Vehicle OS

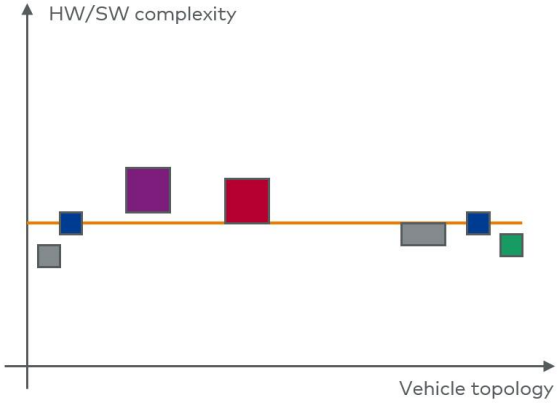
Jun, Zhang

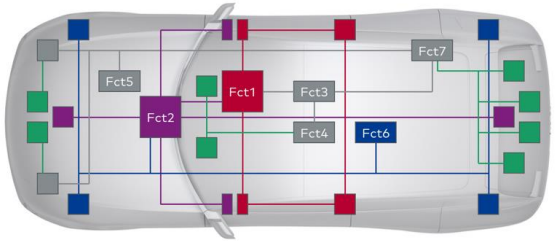
AUTOSAR China Day

16th Mar 2023 Shang Hai

Towards a Centralized/Zonal Architecture

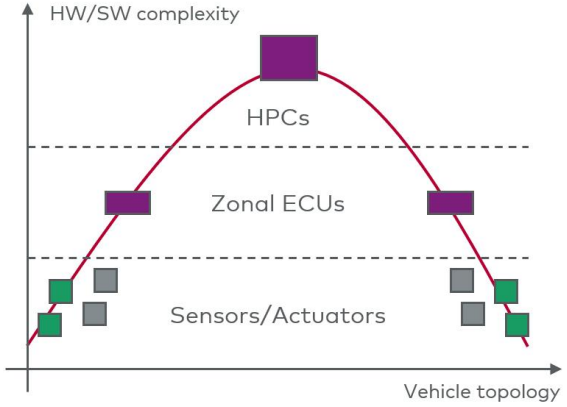
Function Architecture

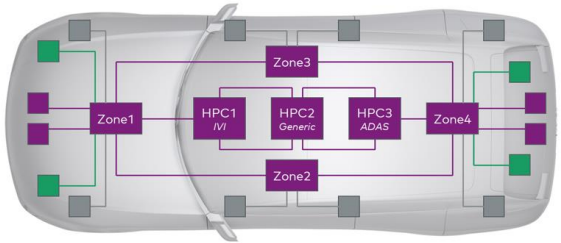




- Reduce cost
  - ECU consolidation
  - Simplified wiring
- Reduce CO_2 footprint
  - Lighter wiring harness
- Enable the software defined vehicle
  - Decouple hardware from software
  - New (purely) software-driven vehicle functions
  - Increase the value of a vehicle over its lifetime

Centralized/Zonal Architecture

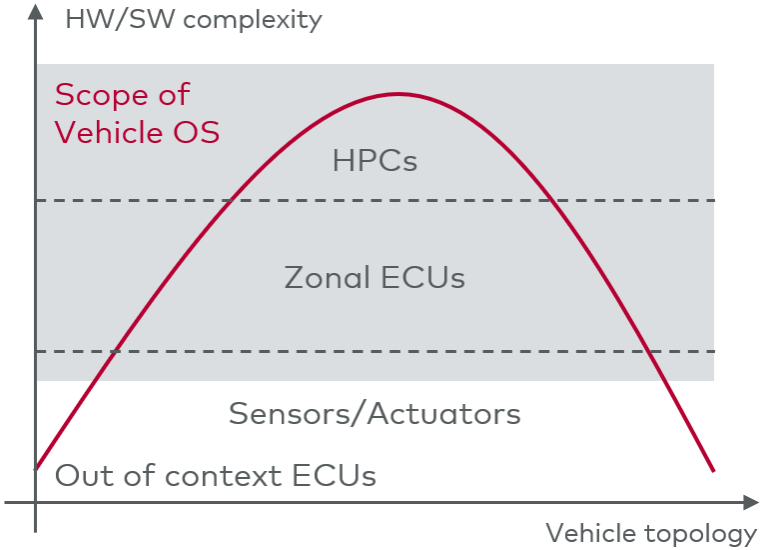


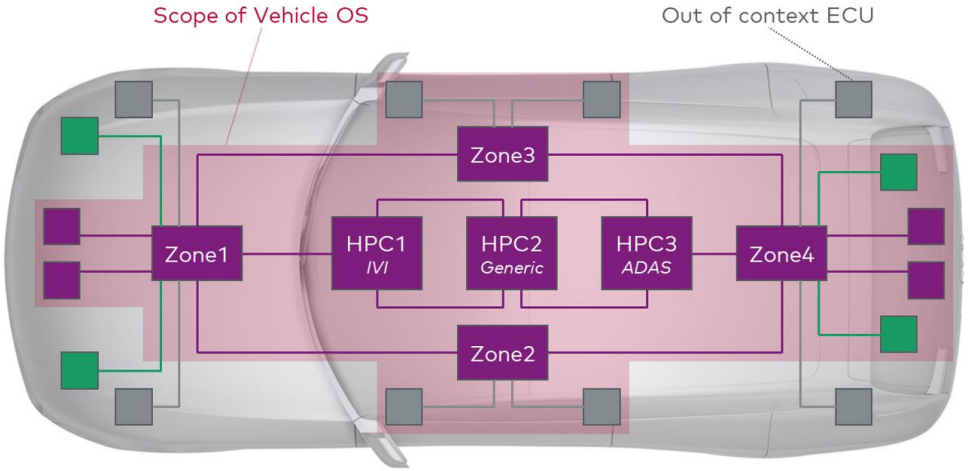


Software Defined Vehicle

In context of the E/E system, there are three enablers for the software defined vehicle

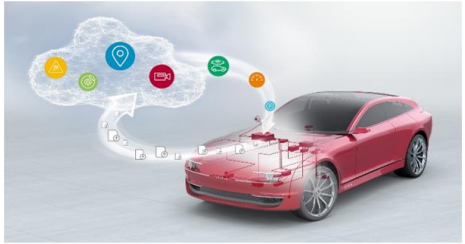
- Architecture: HPCs and zonal ECUs ✓
- Hardware: High-performance microcontrollers and microprocessors ✓
- Software: Powerful software platform and ecosystem → Vehicle OS
  - > To cope with the increasing SW complexity, mainly in HPCs and zonal ECUs, controlled by OEMs
  - > Separate software solution for small ECUs, potentially developed out of context, controlled by Tier1s



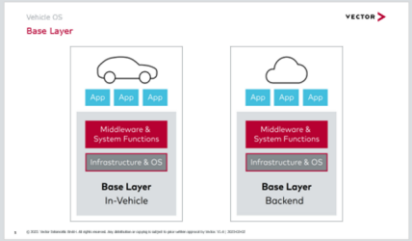


Definition

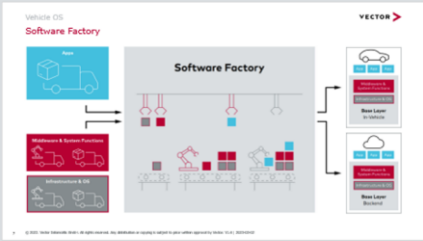
Vehicle OS = *C*(Base Layer + Software Factory)



- A Vehicle OS is a development and operations platform for services and applications of all vehicle domains. It consists of a Base Layer and a Software Factory and supports collaboration between companies.



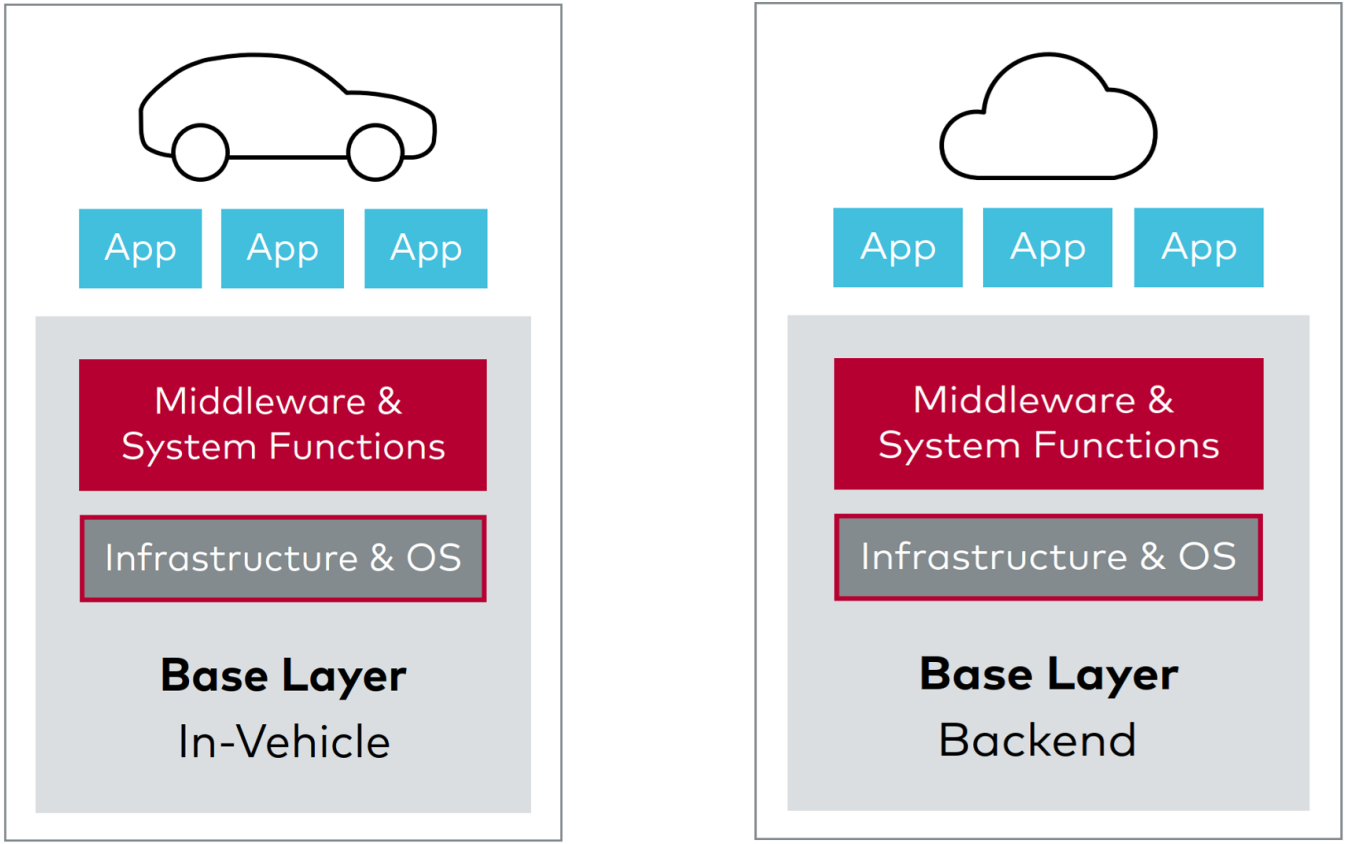
- The Vehicle OS runtime software is called Base Layer and its instantiation may differ from target to target (e.g., microcontroller, micro-processor, and backend).



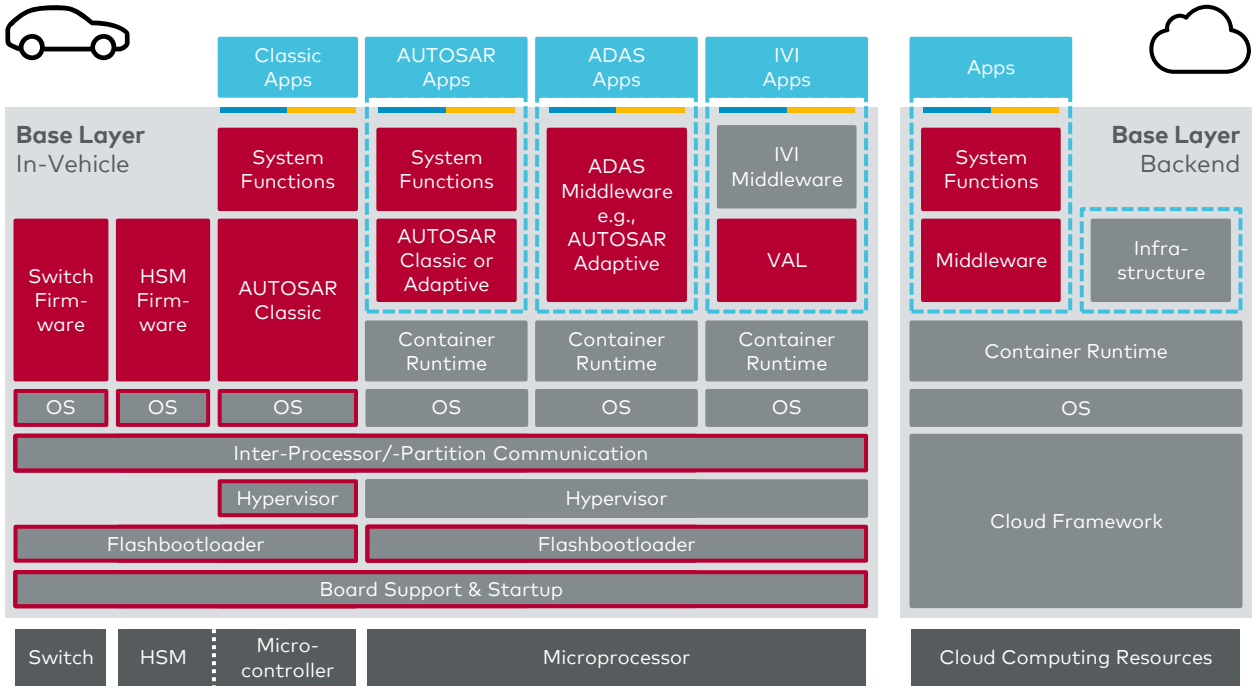
- As Vehicle OS infrastructure, the Software Factory supports and automates the developer's journey to develop, integrate and deploy Base Layer and applications.

- Close and agile Collaboration (*C*) between OEM and suppliers via a supporting platform is key for success.

Base Layer


App
App
App
Middleware & System Functions
Infrastructure & OS
Base Layer
In-Vehicle
App
App
App
Middleware & System Functions
Infrastructure & OS
Base Layer
Backend

Base Layer: Building Blocks



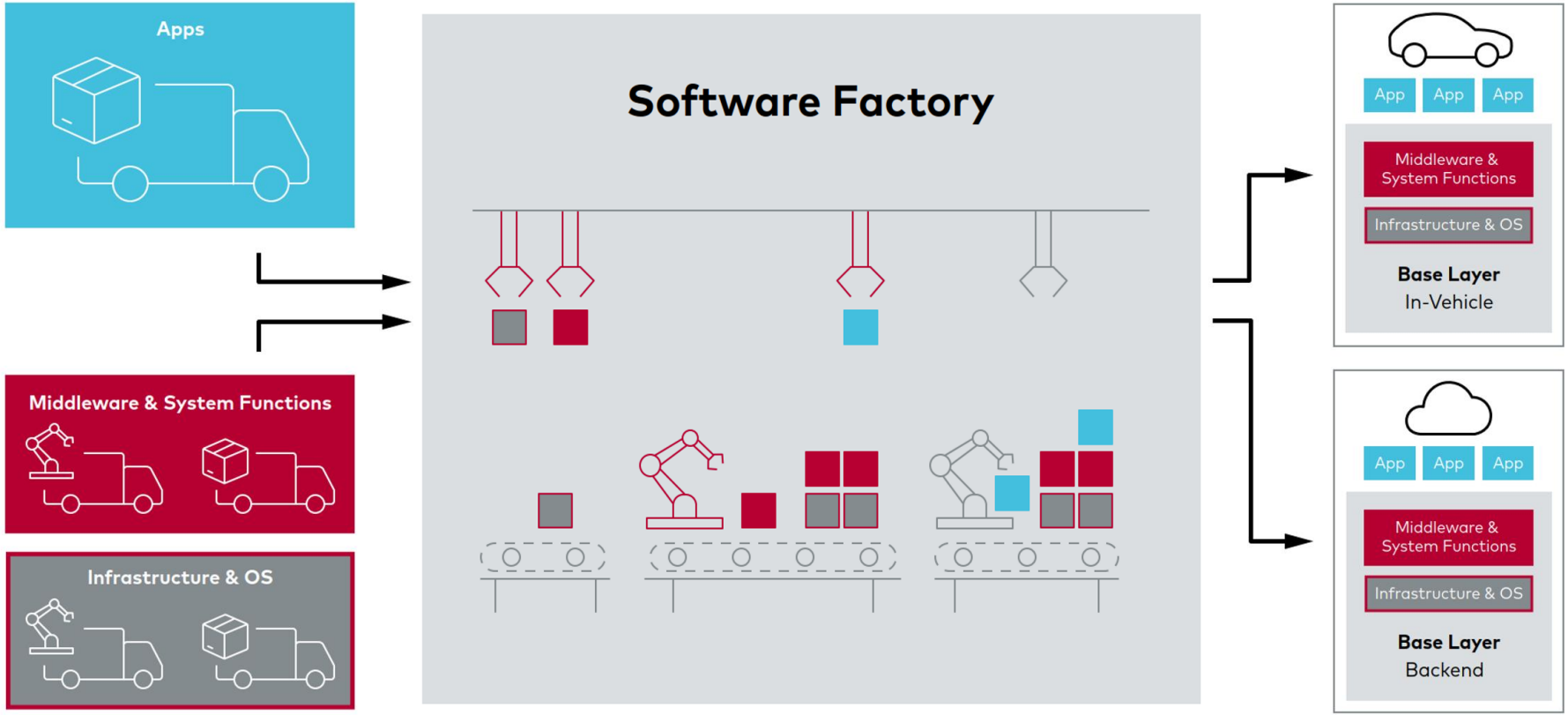
- Applications, Container
- Middleware & System Functions
- Infrastructure & OS
- Hardware

- Vehicle API: (Standardized) Vehicle Data
- Vehicle API: Basic Software Interfaces
- Vector contribution
- 3rd-party contribution

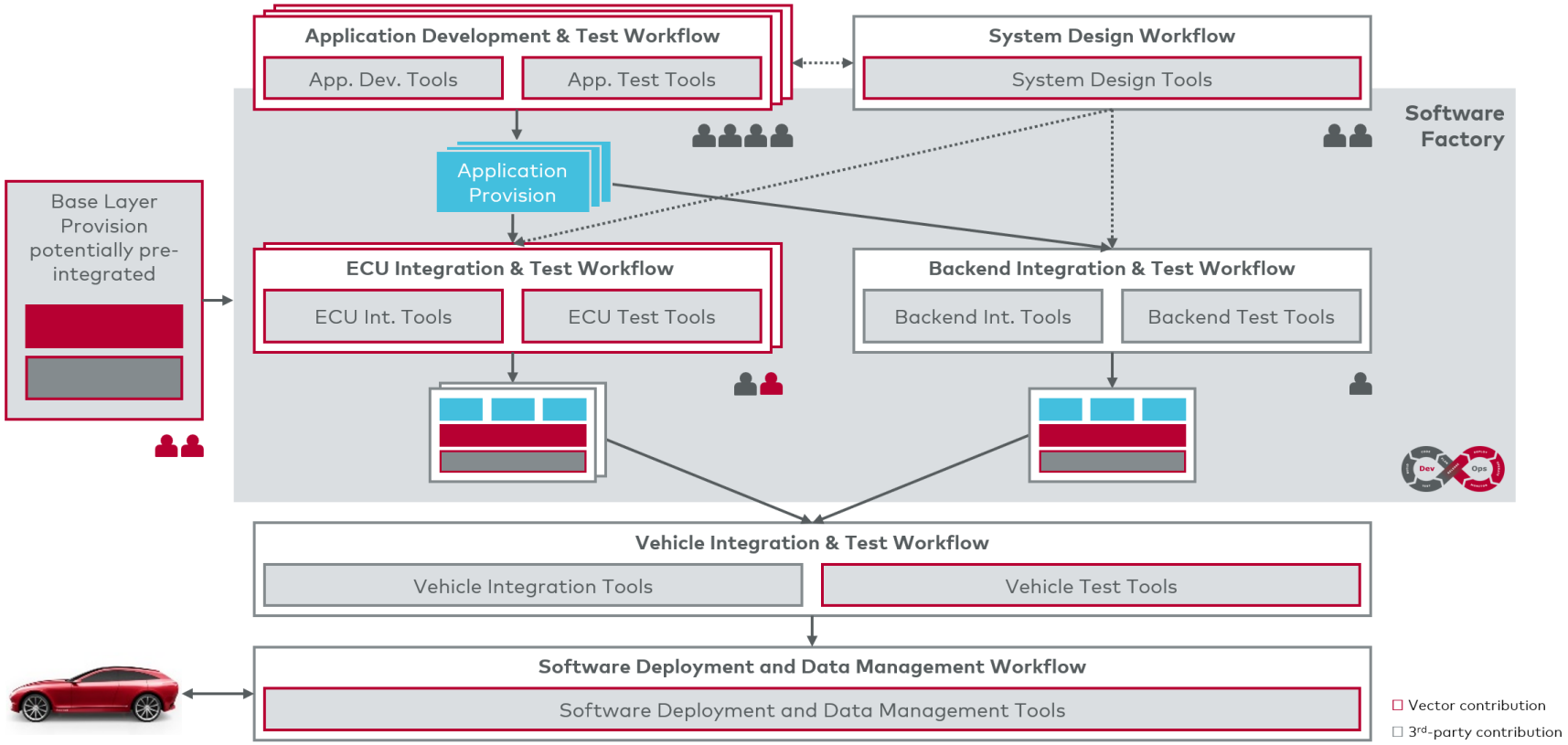
ADAS: Advanced Driver Assistance System
API: Application Programming Interface
AUTOSAR: Automotive Open System Architecture
FBL: Flash Bootloader

HSM: Hardware Security Module
IVI: In-Vehicle Infotainment
OS: Operating System
VAL: Vehicle Abstraction Layer

Software Factory



Software Factory: Workflow and Tools



The Vehicle OS Is the Next Step in Simplifying Our Customer Life

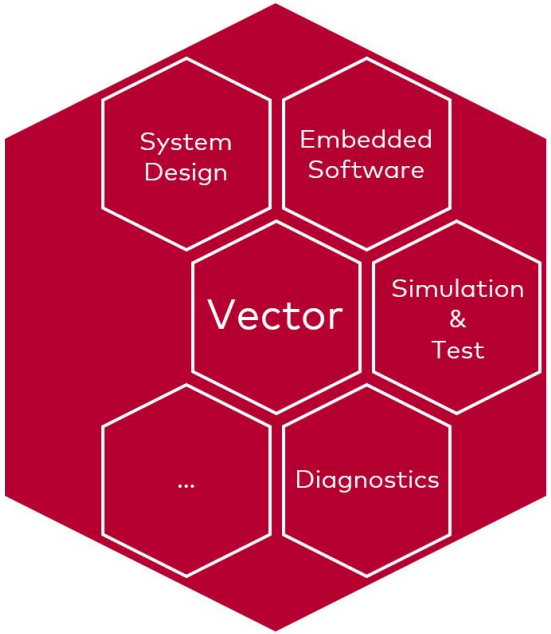
For our customers, we see big benefits when following the Vehicle OS approach

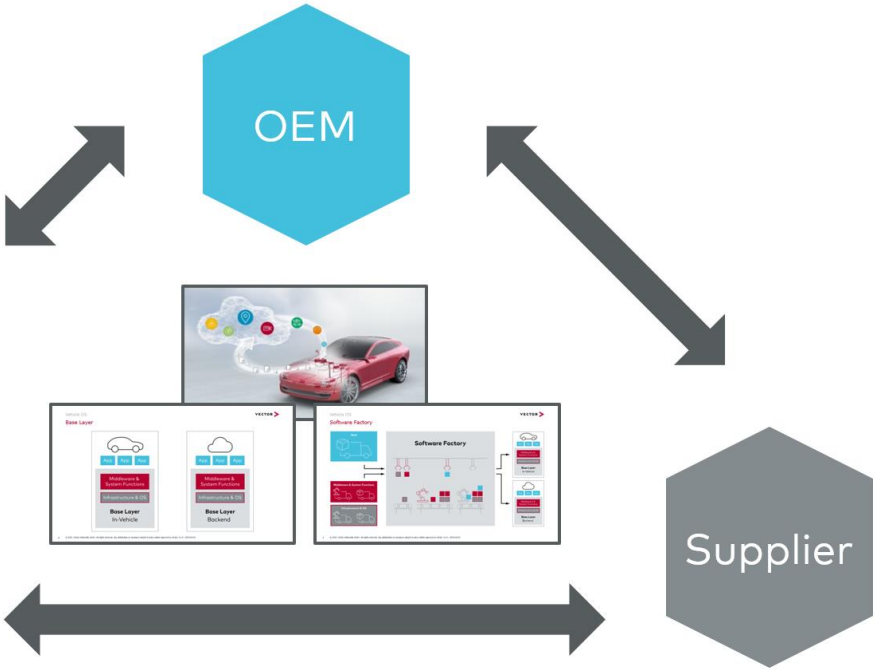
- Base Layer
  - With a Base Layer, Vector provides aligned building blocks for a safe and secure embedded runtime software
    - This goes beyond single products like MICROSAR Classic or MICROSAR Adaptive
  - If desired, a Base Layer can also be pre-integrated by Vector (e.g., in software platform scenarios)
    - This includes the integration with 3rd party products like POSIX OS or microprocessor hypervisor
- Software Factory
  - Big ECUs like HPCs run hundreds of applications, developed asynchronously all over the world
  - Additionally, today's software developers want to follow a feature-based development approach by using e.g., well-known Git workflows
  - Without a high degree of automation, software integration and test become major pain points in this scenario
  - Our answer to this challenge is the Software Factory enabling a highly automated software integration and test process according to the DevOps principle
  - The result is a scalable development environment that enables focusing on application development

Vector's strategy

- For Vector, the Vehicle OS is a common vision shared between many products of different product lines, and not limited to embedded software
- Many products are and will be aligned to this vision with the goal of providing a powerful software platform and a corresponding development and operations ecosystem

Collaboration & Summary





Let’s shape the future of automotive software together!

Vector Vehicle OS Symposium 2022

Friday, October 28, 2022

	Marcelino Varas | Vector ▸ Model based E/E system design ▸ Contribution of the system design to the vehicle OS concept ▸ PREEvision as system design tool
12:00 p.m. CEST	**Automotive Software Factory** Matthias Wernicke | Vector ▸ Key elements of an Automotive Software Factory ▸ Workflows for application development and base layer integration ▸ Tool building blocks provided by Vector
12:30 p.m. CEST	**Lunch Break & Exhibition** Time for networking & visiting the exhibition
1:30 CEST	**Cloud-Native Technologies for In-Vehicle Software** Andreas Raisch | Vector ▸ Applying cloud native paradigms to automotive software ▸ Deployment in the heart of the workflow ▸ Where are we today - what's next?

3:15 p.m. CEST	**Coffee Break - Exhibition - Get Together with Open End** Time for networking & visiting the exhibition

For more information about Vector
And our products please visit

www.vector.com

wechat

bilibili

Jun, Zhang
Vector China