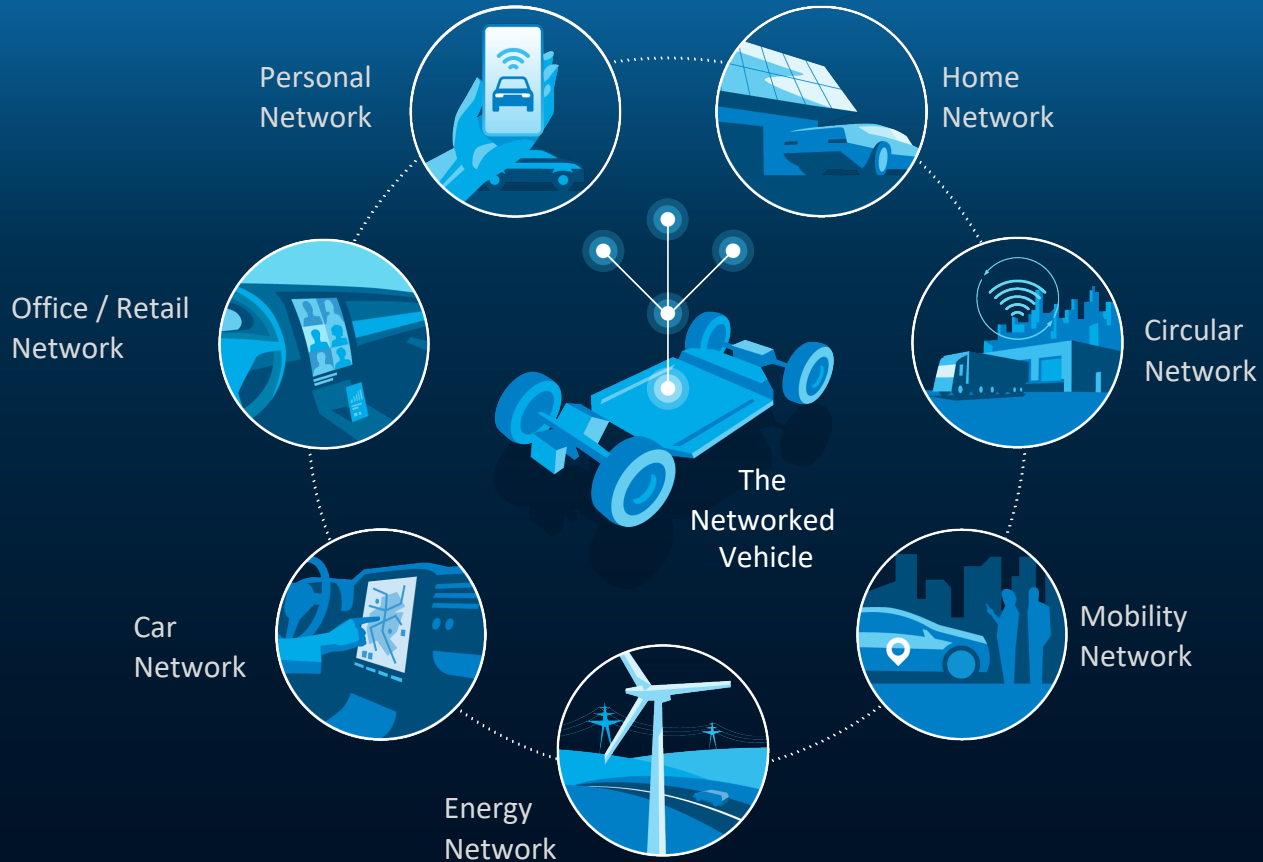# Software First, Digital Always
How Software accelerates Next Generation Mobility
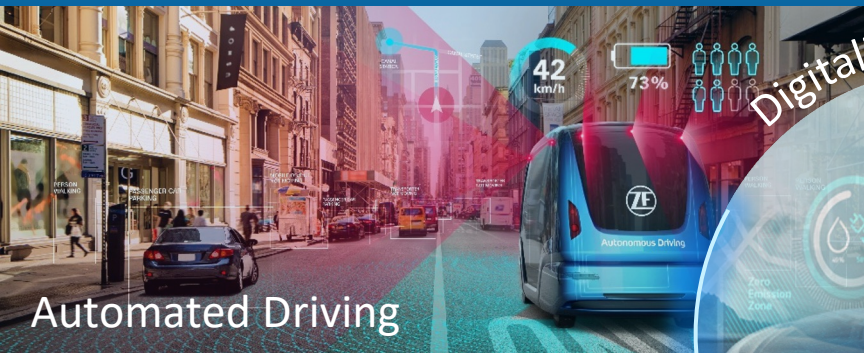
Dr. Christian Müller | Corporate R&D | ZF Group

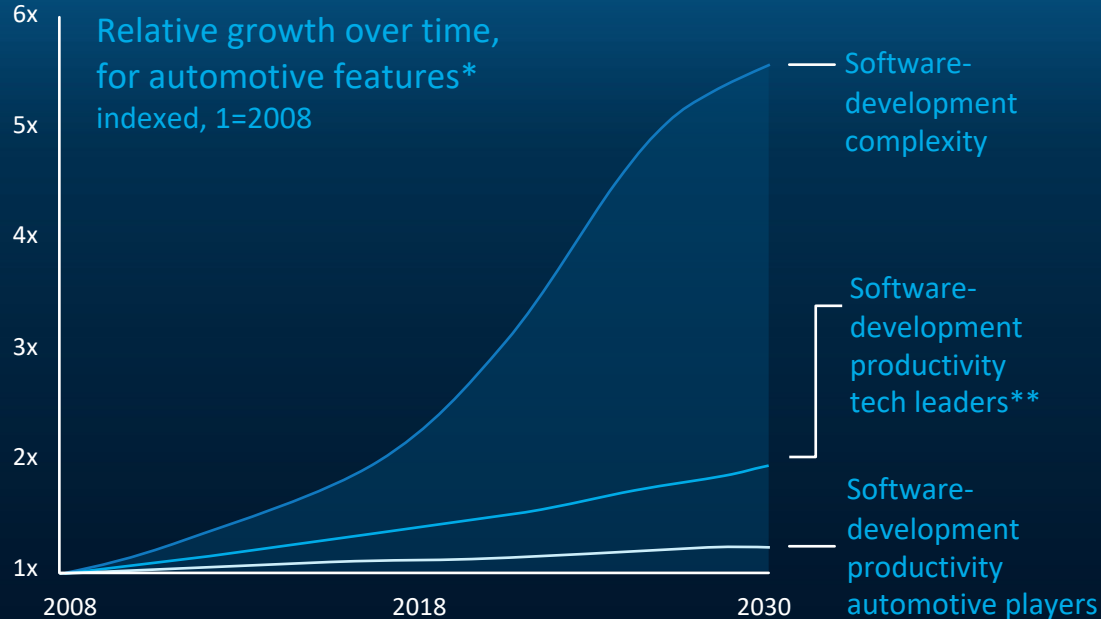# The Car Becomes Part of our Everyday Infrastructure

Personal Network

Home Network

Office / Retail Network

Circular Network

Car Network

The Networked Vehicle

Energy Network

Mobility Network

Software is Driving Next Generation Mobility at ZF: Leveraging Vehicle System Expertise for Disruptive SW Functions

Automated Driving

Digitalization / Software

Integrated Safety

Vehicle Motion Control

Electric Mobility

Managing the new SW paradigm

Complexity dilemma

Relative growth over time,
for automotive features*
indexed, 1=2008

6x
5x
4x
3x
2x
1x

2008   2018   2030

— Software-
development
complexity

Software-
development
productivity
tech leaders**

Software-
development
productivity
automotive players

*Analysis of >200 software-development projects from OEMs and from tier-1 and tier-2 suppliers.
**Top-performing quartile of technology companies.

Source McKinsey

Transformation need

▶ **New EE-Architectures & HPC**

▶ **Connectivity & Cloud**

▶ **SW / HW Separation & SWaaX**

▶ **Shared Platforms & Development Kits**

▶ **Community Mindset & People**

*Source Synopsis 2022

software first
digital always

360° offering for Software-defined Vehicles

Focus areas:
▷ Software solutions
  Connectivity
▷ Computing
▷ power

e-drive

Sensors

Actuators

High Performace Controller
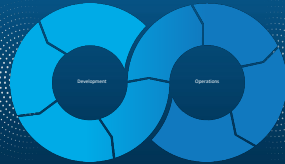
Software

Connectivity & Cloud
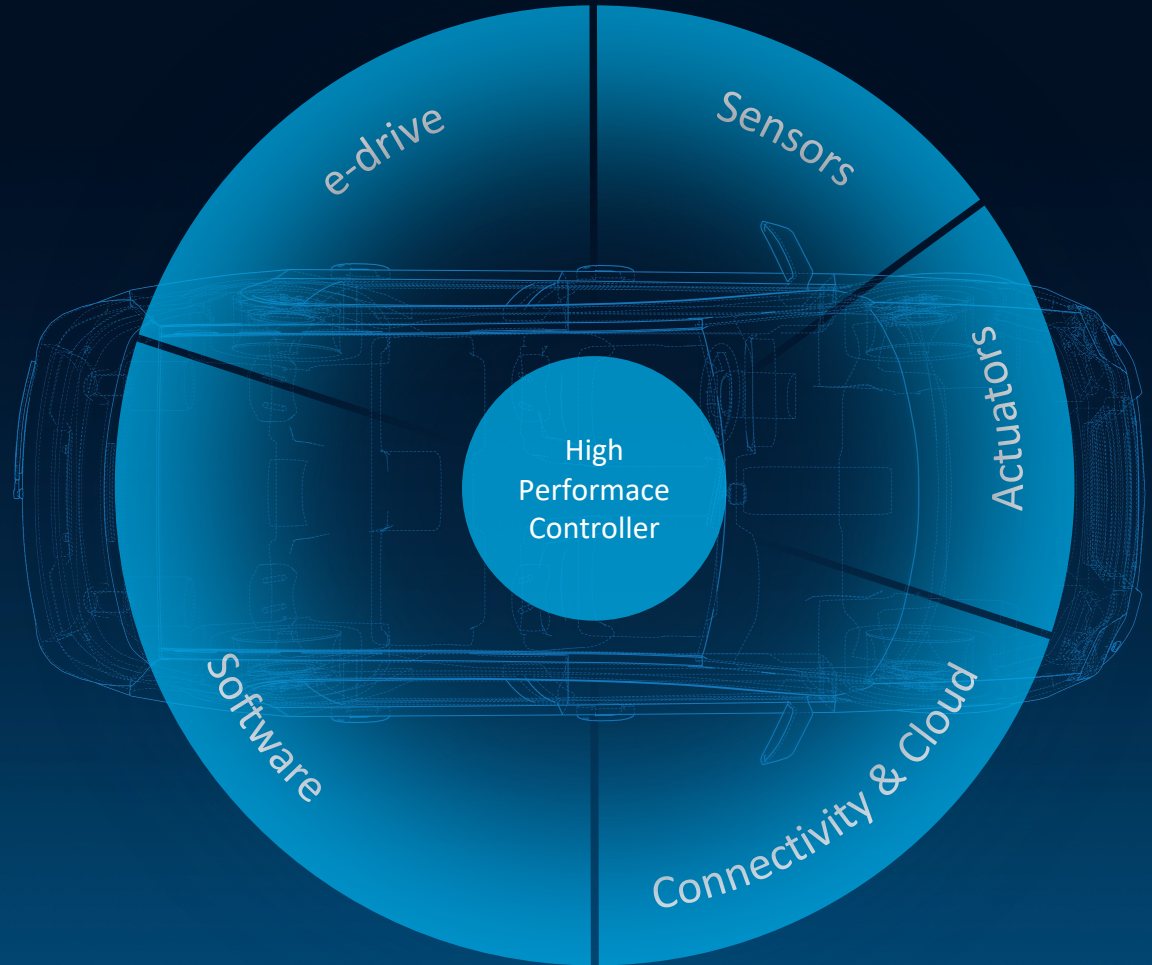
Software-enabled Acceleration
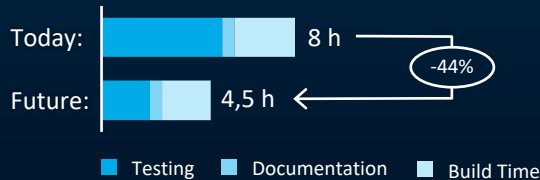
DevOps development approach

Cloud-based platform
Continuous integration

Benefits

- Agile development and higher robustness
- Improved international collaboration
- Higher efficiency, quality and transparency

Integration time

Today: 8 h

Future: 4,5 h

-44%

■ Testing ■ Documentation ■ Build Time

Frontloading Middleware

ZF Middleware

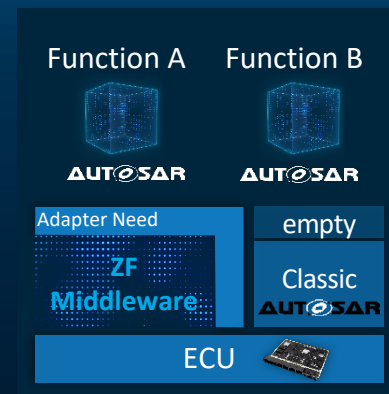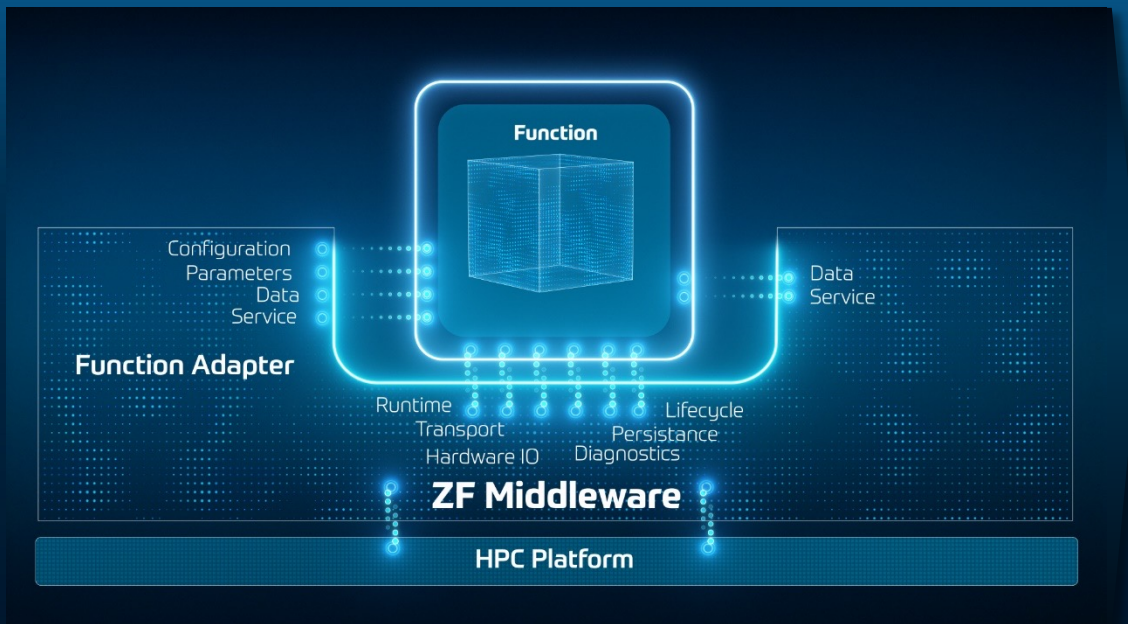Generic Middleware
OEM specific application

Benefits:

- Shortened starting phase of projects
- Earlier supply of software on target hardware
- No gateway workaround solutions needed

Delivery time

Today: Ready for C-Sample

Future: Ready for B-Sample

6 months

Future software kit enables high product maturity and reduction of delivery time

Functional Development Kit

Function

Configuration
Parameters
Data
Service

Function Adapter

Data
Service

Runtime
Transport
Hardware IO

Lifecycle
Persistance
Diagnostics

ZF Middleware

HPC Platform

Function A   Function B

AUT⊘SAR   **AUT⊘SAR**

Adapter Need   empty
ZF Middleware   Classic **AUT⊘SAR**

ECU

FDK not limited to Middleware
also for Classic Architecture

With the Function Adapter, ZF already equips each function with the appropriate connector for every interface in SdV-platforms

Summary

- Software efforts will grow above average

- Companies work on components in the software ecosystem (non differentiating)

- Join forces with "code first" inner and open source approach leverages individual efforts

Next Generation Mobility.

NOW.

clean, safe, comfortable