Elektrobit

Market Trends & Challenges

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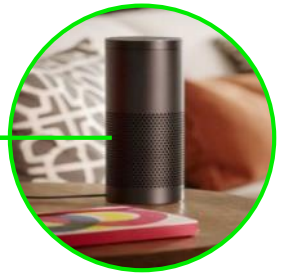
Executive Vice President – Products & Innovation
August 23, 2018

Megatrends

Electrification



Smart Devices

Connected Car

Automated Driving

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Megatrends

Electrification

Battery cost reducing from $200/kWh to <$100/kWh by 2025

Smart Devices

Virtual digital assistant grows from 390M users to 1.8B by 2021

Connected Car

98% of new cars sold will be connected by 2025

Automated Driving

All Top 10 OEMs to have highly automated technology by 2025

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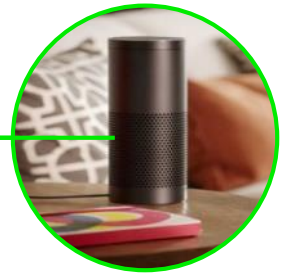
Megatrends

Electrification

Fail operational

Cybersecurity

Personal assistant



Smart Devices

Self-learning HMI

Augmented/virtual reality

Connected Car

OTA

IoT, cloud computing

SW factory

High performance computing

Artificial intelligence

Automated Driving

Simulation and testing

Hardware virtualization

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Traditionally, Cars viewed as Hardware Products…

Source: Volkswagen, https://www.welt.de/wirtschaft/article157906275/Wie-der-Apple-Effekt-die-Autoindustrie-veraendert.html

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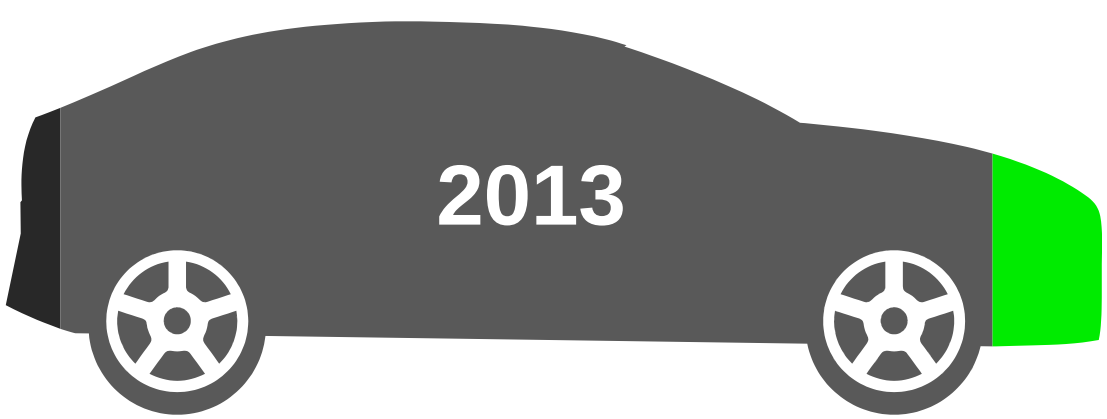
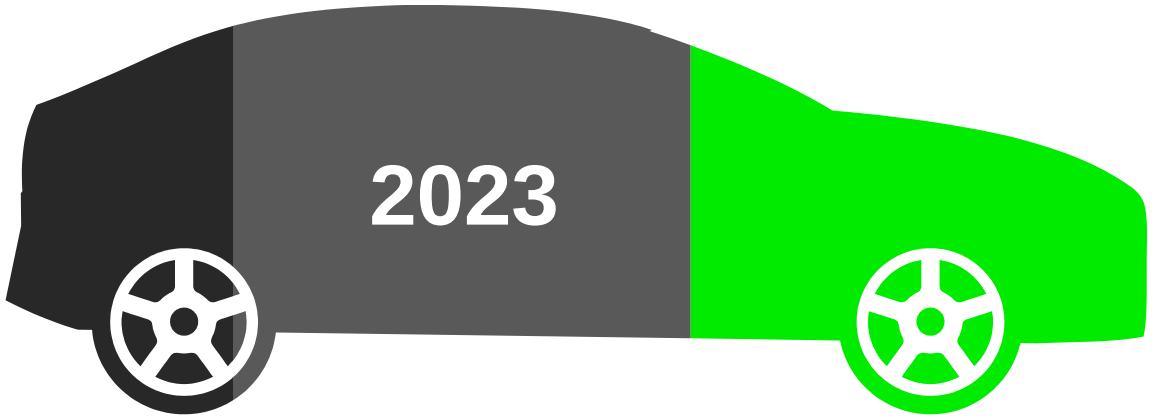
Future Value - Created through Software

Value of a car: yesterday vs. tomorrow



5 % Content 85 % Hardware 10 % Software



20 % Content 40 % Hardware 40 % Software

Source: Morgan Stanley Research

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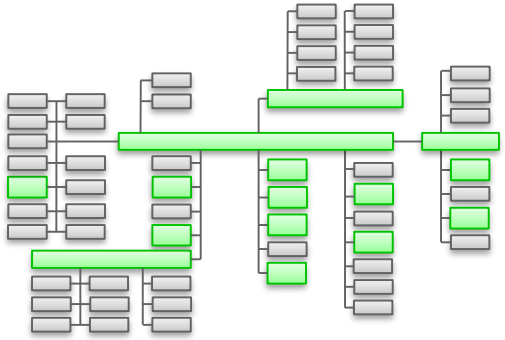
Software drives Architecture, Process and Organization

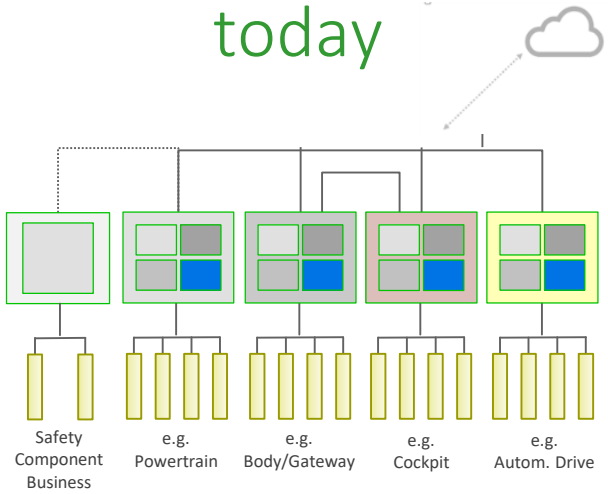
new E/E-architectures are developed by all technology leaders now → continued evolution ongoing beside massive scaling need for volume OEMs!

yesterday



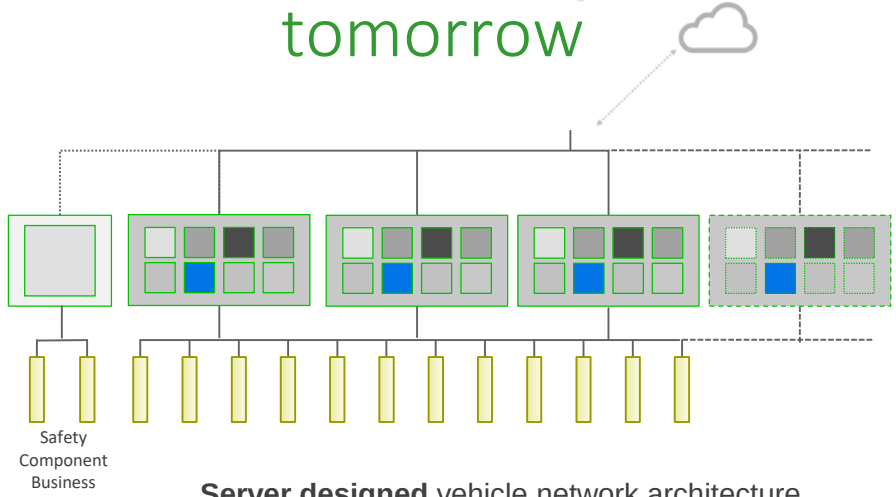
ECU-designed E/E Architecture
- high number of embedded ECUs
- Several domains
- Very specific ECU design

today



Domain designed vehicle network architecture
- Centralized functionality
- High Performance Computing
- HW & SW separation
- Less embedded ECUs & domains

tomorrow



Server designed vehicle network architecture
- High standardization of hardware
- Hardware plug & play if additional resources are needed
- Drastically reduced HW variance
- Evolved distribution of HW-abstracted functions

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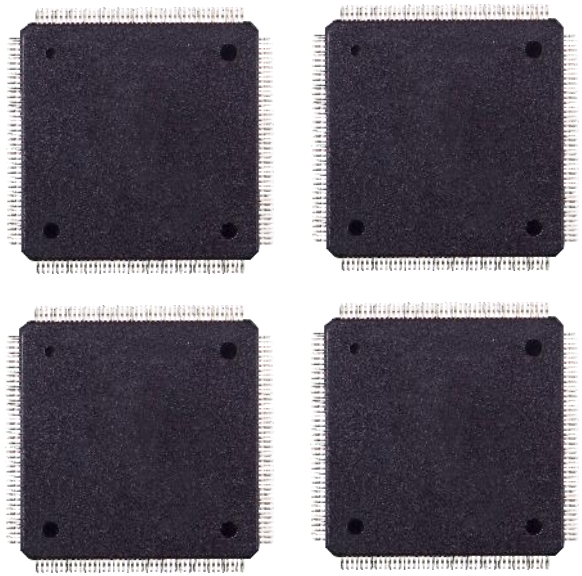
High-Performance ECU Insight: New Dimension of Complexity

Processors

4 processors with a total of
14 cores

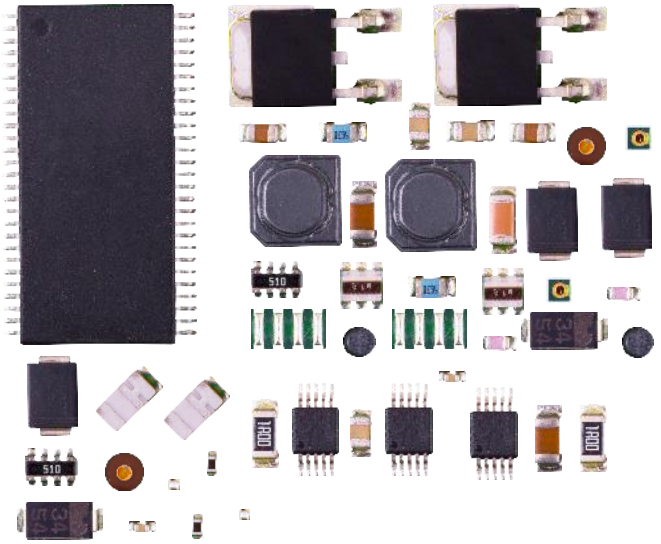


Operating systems

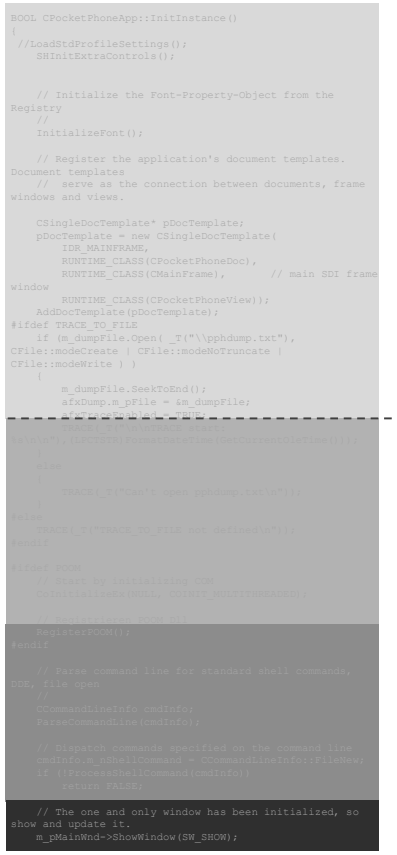
3 Operating systems
- AUTOSAR OS (Safety and QM)
- POSIX-based OS (e.g. Linux)
- Security OS

4 Boot managers

Several virtual machines



Software lines of code (LoC)



High performance controller:
~20 million (estimation)

High-end infotainment system: **10 million**

High-end navigation software: **4 million**

Typical body controller: **200.000 – 2 million**

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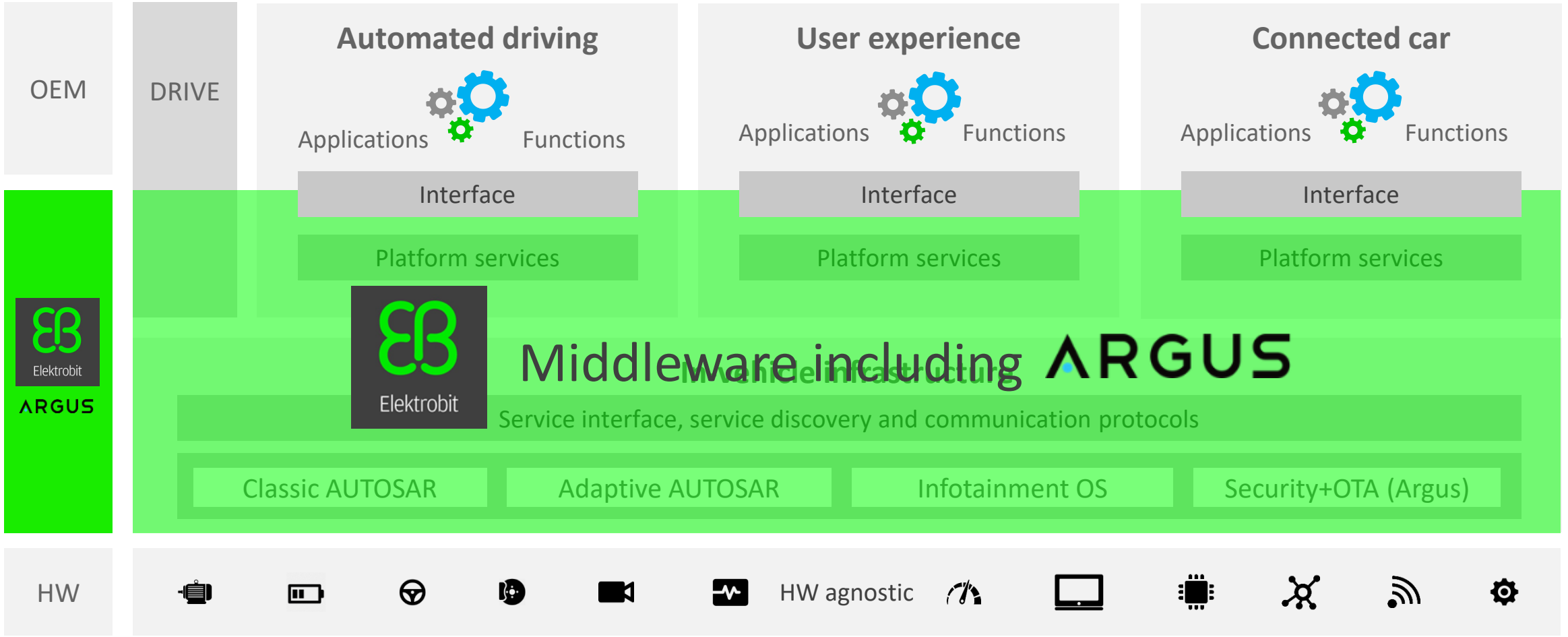
Vehicle Network will evolve into a Software Platform



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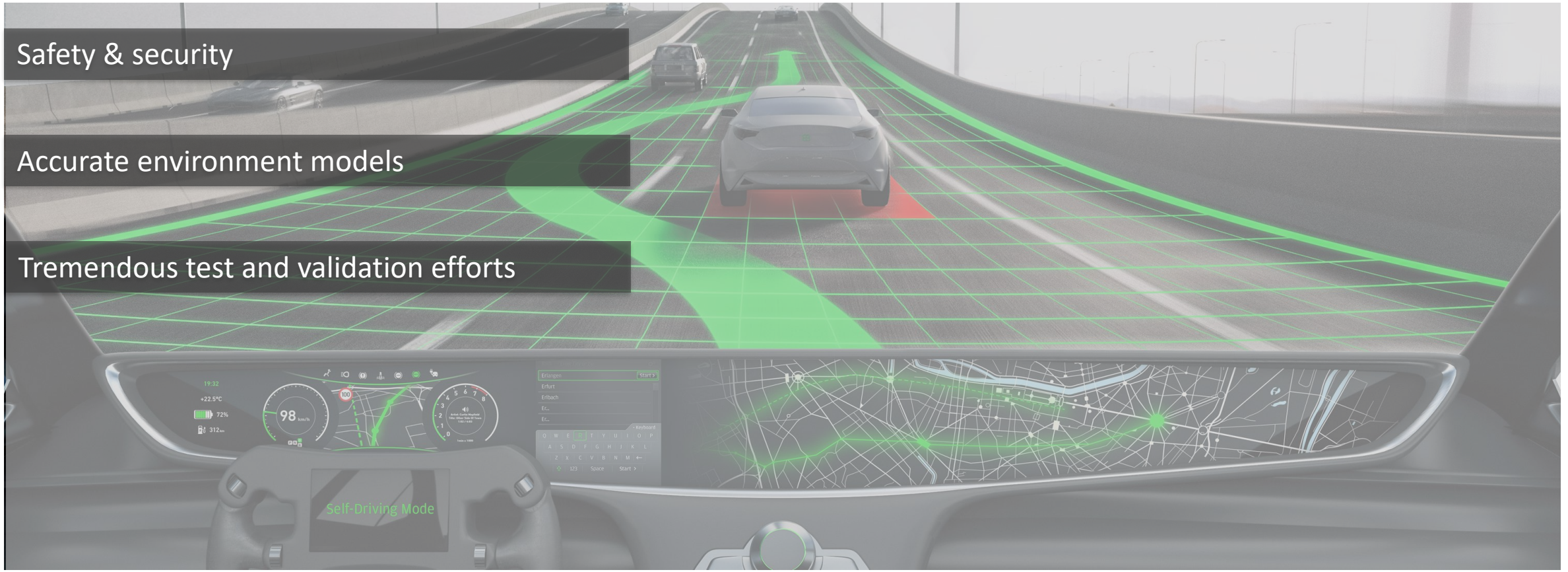
Trends in Automated Driving

Tackle the challenges and pave the way towards future mobility.



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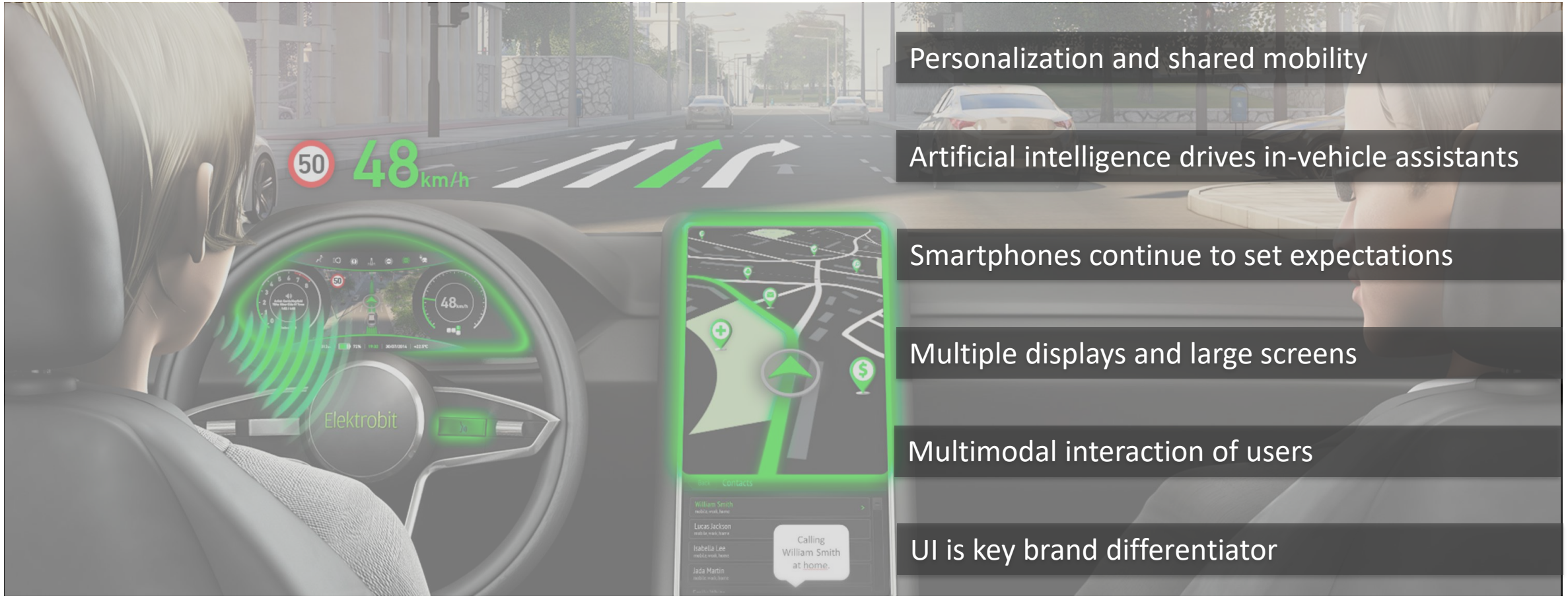
Trends for User Experience

Tackle the challenges and pave the way towards future mobility.



- Personalization and shared mobility
- Artificial intelligence drives in-vehicle assistants
- Smartphones continue to set expectations
- Multiple displays and large screens
- Multimodal interaction of users
- UI is key brand differentiator

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Trends for Connected Car

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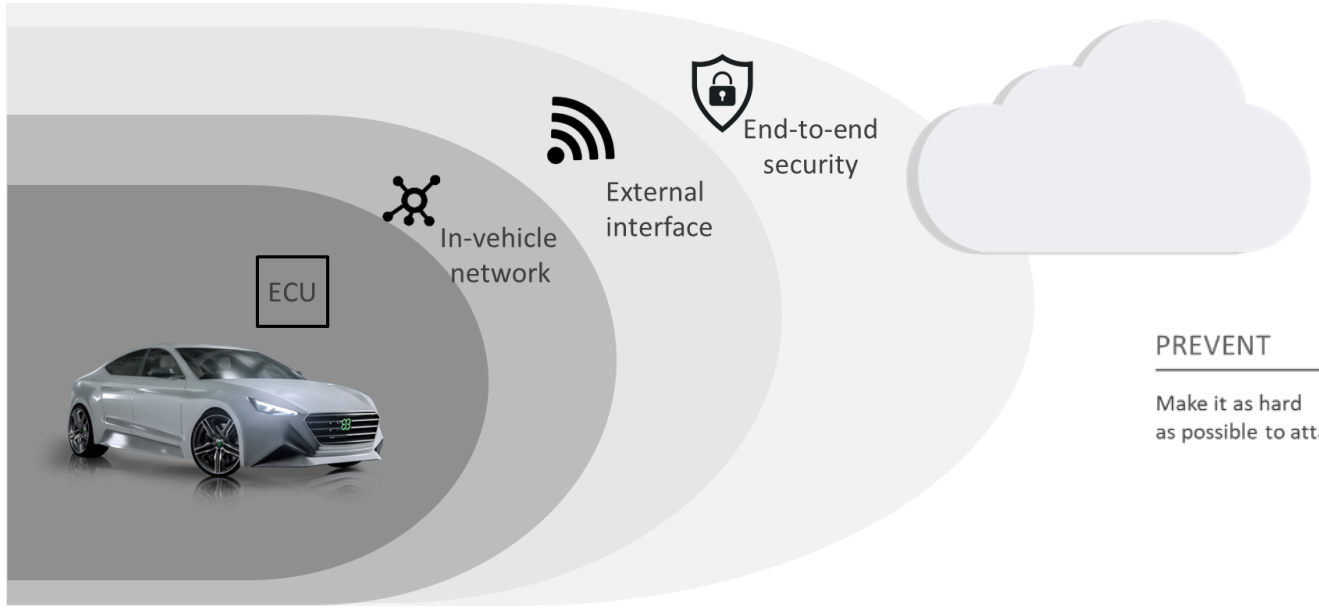
Extending the Software Platform into the Cloud



Argus Products:

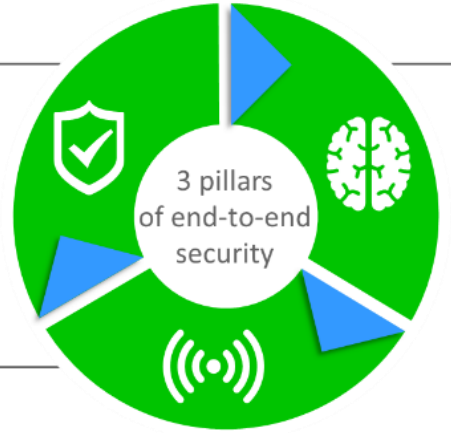
In-vehicle network protection

Connectivity Protection

ECU protection

Lifespan Protection

ARGUS



PREVENT

Make it as hard as possible to attack

UNDERSTAND

Know you are being hacked and how, in real time
Monitor > Detect > Analyze.

RESPOND

Mitigate the damage and immunize the fleet in hours with software updates over-the-air

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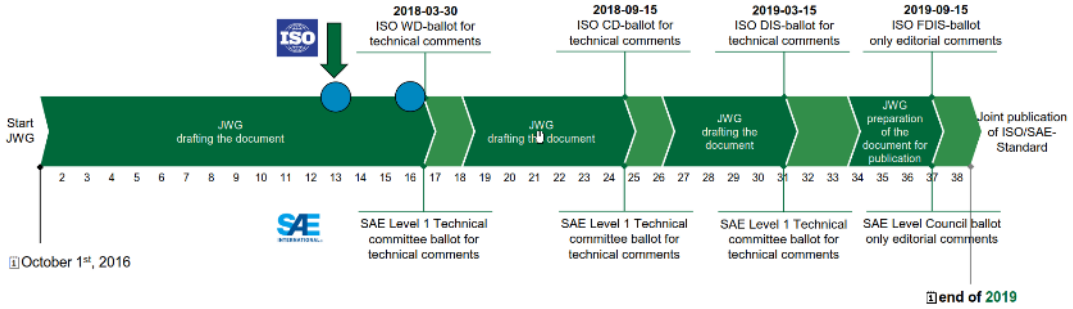
Cybersecurity and Over-the-Air Updates

- Various legal regulations for Cybersecurity underway in US, UK, China, EU
- ISO/SAE 21434 – Cybersecurity Engineering – will be published end of 2019

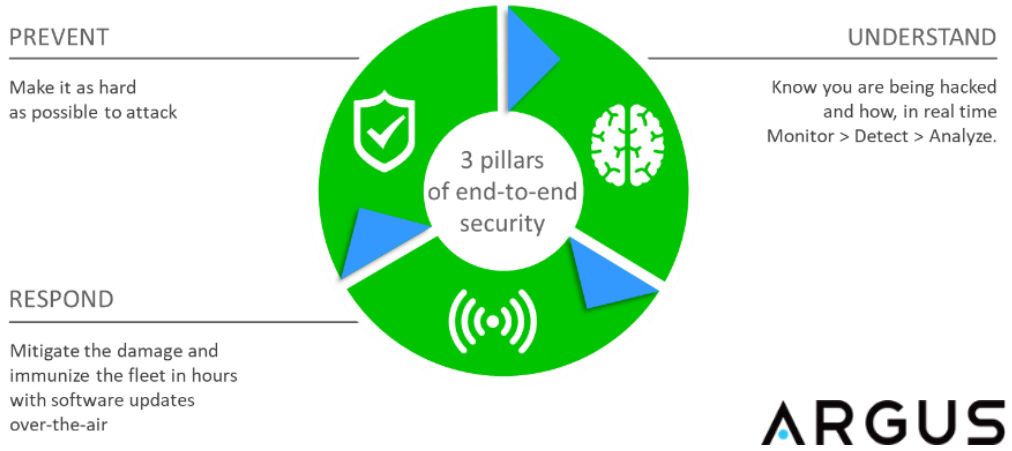


Security has more aspects than Functional safety

- To be addressed during product R&D
- *Over whole product lifetime*
- *Company infrastructure and IT systems to be included*

Approach at EB

- Security (IDPS, etc.) from Argus
- Over-the-air-update included
- Integrated architecture (as part of software platform)



IDPS: Intrusion Detection and Prevention System

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Summary:

1. **Competitive Solutions for Next Generation Architecture**
2. **Reusable Software Components offered Out-of-the-Box**
3. **End-to-End Solution for Security and Intrusion Detection**

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Thank you for your attention!
Questions?

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