The Evolution of E/E Architecture and the Impact on Future Software Development

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MATLAB EXPO 2021

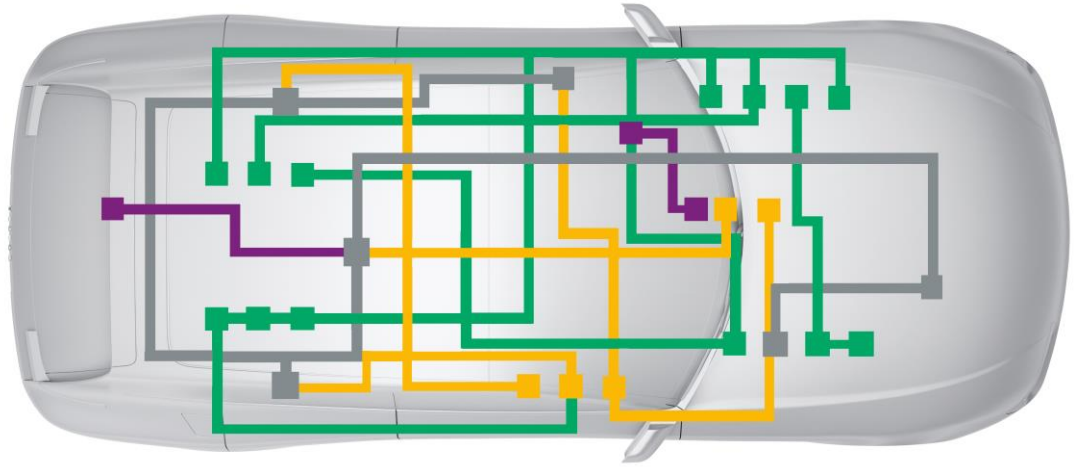
VECTOR

The Evolution of E/E Architecture and the Impact on Future Software Development

Using Vector AUTOSAR Basic Software and DaVinci Tools in Combination With Simulink

V1.0 | 2021-05-04

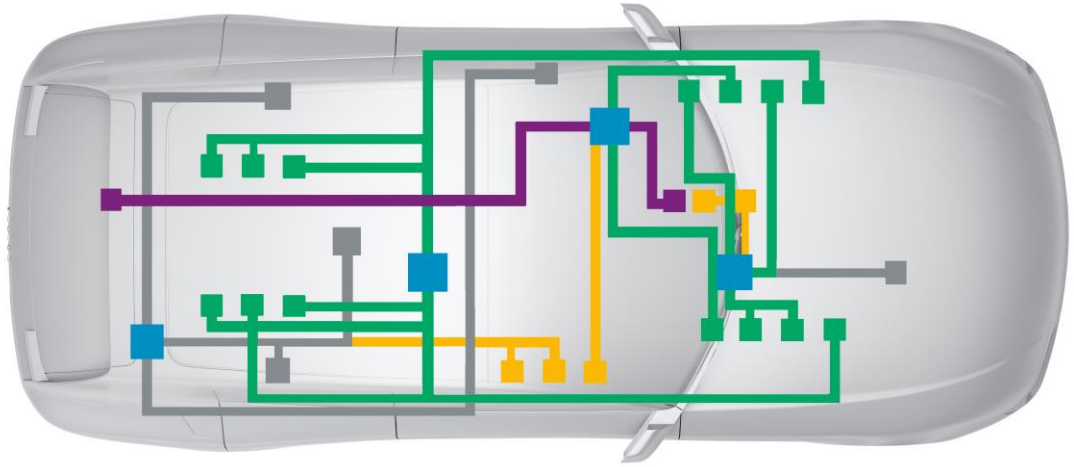
Evolution of Vehicle Architectures



Distributed Architecture

- ECUs implement dedicated function
- One supplier per ECU
- Limited amount of data shared between ECUs

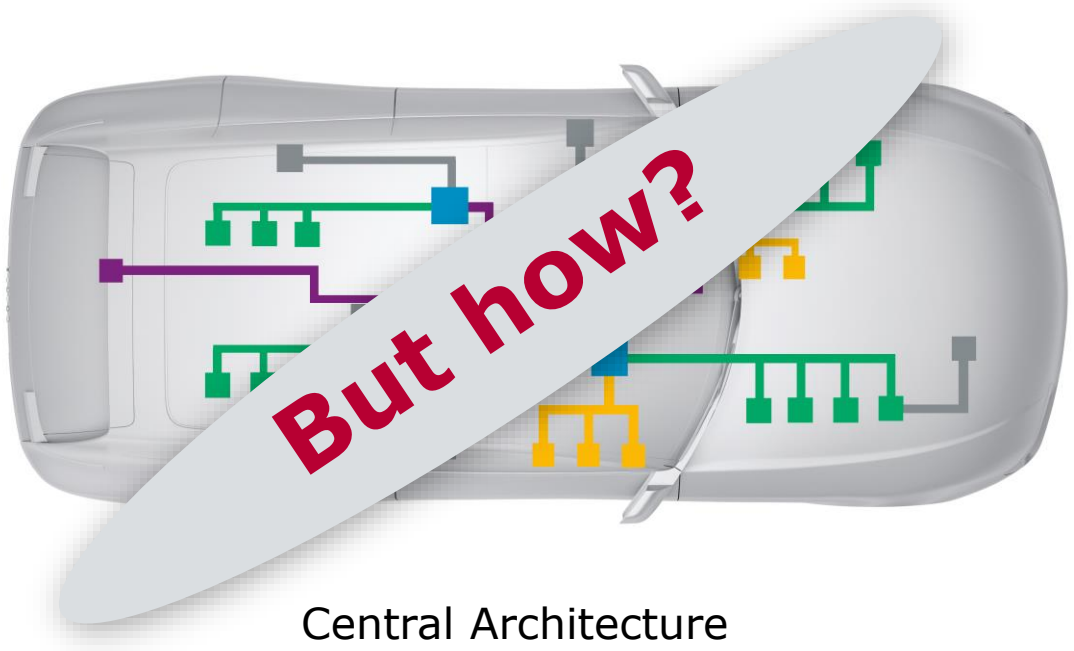
Evolution of Vehicle Architectures



Domain Architecture

- Functions integrated per domain
- Multiple application software supplier per ECU
- High-level functionality of sensors and actuators already reduced and moved to Domain Controllers

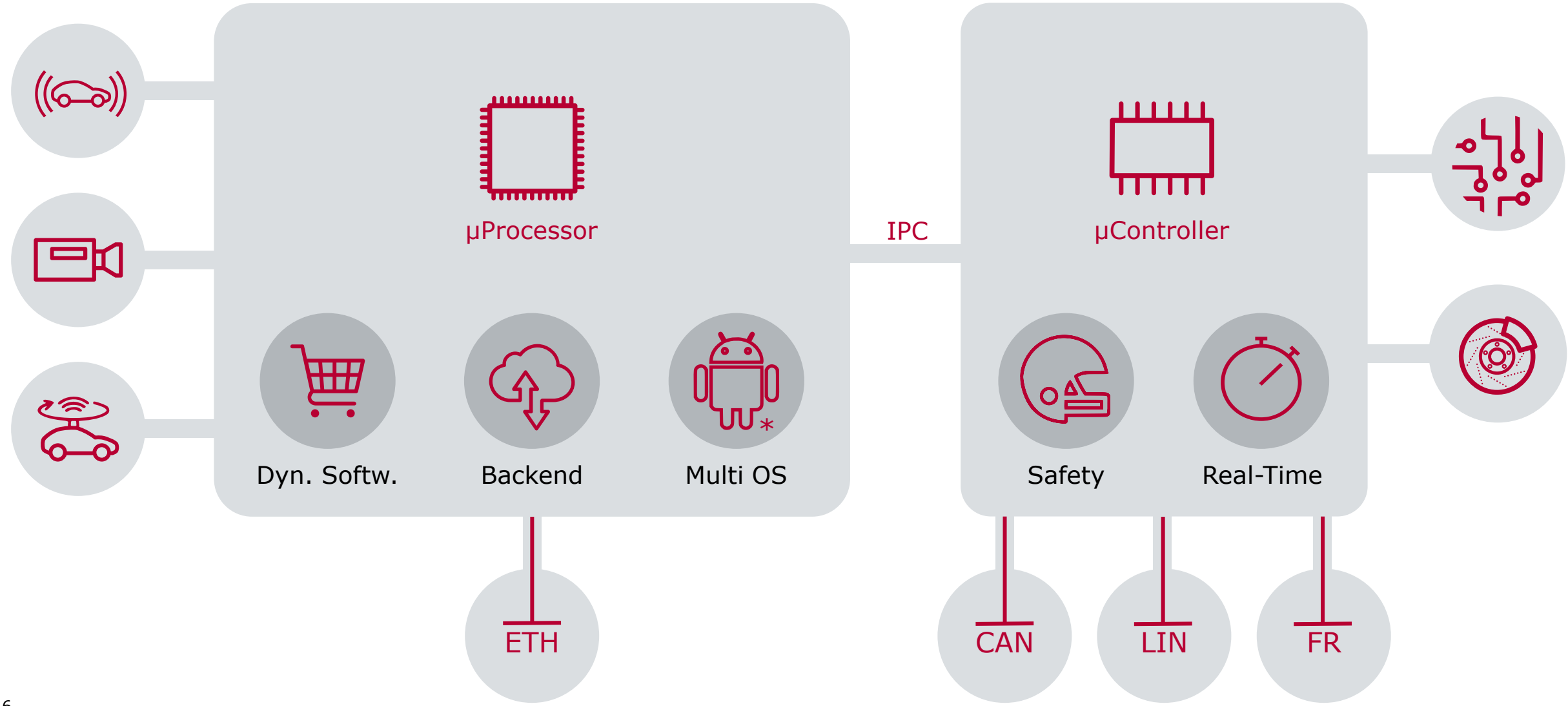
Evolution of Vehicle Architectures



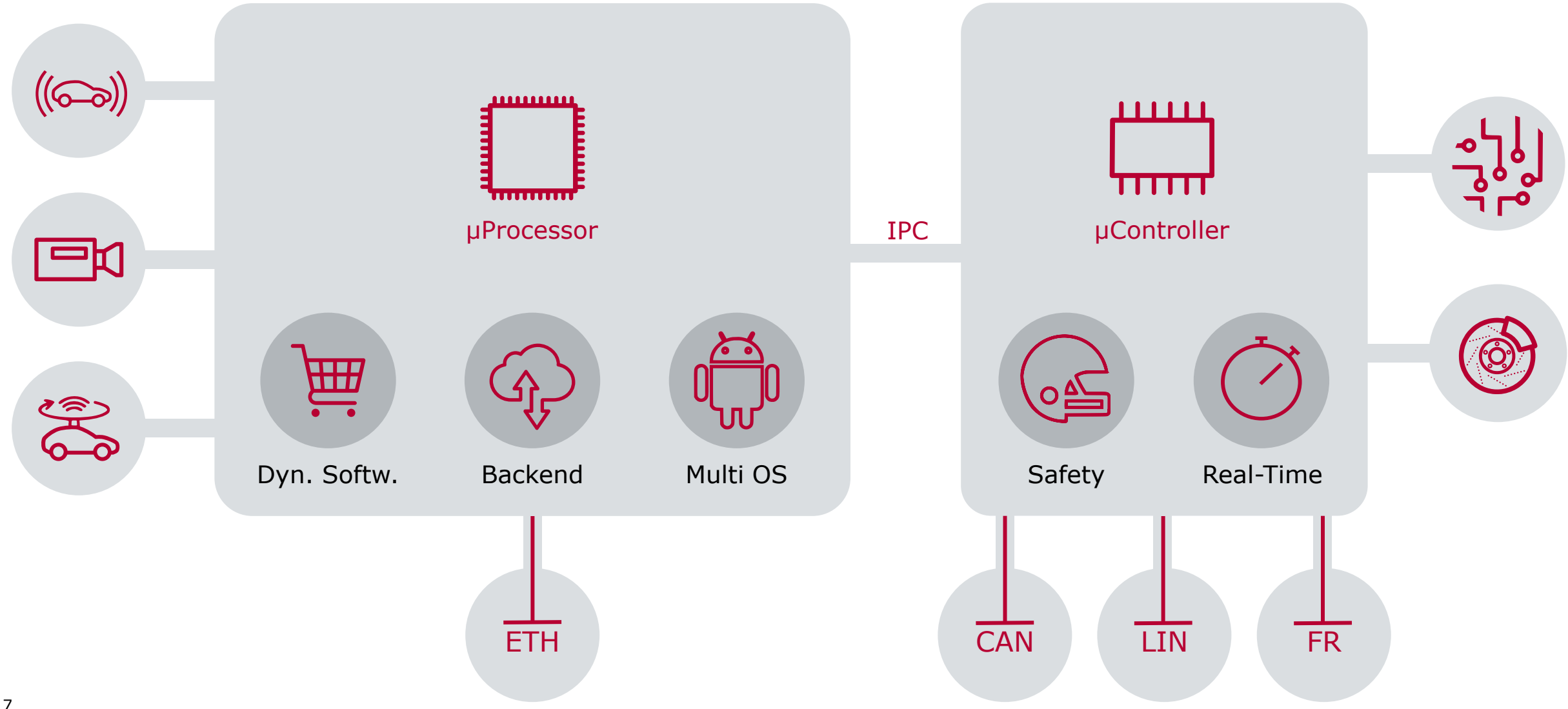
Central Architecture

- Cost Saving
  - More COTS
  - More software reuse
  - Reduce number of ECUs
- Easy extension of functionality
- Keep rolled-out ECUs up to date

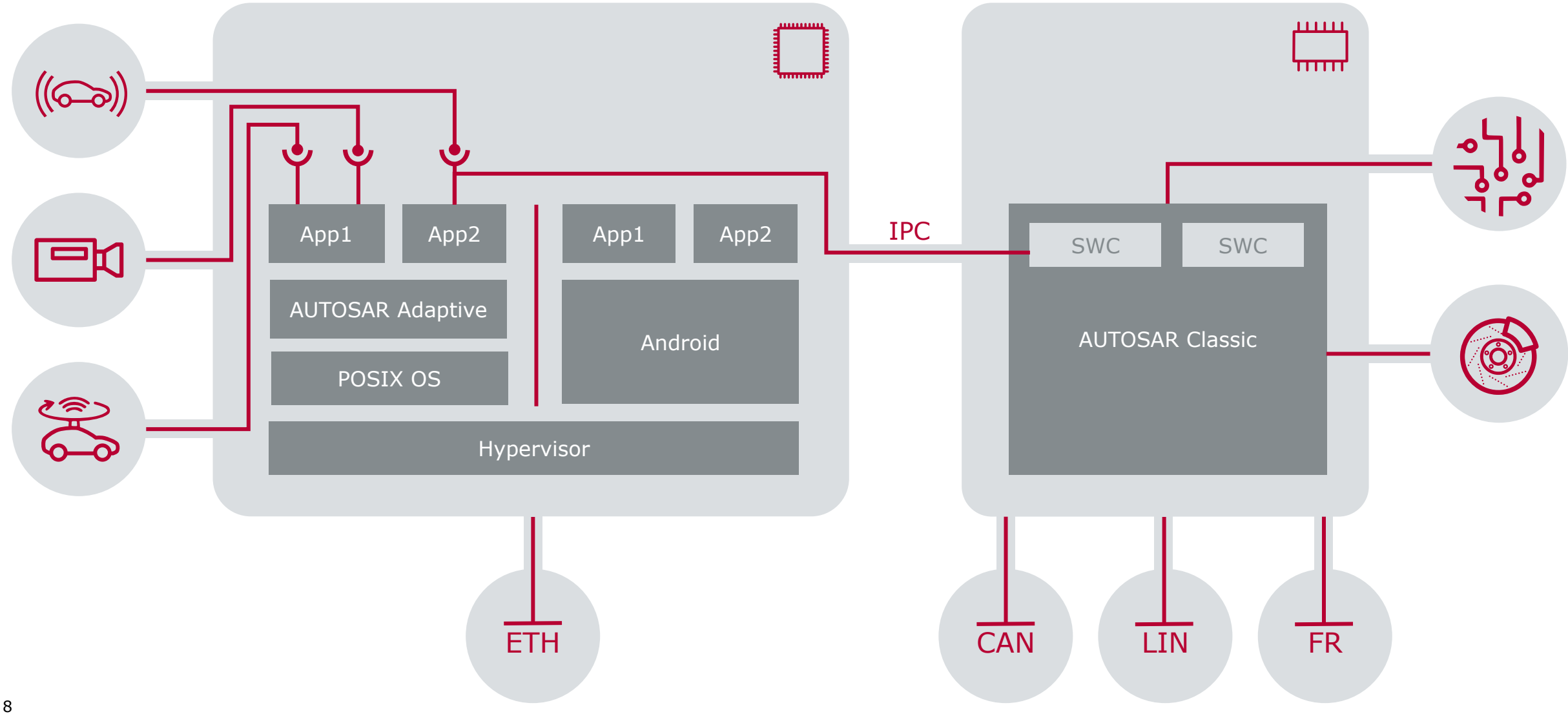
ECU Design: Hardware



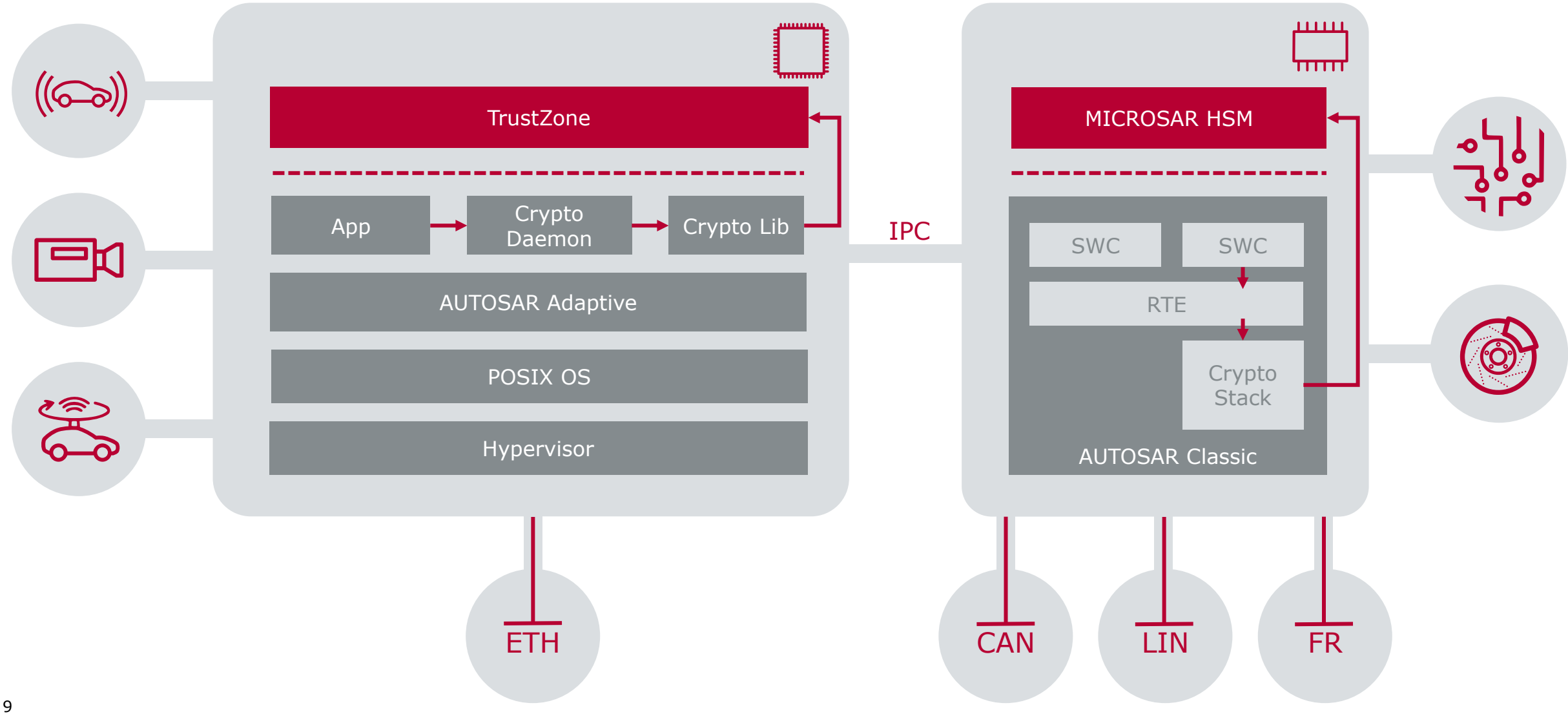
ECU Design: Hardware



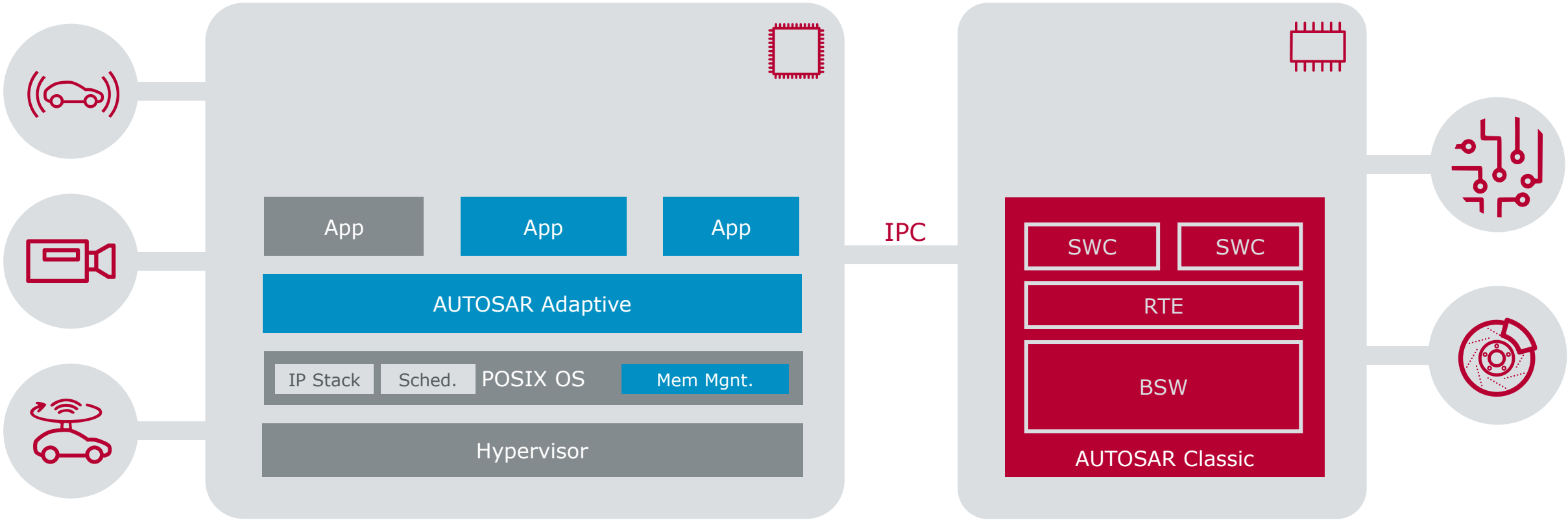
ECU Design: Software



What About Security?



What About Safety?



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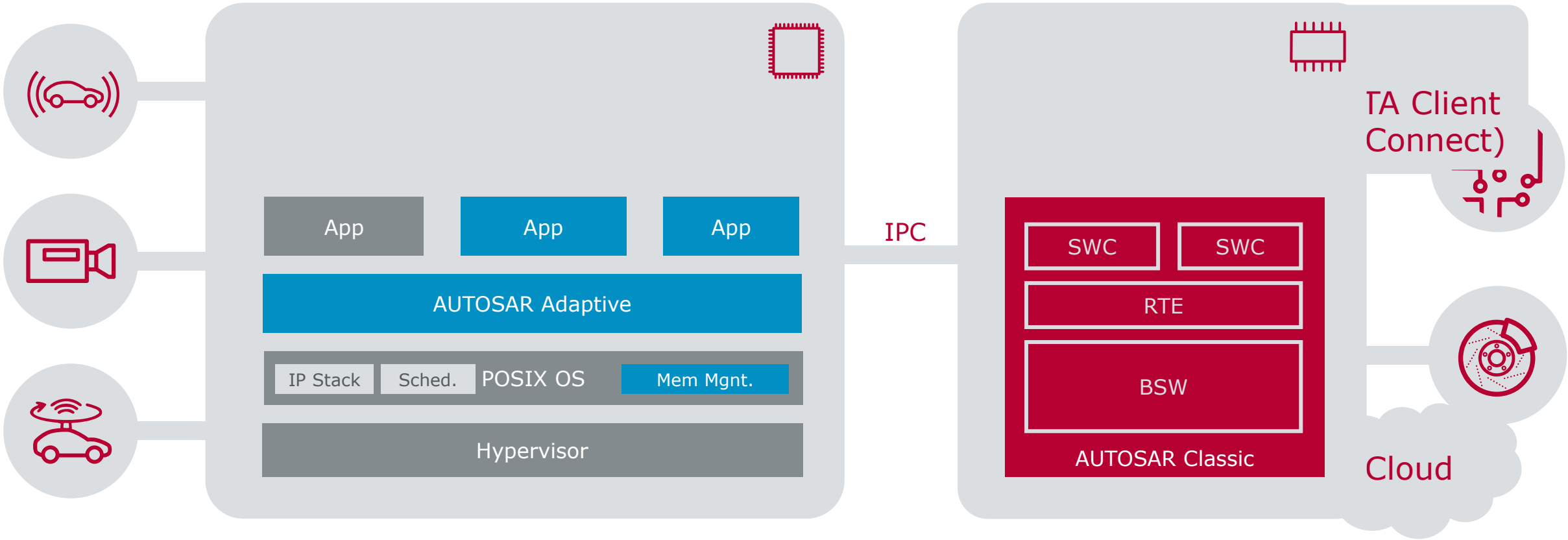
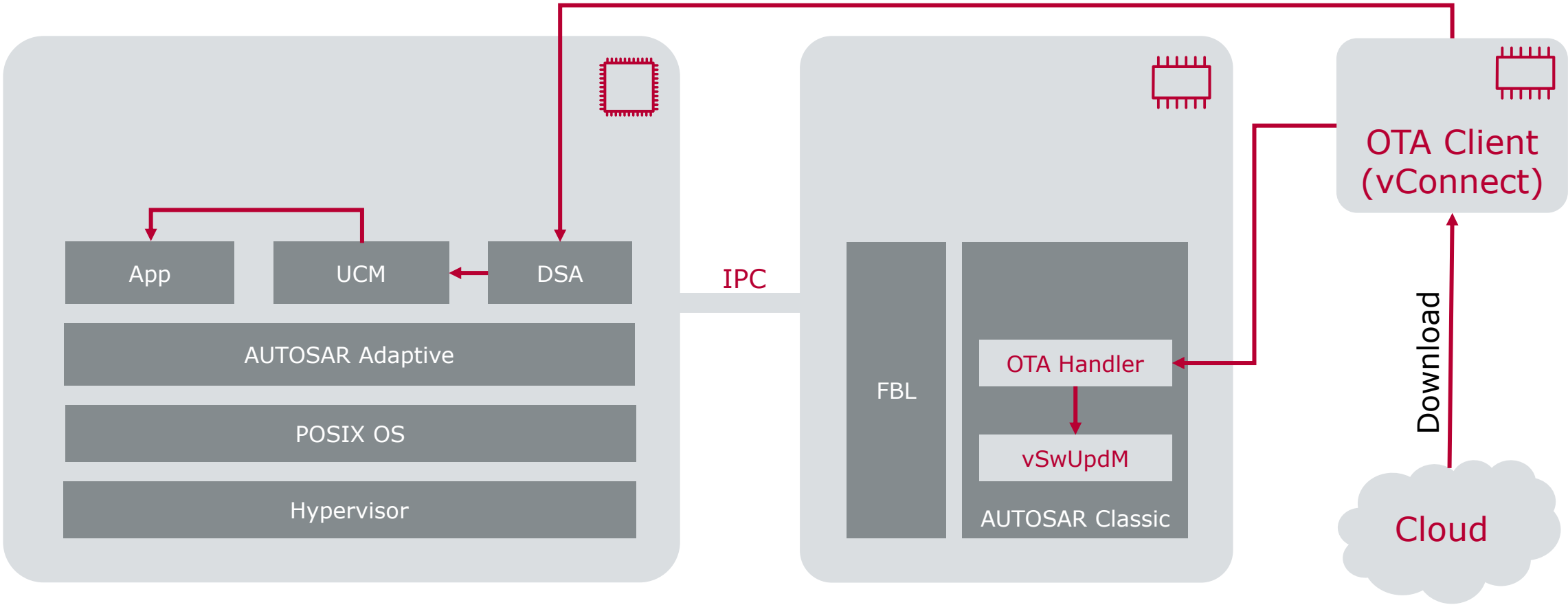


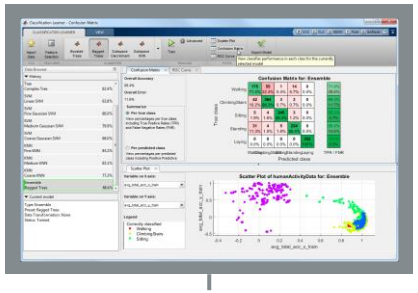
Legend:

Avail. for Fail-Op. | Fail-Safe | QM

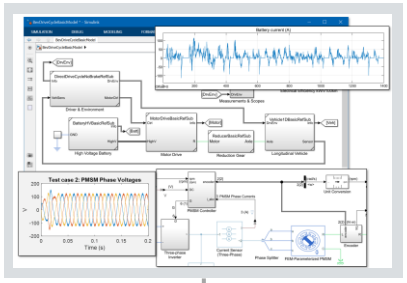
What About Updates?



Integrating Application Software in AUTOSAR Stack



MATLAB® & SIMULINK®



App1
App2
AUTOSAR Adaptive
POSIX OS
Hypervisor
App1
App2
Android
IPC
SWC
SWC
AUTOSAR Classic
ETH
CAN
LIN
FR

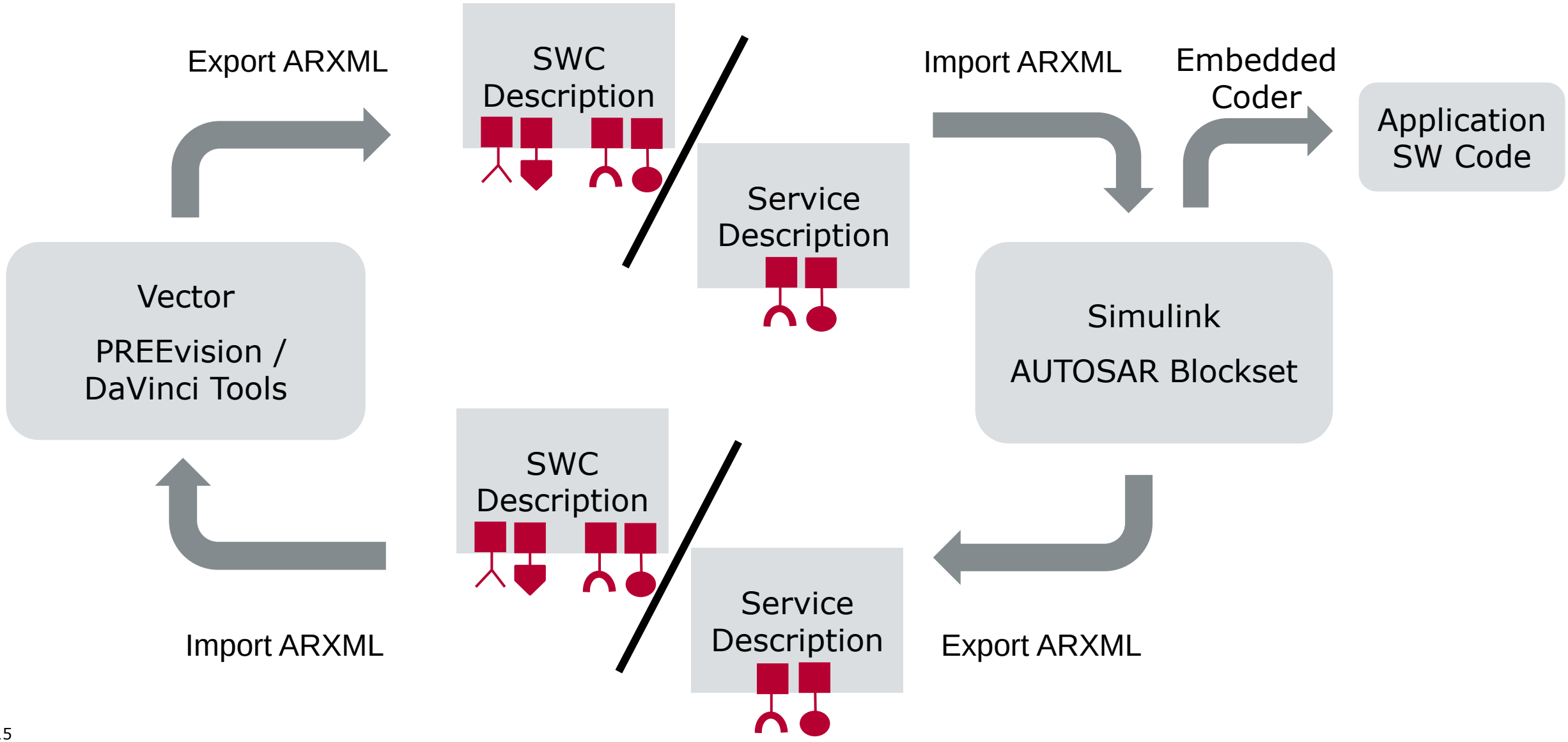
Poll question

- Which tool(s) do you use during your project work as an Application Developer apart from MATLAB?

Please choose from the following (Multiselect possible):

- ☐ Davinci Developer
- ☐ Davinci Configurator Pro
- ☐ PREEvision
- ☐ Other
- ☐ None

AUTOSAR Workflows - Importing and Exporting AUTOSAR Description



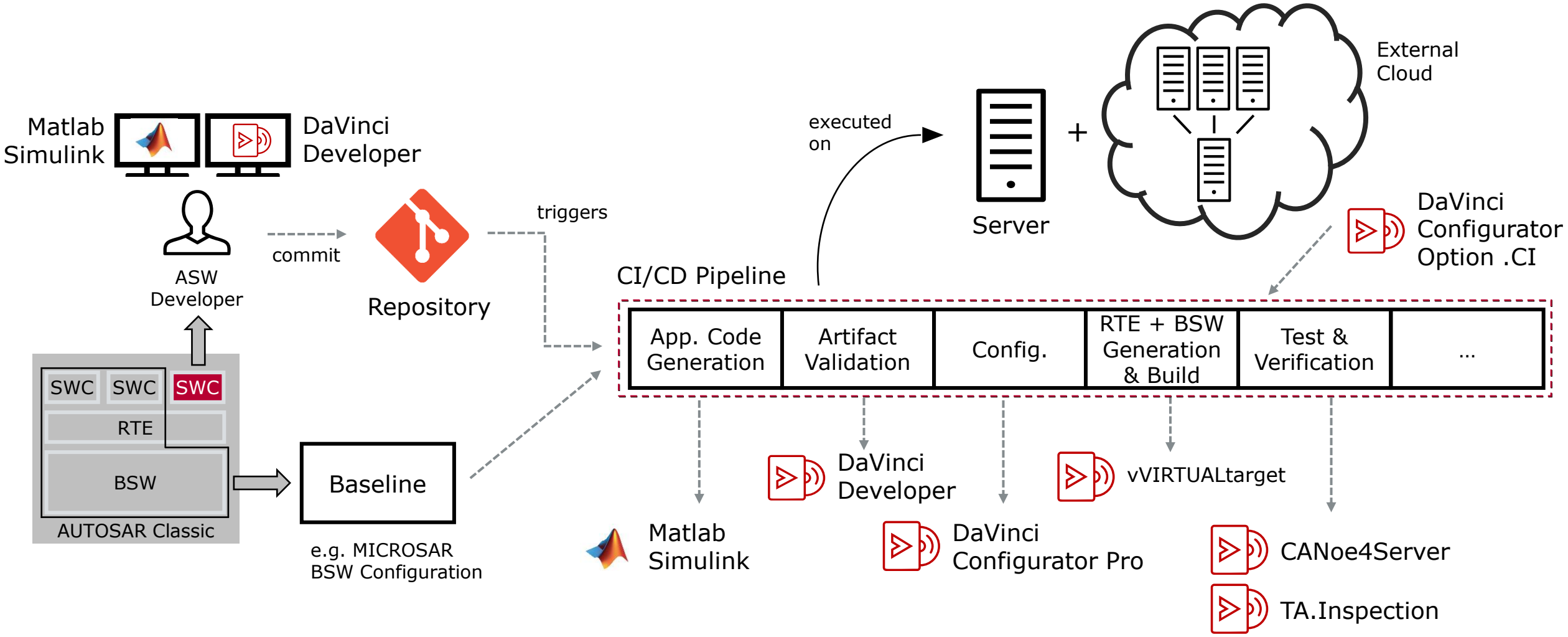
Poll question

- Who is doing the Application Software integration (which role) and using which method – manual integration or automatically in a continuous integration workflow?

Please choose from the following (Multiselect possible) :

- ☐ Method: Manual Integration OR
- ☐ Method: Automatic /Continuous Integration (CI)
- ☐ Role: Developer
- ☐ Role: Integrator
- ☐ Role: System Responsible
- ☐ Role: DevOps Engineer

Continuous Integration for AUTOSAR Classic Platform



Poll question

- How often is an Application Software integration typically done (manually or automatically/CI) in total within a month by the previously mentioned role(s)?

Please choose one of the following:

- ☐ 1 - 10
- ☐ 11 - 30
- ☐ 31 – 60
- ☐ 61 – 120
- ☐ > 120

Poll question

- How much time do you wait for a scheduled Application Software integration?

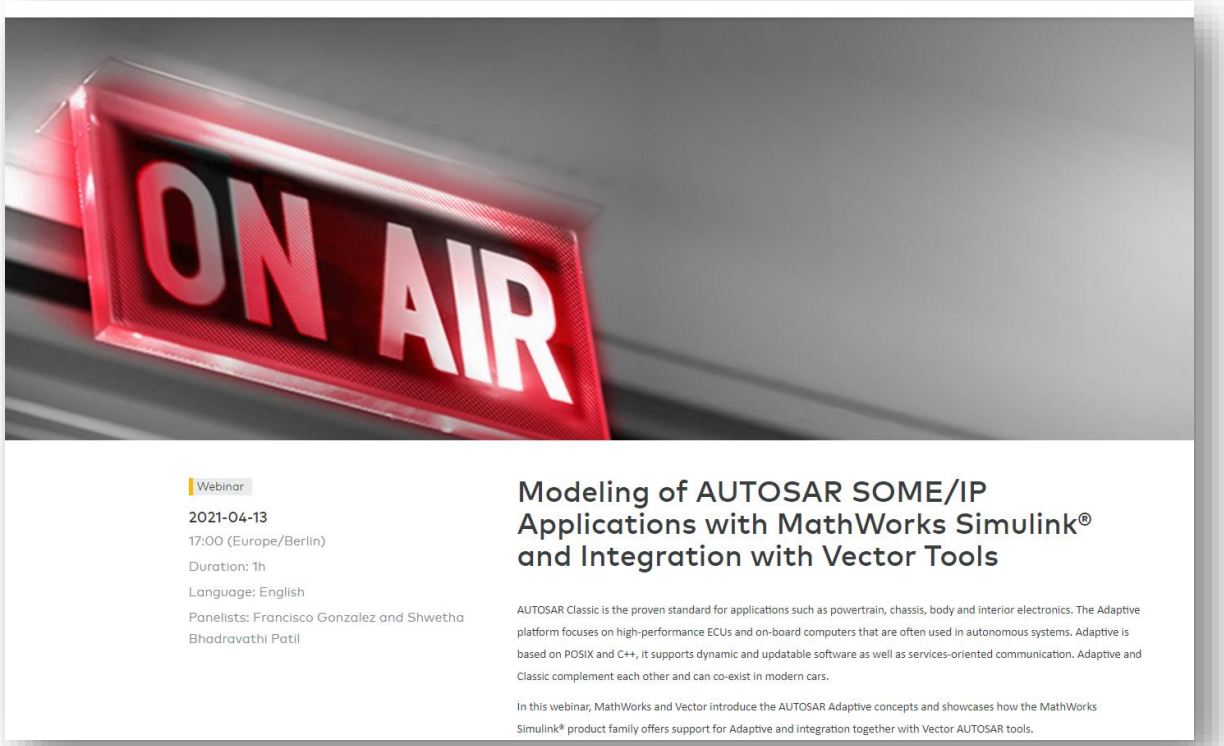
Please choose one of the following:

- ☐ Zero. Application Software Integration is done by me.
- ☐ About 1 day
- ☐ < 1 week
- ☐ < 2 weeks
- ☐ < 4 weeks

Practical Example – AUTOSAR Adaptive Platform Development

Webinar – AUTOSAR SOME/IP with MathWorks & Vector Tools

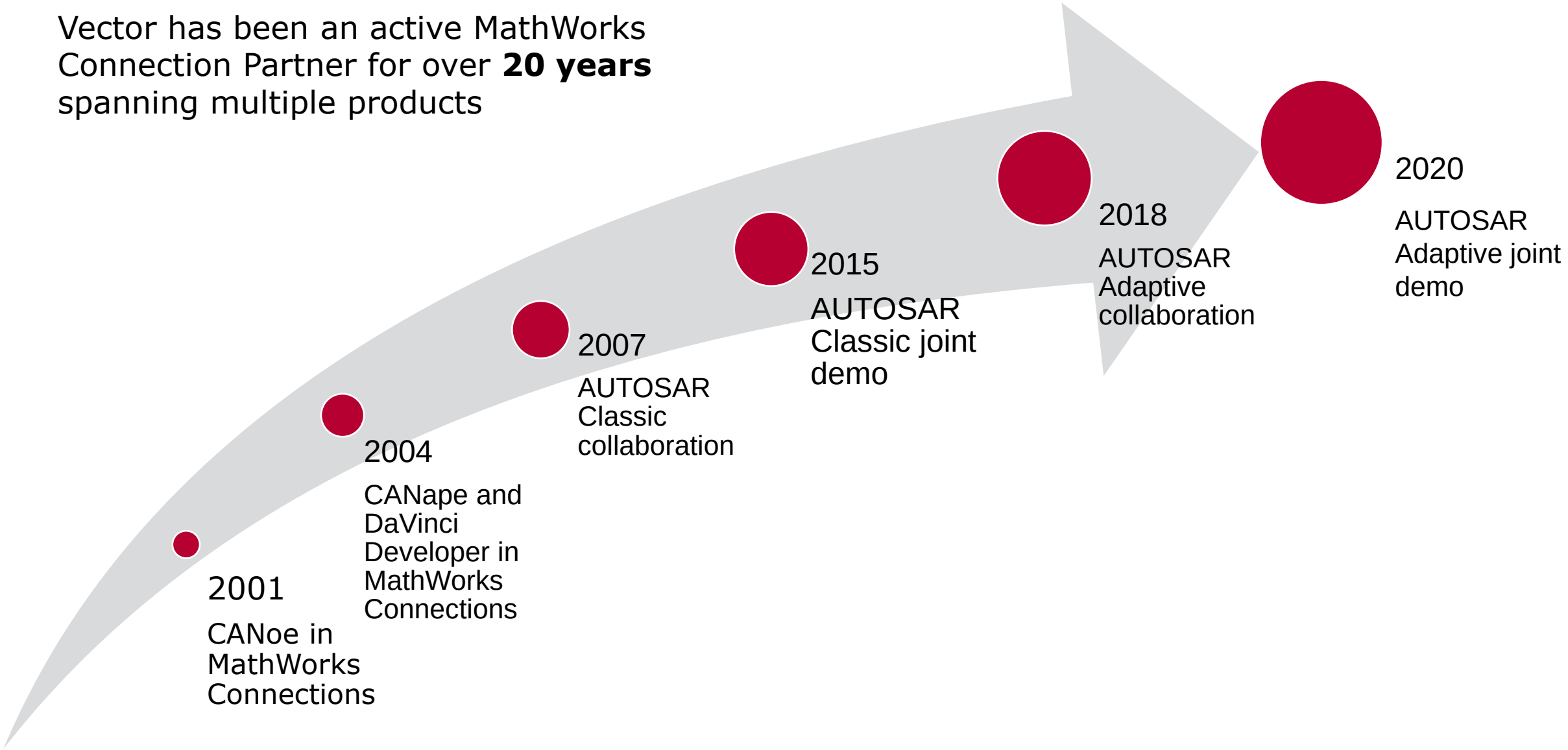
- Seamless interaction of DaVinci Developer Adaptive & Simulink for development of AUTOSAR Adaptive Platform
- Signal & Service-Oriented communication in AUTOSAR
- Overview of SOME/IP as AUTOSAR middleware
- Modeling of SOME/IP applications for Service-Oriented software architectures



➔ Recording is now available!

Partnership for Providing Seamless Automotive Tool Chains

Vector has been an active MathWorks Connection Partner for over **20 years** spanning multiple products

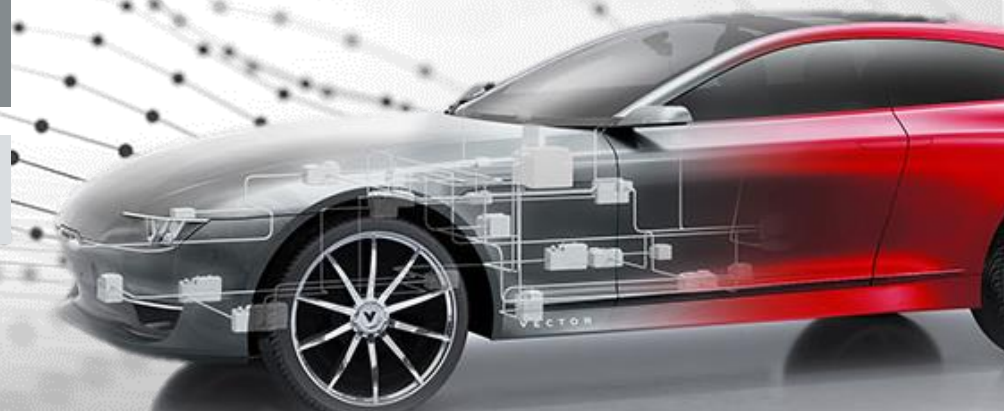


Conclusion

- Software is split-up across controllers and processor
- Multiple difficult challenges to face during development of new hardware and software architectures
- AUTOSAR is a common language for standardized integration of application software, but tools must understand the dialect
- Automation support of tools are preconditions for Continuous Integration and Continuous Delivery approaches

- Integration of functional modeling tools and AUTOSAR modeling & configuration tools to an automation pipeline:
  - Heavily reduces manuals steps
  - Enables fast testing of new features
  - Increases quality due to reduction of manual errors

- Vector and MathWorks are helping you to get it done!



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