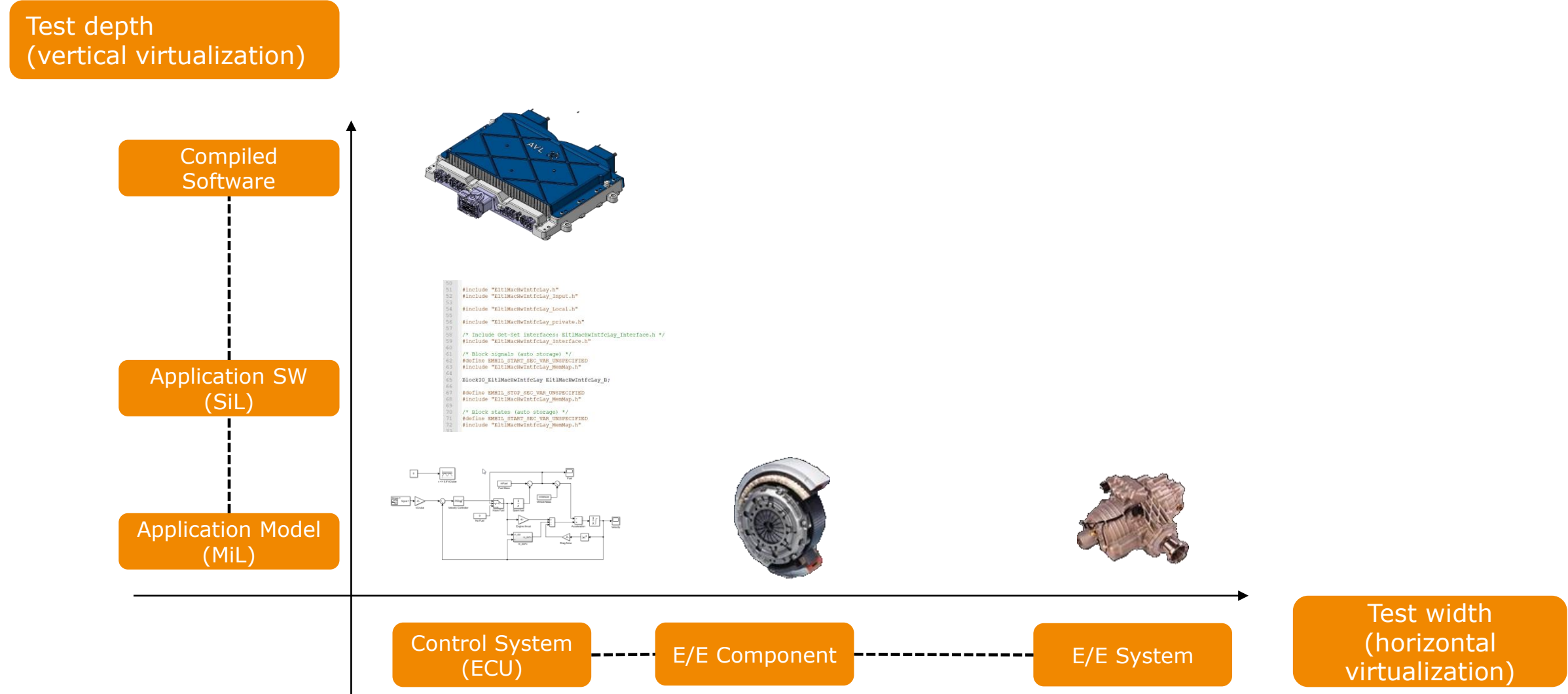
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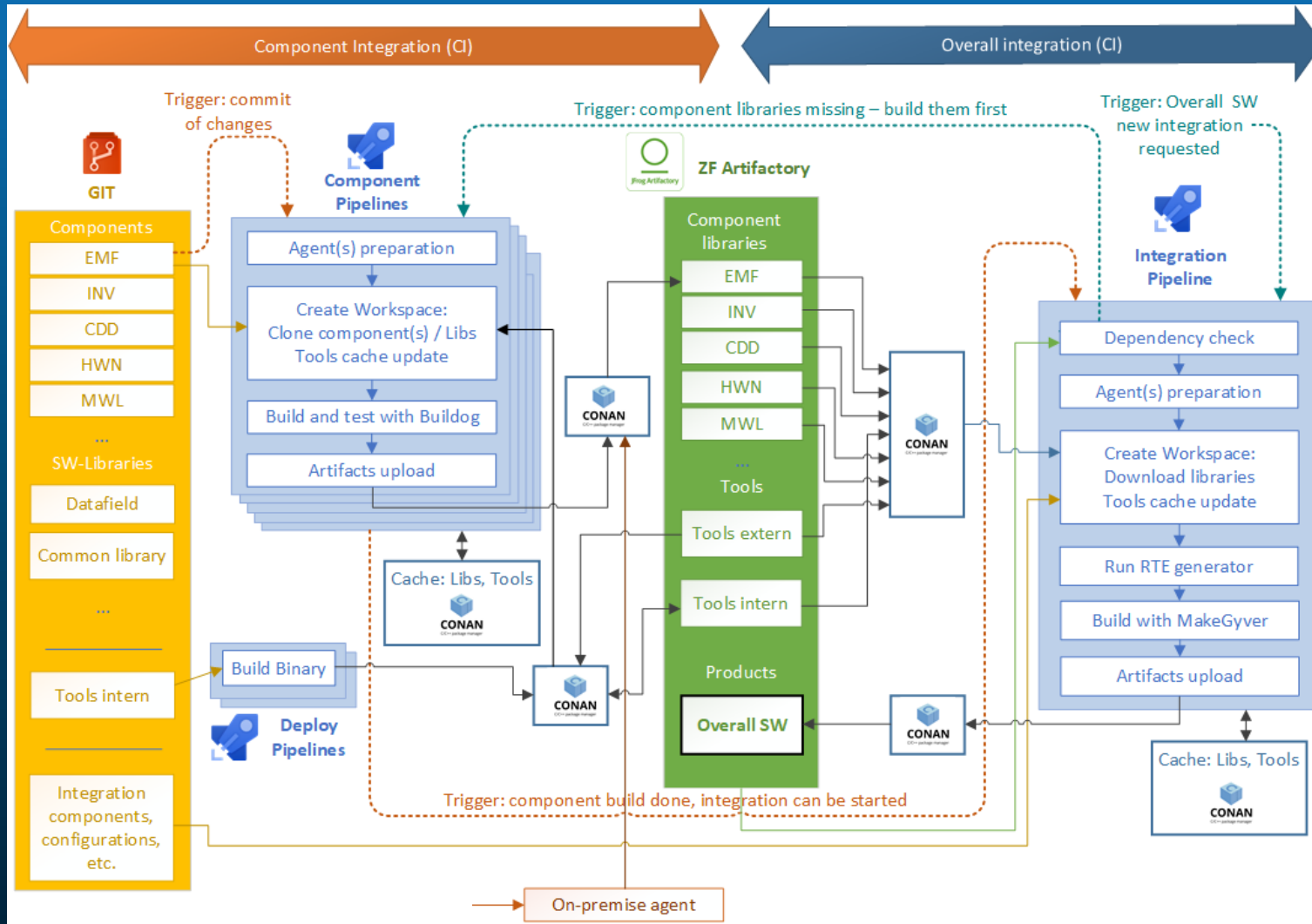
4 Are there tools for developing SDVs and are they interoperable?

Virtual ECU

Separation of Concerns (Scalability)



CI Infrastructure



Multi-Stage integration pipeline, fully automated, bi-directional, parallel, reproducible, AUTOSAR ready

◆ AZP-003_PE_demonstrator , +9 15. Nov. at 09:26 0 work items
 See Sources card for details 31m 26s 9 consumed

Stages Jobs

<ul style="list-style-type: none"> Initialization (2 jobs completed, 1m 8s) ComponentsCheck (1m 4s) ComponentsImport (33s) 	<ul style="list-style-type: none"> Components (7 jobs completed) BSW_CORE EH EMF HWL INV PLZCDD SABIN 	<ul style="list-style-type: none"> 8HP (1 job completed, 29m 36s) SoftwareIntegration (29m 33s) 	<ul style="list-style-type: none"> Email_Report (1 job completed, 20s) Email_Report (17s)
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Continuous Workflow: Development – Testing

The Solution

Requirements update

Compile vECU

Function development

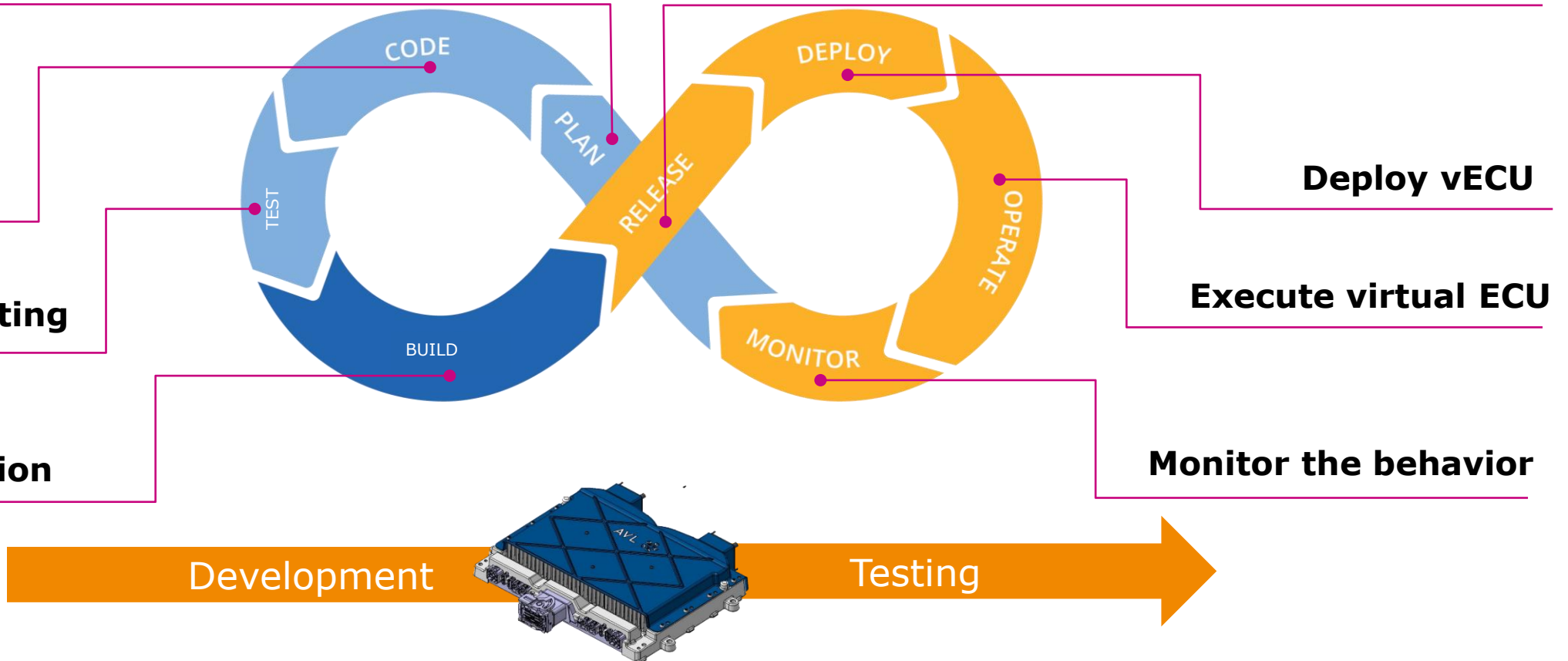
Deploy vECU

Component testing

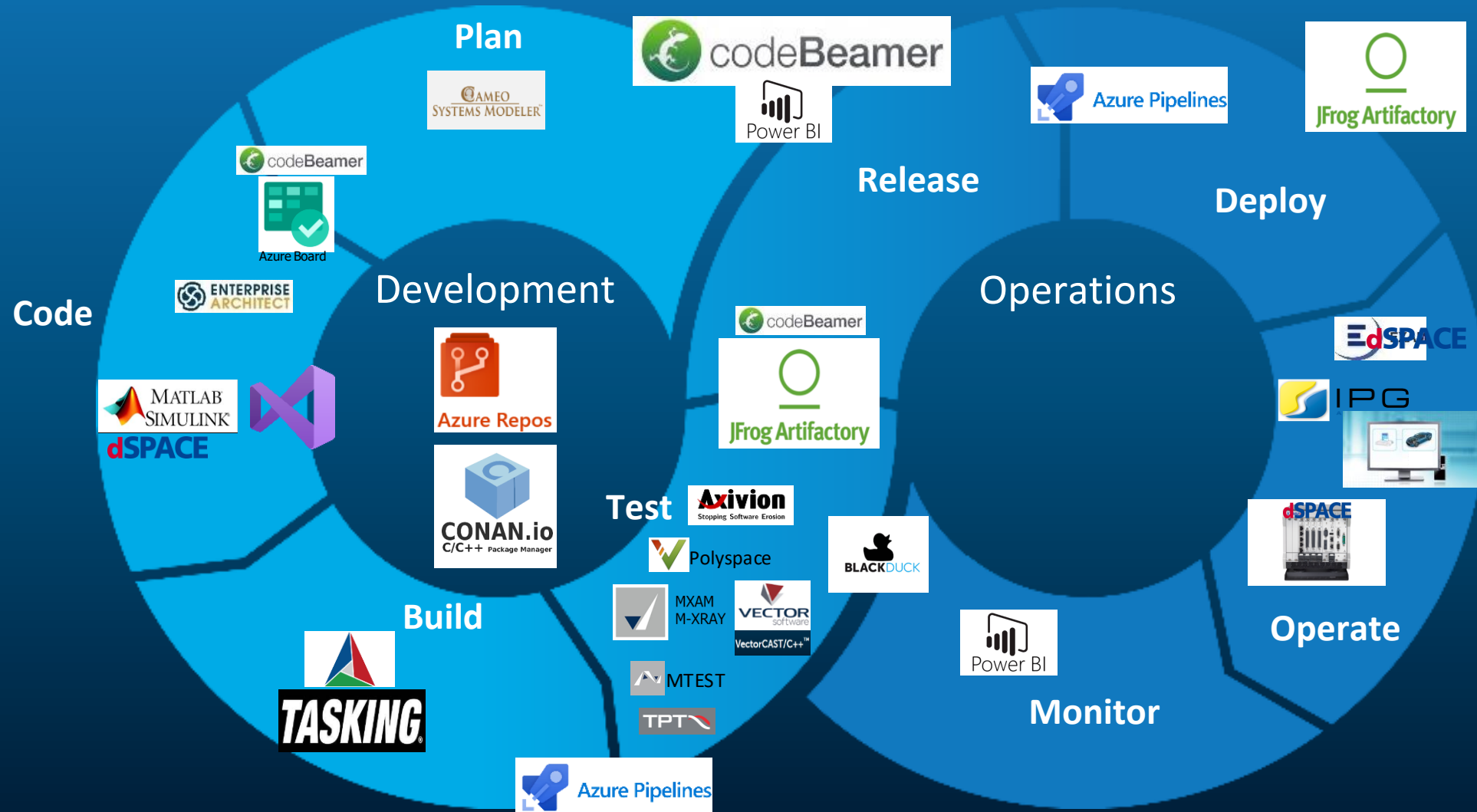
Execute virtual ECU

Virtual integration

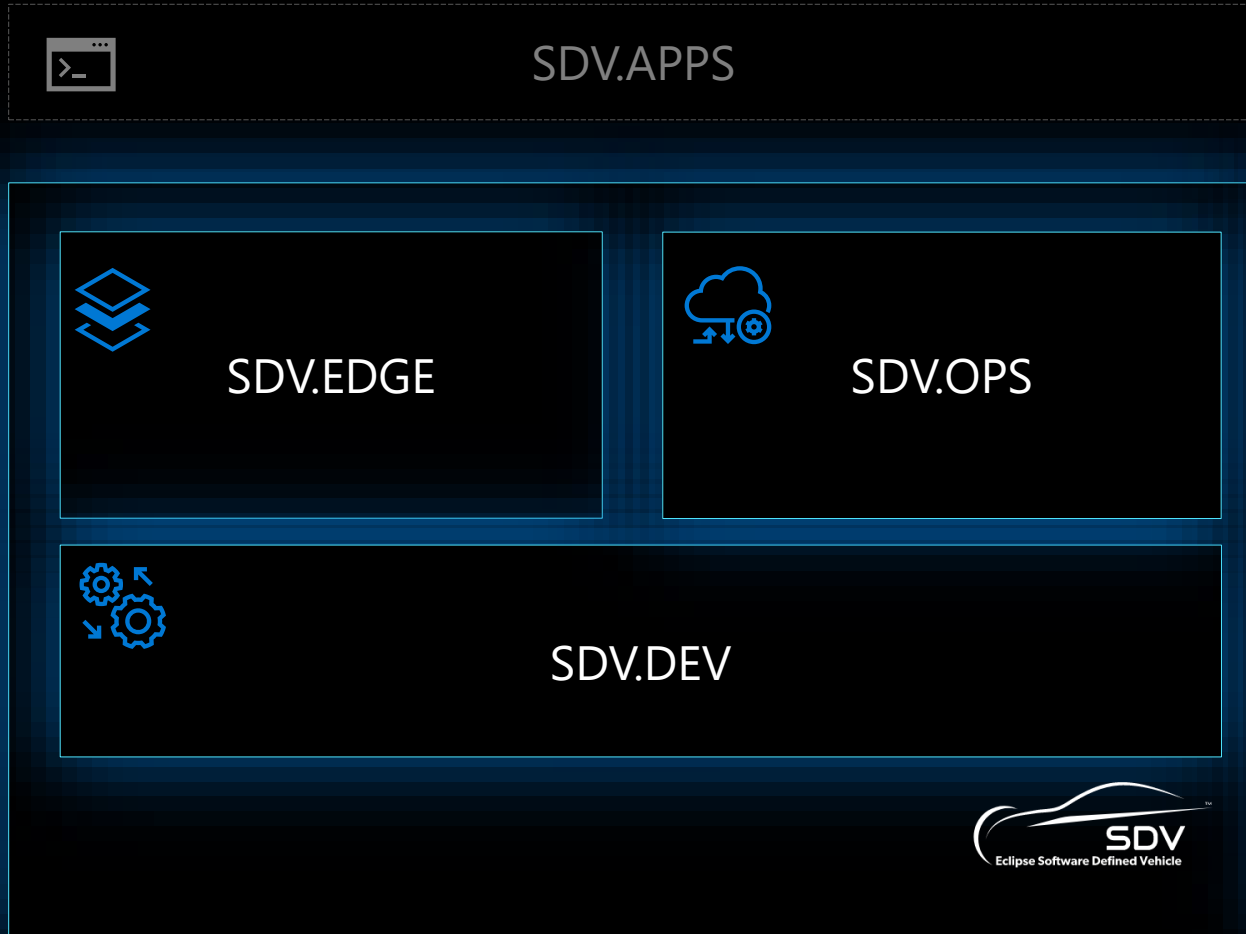
Monitor the behavior



Overview Tool Architecture from Requirement to Operations



Eclipse SDV – Overview & Current Status





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Q&A

Contact



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Thank you

