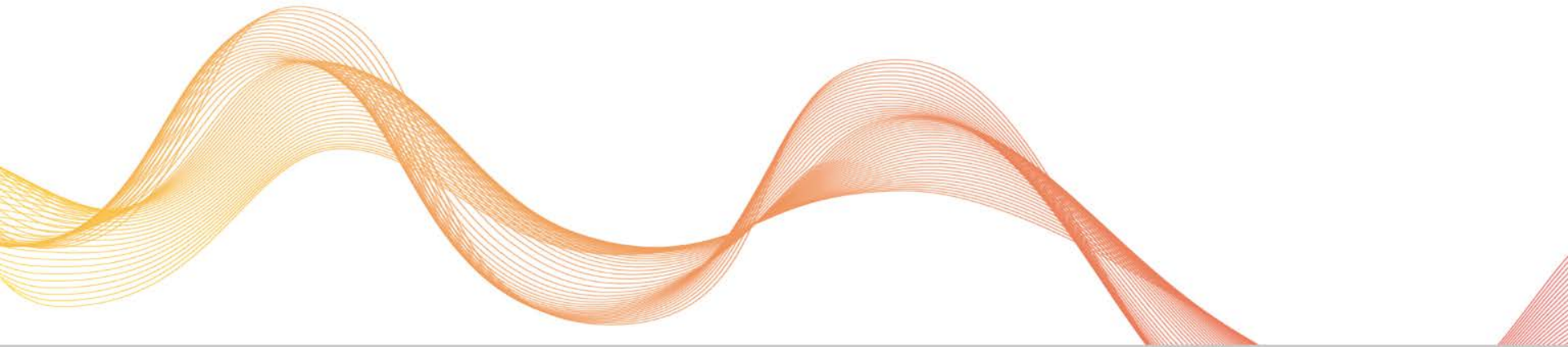




ASAM

Association for standardisation of
automation and measuring systems



Impact of ADAS and Autonomous Driving Systems on ASAM Standards

Regional Member Meeting Japan, 2017, Tokyo

Presenter

Thomas Thomsen

ASAM e.V.

Content

1	New System Architectures for ADAS and Autonomous Driving
2	AUTOSAR Adaptive Platform
3	Impact on ASAM Standards
4	Summary

Photos



Gerd Winkler, Continental Automotive Systems



Martin Lunt,
Robert Bosch GmbH
& AUTOSAR

from the

ASAM General Assembly

March 08, 2017
Stuttgart, Germany



Audience



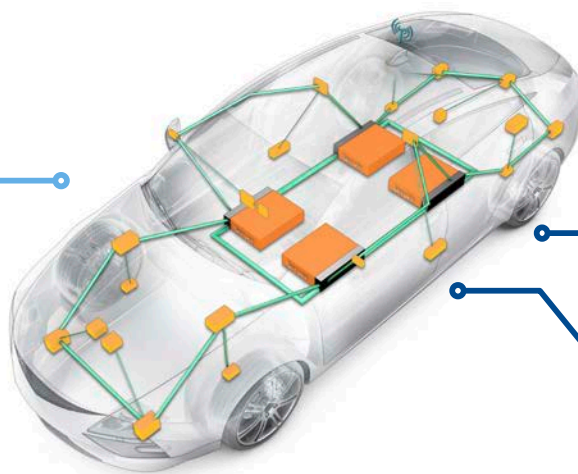
Panel Discussion



Continental : Drivers for New System Architecture

Key Drivers

- › eMobility
- › Automated Driving
- › Services
- › Connectivity
- › Market
- › User needs



System orientation **enables us to**
handle the challenges

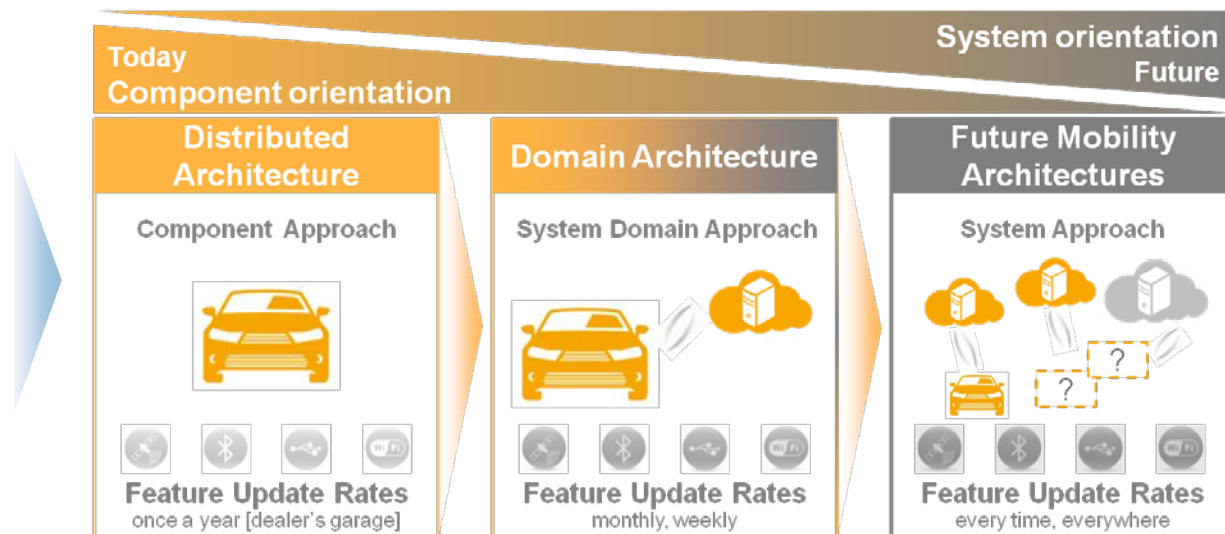
- › Updatable
- › Upgradable
- › Reliable
- › Technology
- › Function
- › Costs
- › Quality

Challenges

Source: "Future Vehicle System Architecture"
Gerd Winkler, Continental Automotive Systems
ASAM General Assembly, Stuttgart, March 08, 2017

Continental : System Orientation and its Impact

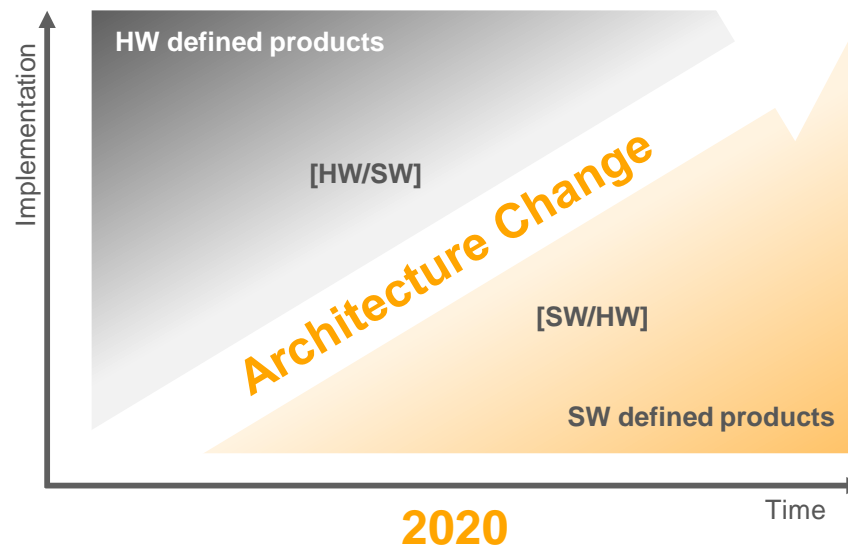
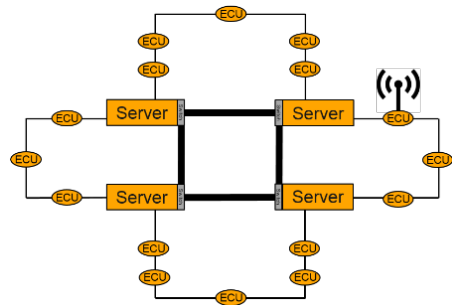
Key Drivers and
Challenges



Source: "Future Vehicle System Architecture"
Gerd Winkler, Continental Automotive Systems
ASAM General Assembly, Stuttgart, March 08, 2017



Continental : Architecture Vision



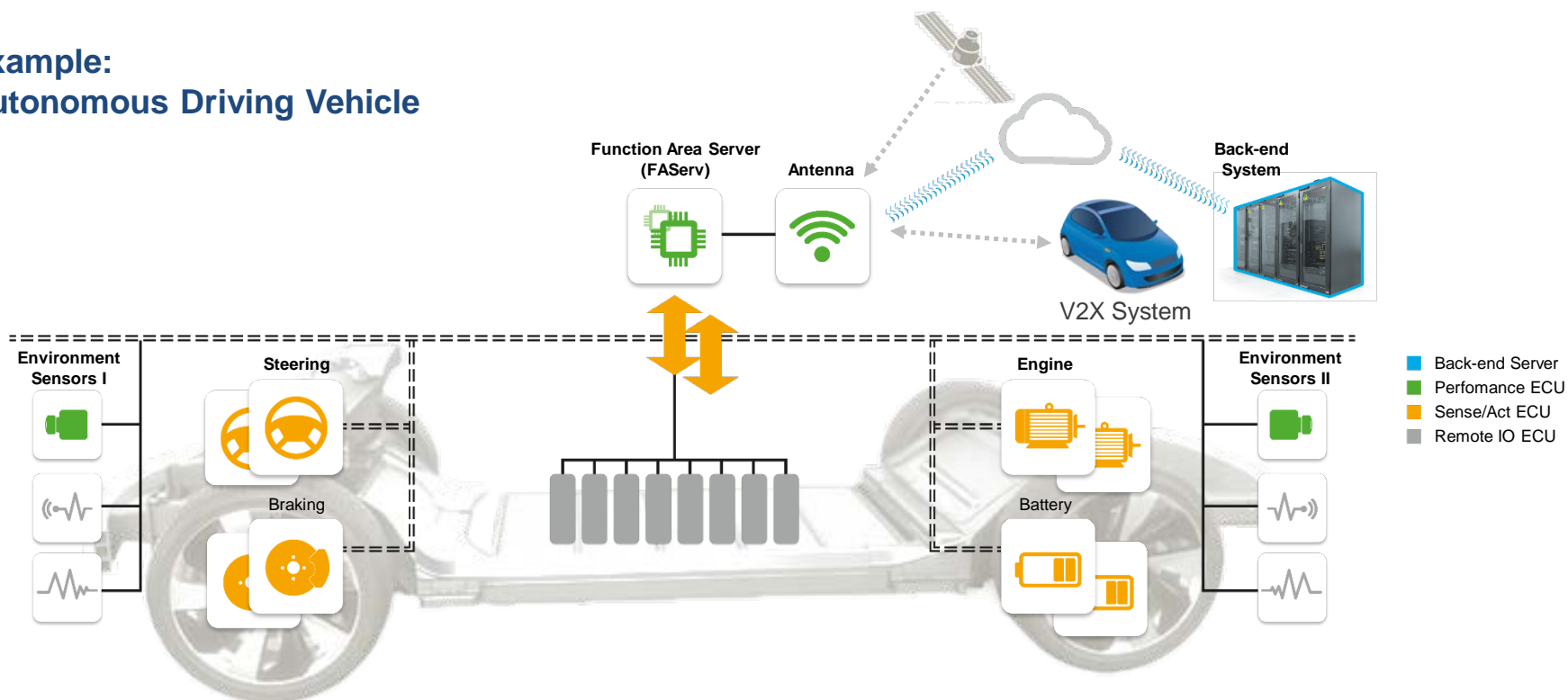
Focus will shift to:

- › Intelligent Networks
- › “SW Defined” Products

Source: "Future Vehicle System Architecture"
Gerd Winkler, Continental Automotive Systems
ASAM General Assembly, Stuttgart, March 08, 2017

Continental : Server-Based Architecture

Example: Autonomous Driving Vehicle



Source: "Future Vehicle System Architecture"
Gerd Winkler, Continental Automotive Systems
ASAM General Assembly, Stuttgart, March 08, 2017

BOSCH: Domain-Centralized E/E Architecture

Advanced Gateways

Increased routing complexity and communication throughput.

Communication Network

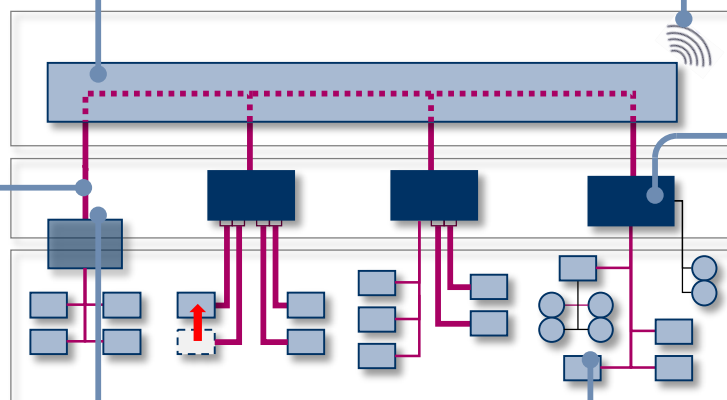
Higher bandwidth, flexible communication mechanism.

(Gbit Ethernet)

Integration Platform

Integration platform for superposed software components.

(Hypervisor)



Connected Car

Open E/E architecture with external communication, secure connection and SW download.

(FOTA/SOTA)

Domain ECUs

Powerful controller as integration platform for cross domain software components, high performance platform.

(non-automotive μ P)

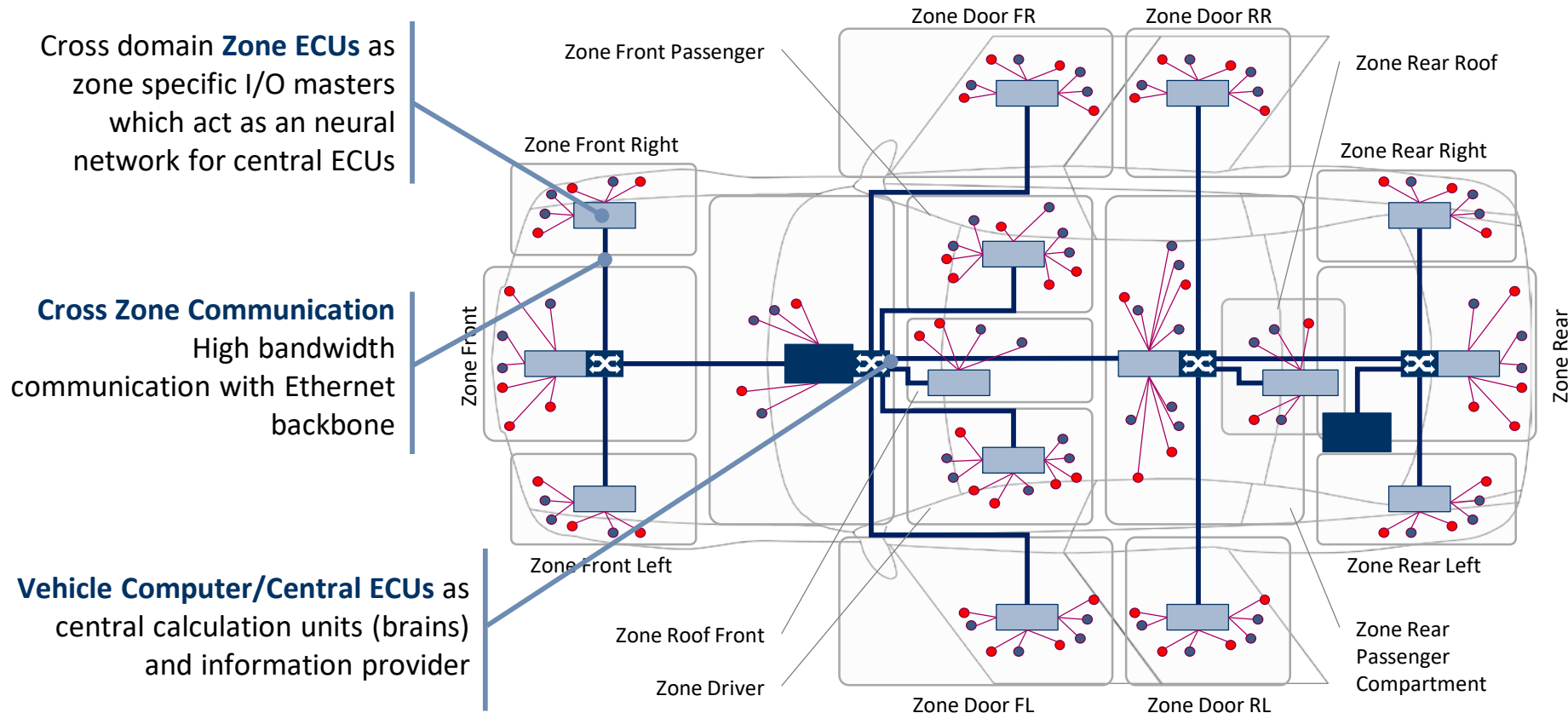
Embedded System ECUs

Focusing on deep system specific functionalities.

Source: "E/E Architecture in a Connected World"
Martin Lunt, Robert Bosch GmbH
ASAM General Assembly, Stuttgart, March 08, 2017



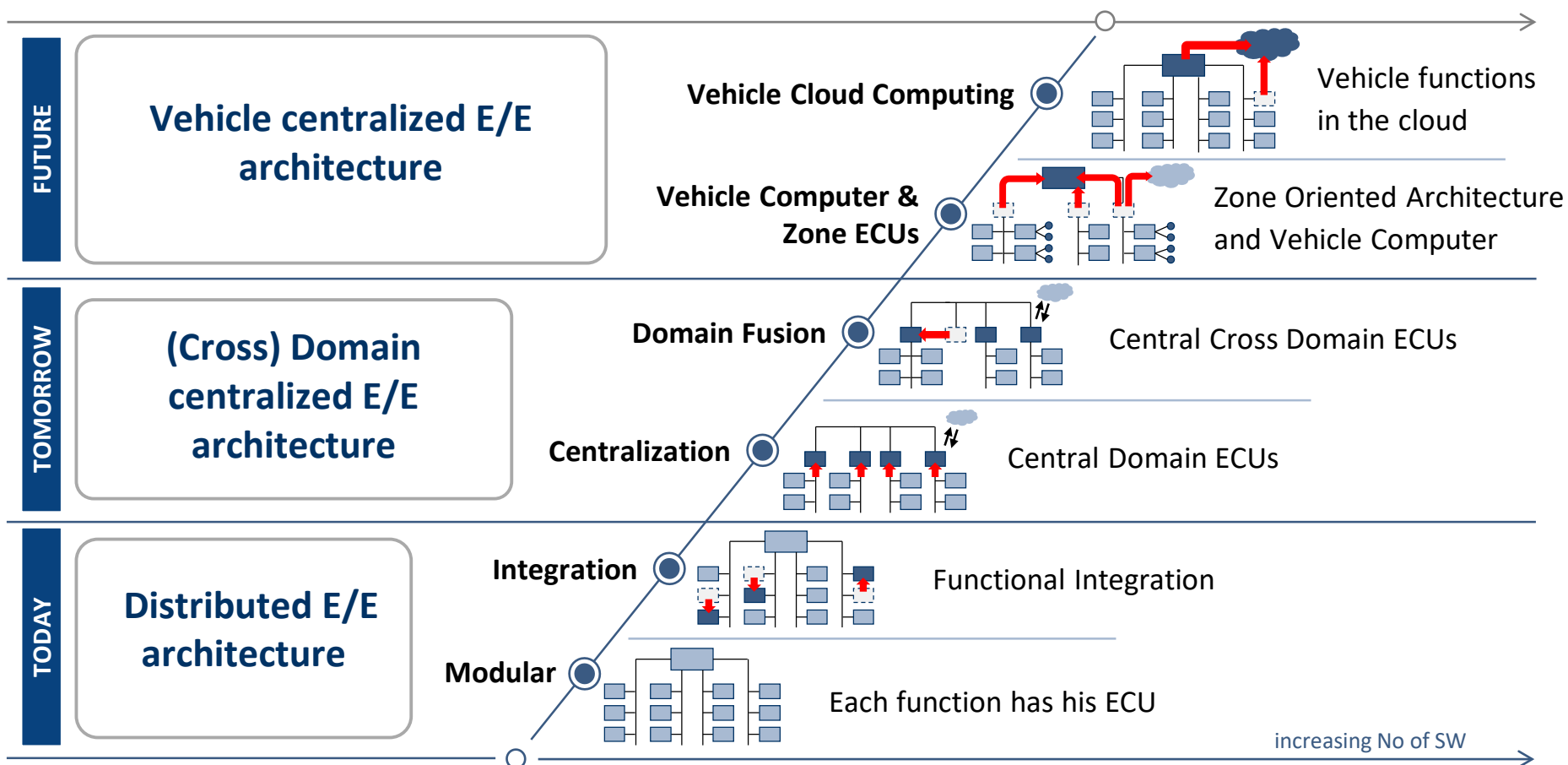
BOSCH: Vehicle-Centralized E/E Architecture



Source: "E/E Architecture in a Connected World"
Martin Lunt, Robert Bosch GmbH
ASAM General Assembly, Stuttgart, March 08, 2017



BOSCH: Roadmap E/E Architecture

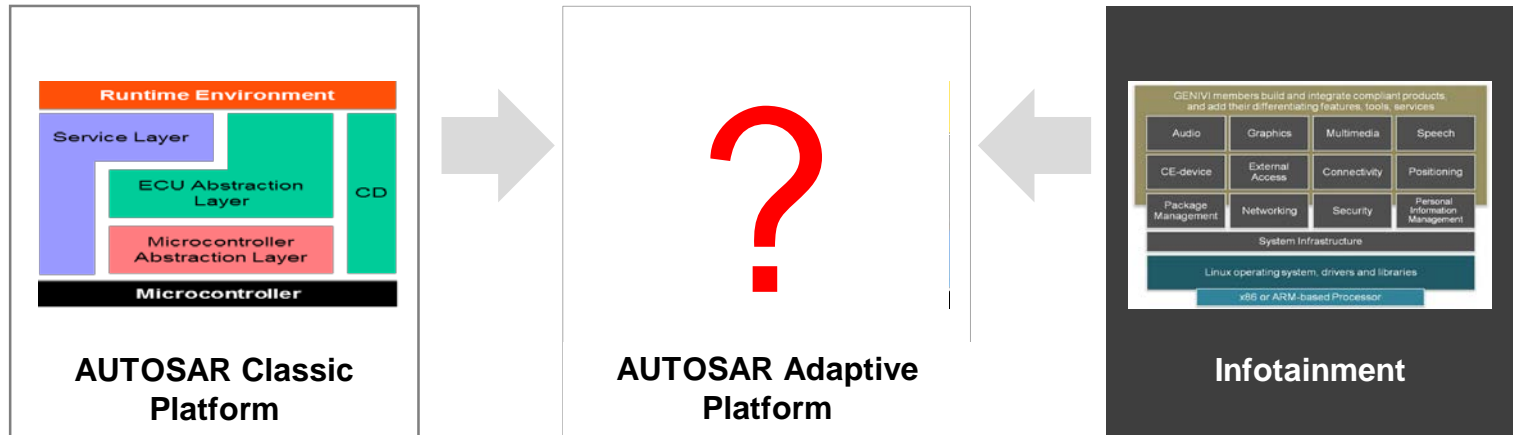


Source: "E/E Architecture in a Connected World"
Martin Lunt, Robert Bosch GmbH
ASAM General Assembly, Stuttgart, March 08, 2017

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AUTOSAR: Motivation for a New Platform

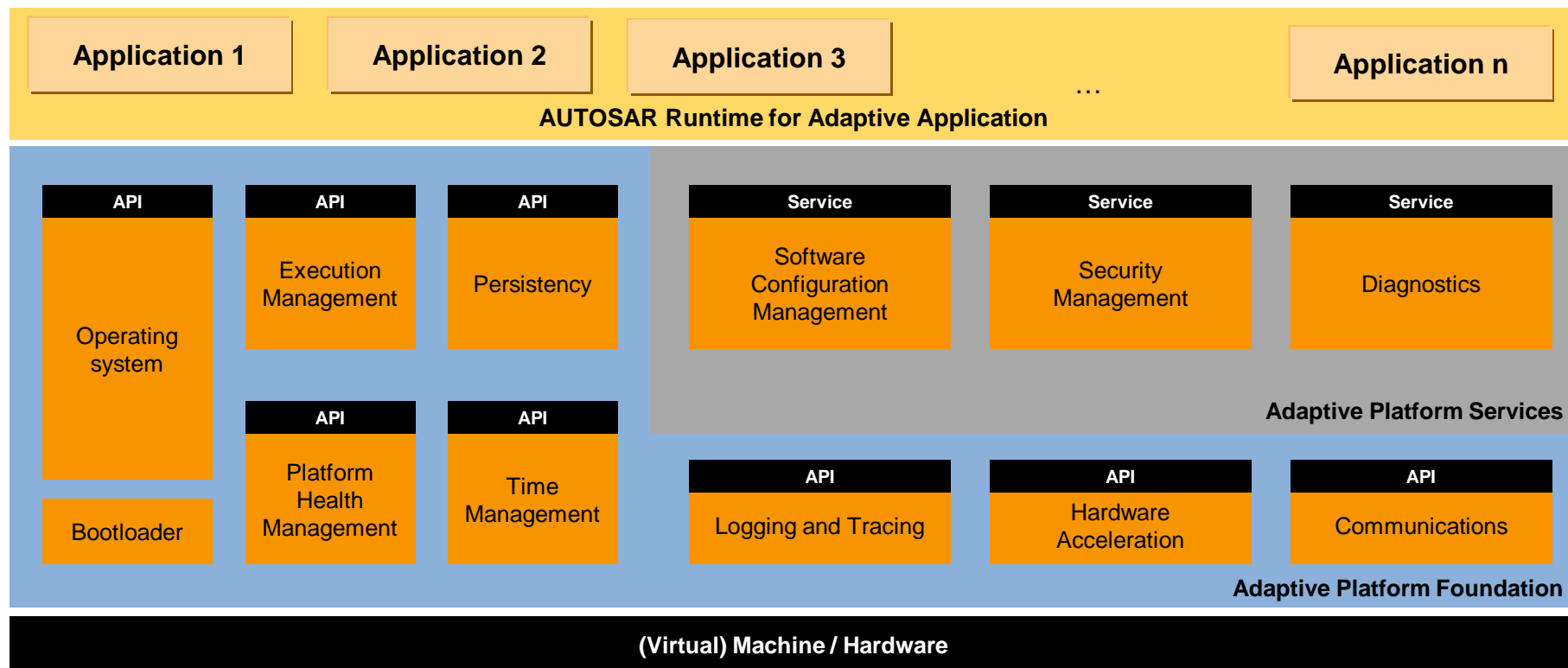


Real time Requirements	High, in the range of micro-sec	Mid, in the range of milli-sec	Low, in the range of sec
Safety Criticality	High, up to ASIL-D	High, at least ASIL-B	Low, QM
Computing power	Low, ~ 1000 DMIPs	High, > 20.000 DMIPs	High, ~ 10.000 DMIPs

Source: "AUTOSAR Adaptive Platform Introduction"
 Martin Lunt, Robert Bosch GmbH
 ASAM General Assembly, Stuttgart, March 08, 2017



AUTOSAR: Architectural Overview



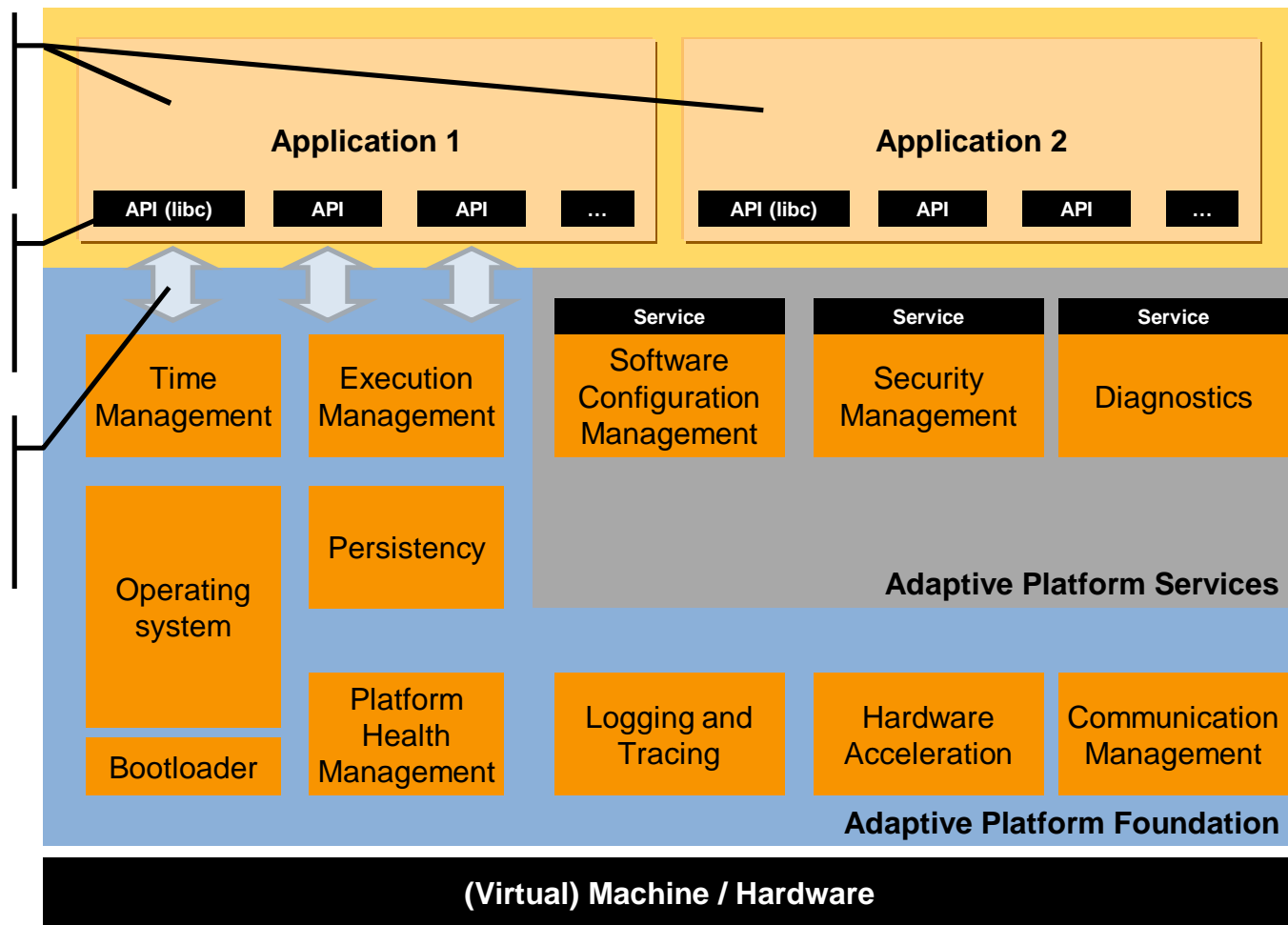
Source: "AUTOSAR Adaptive Platform Introduction"
Martin Lunt, Robert Bosch GmbH
ASAM General Assembly, Stuttgart, March 08, 2017

AUTOSAR: Memory Virtualization & Communication

Each application runs in its own protected address space

Access to platform functionality via libraries

Communication via implementation specific inter process communication (IPC)

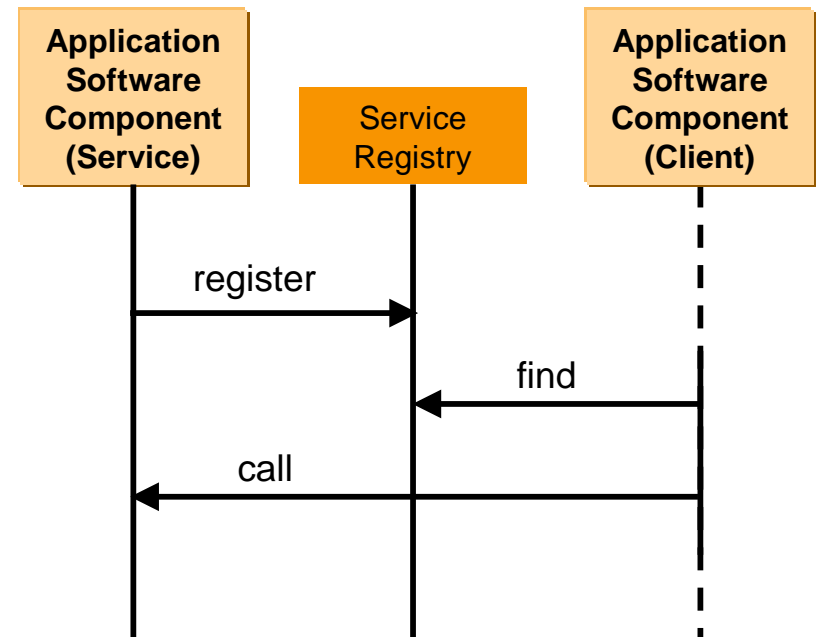


Source: "AUTOSAR Adaptive Platform Introduction"
Martin Lunt, Robert Bosch GmbH
ASAM General Assembly, Stuttgart, March 08, 2017



AUTOSAR: Service-Oriented Communication

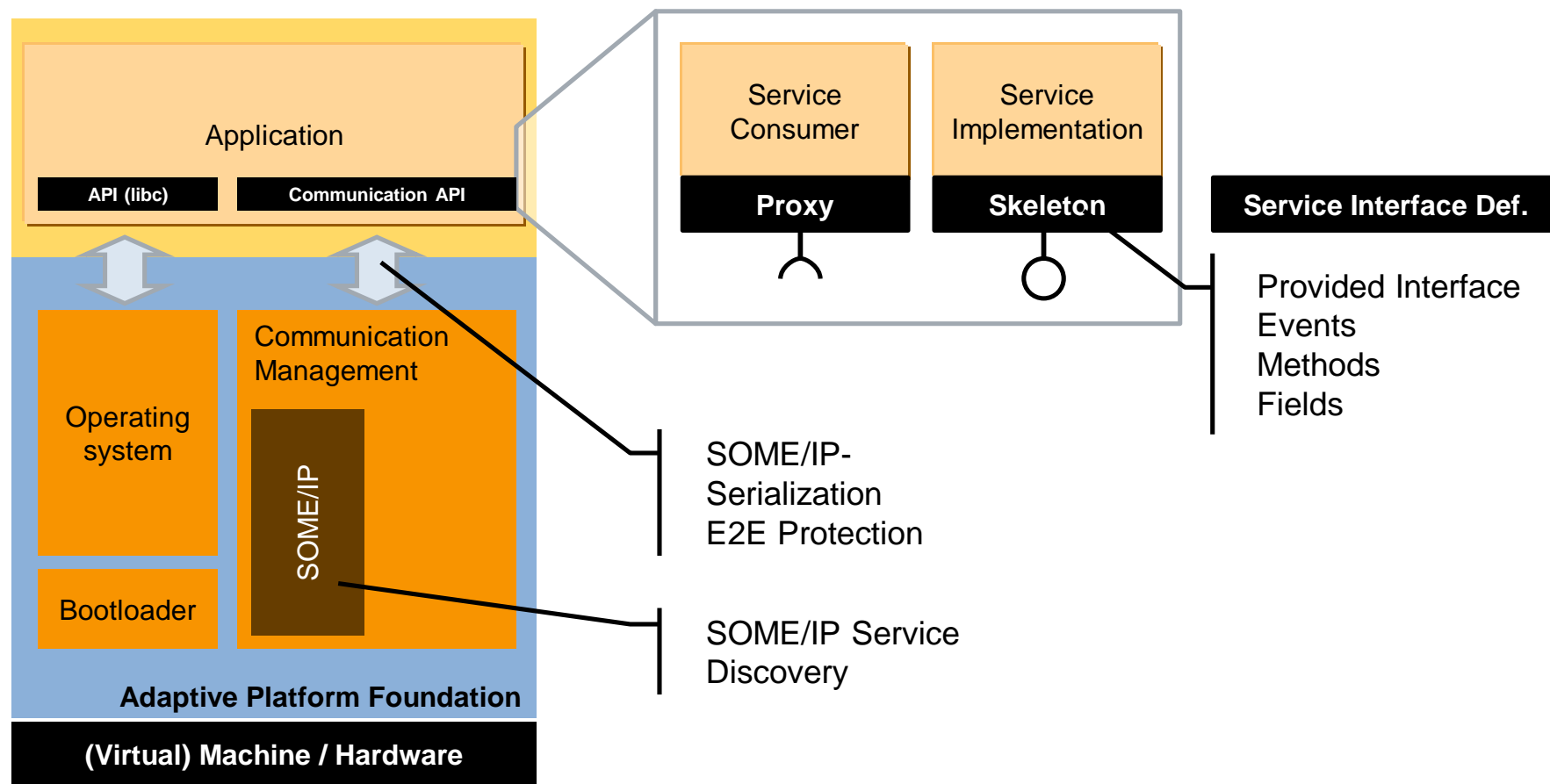
- SW components executed on the adaptive platform will use service-oriented communication.
- Communication paths can be established at design- and at run-time.
- The AUTOSAR Adaptive platform will therefore provide middleware functionality.



Sequence Diagram

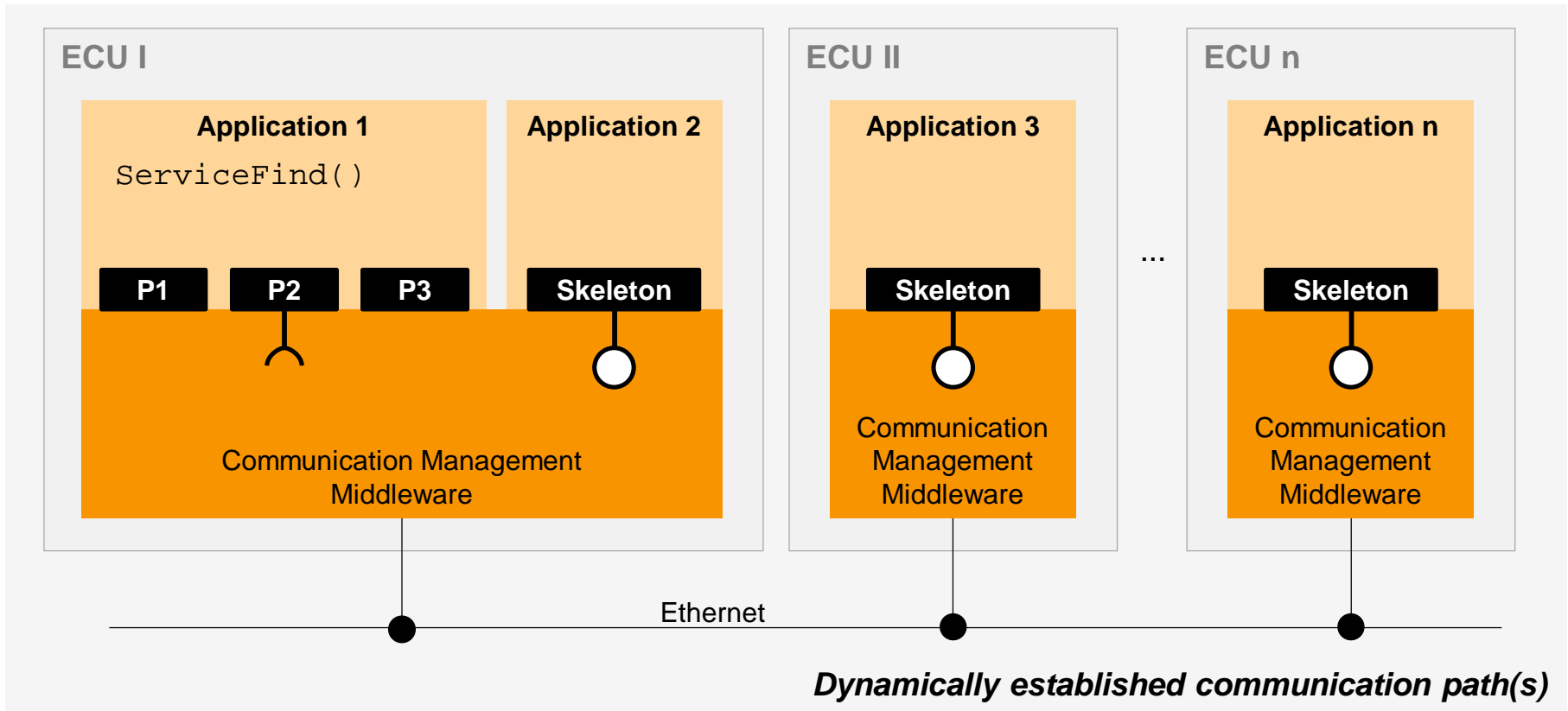
Source: "AUTOSAR Adaptive Platform Introduction"
Martin Lunt, Robert Bosch GmbH
ASAM General Assembly, Stuttgart, March 08, 2017

AUTOSAR: Service-Oriented Communication



Source: "AUTOSAR Adaptive Platform Introduction"
Martin Lunt, Robert Bosch GmbH
ASAM General Assembly, Stuttgart, March 08, 2017

AUTOSAR: Dynamically Established Communication



- Service discovery finds all local and remote service instances in the system.
- Available service instances are represented by Proxies (P1 ... P3) to the application.
- Application can choose which service instance(s) to use.

Source: "AUTOSAR Adaptive Platform Introduction"
Martin Lunt, Robert Bosch GmbH
ASAM General Assembly, Stuttgart, March 08, 2017

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Paradigm Shift in E/E Development

Classic

- SOP = ECU is feature-complete
- In-vehicle networks
- Ports to connect with workshop testers
- Signal-oriented communication
- Static memory allocation
- Variables, recorded as time-series

Adaptive

- SOP = ECU has minimum feature set
- Applications are added after SOP
- In-vehicle networks
- Telematics unit to connect with external servers
- Service-oriented communication
- Dynamic memory allocation
- Objects, recorded as event-series
- Frame-based data, recorded as streams

Development
Duration

ECU
Connectivity

Inter-ECU
Communication

Internal
ECU Data

Development
Duration

ECU
Connectivity

Inter-ECU
Communication

Internal
ECU Data



The Classic Paradigm - Well Covered by ASAM

Classic

Development
Duration

- SOP = ECU is feature-complete

ECU
Connectivity

- In-vehicle networks
- Ports to connect with workshop testers

Inter-ECU
Communication

- Signal-oriented communication

Internal
ECU Data

- Static memory allocation
- Variables, recorded as time-series

- Well covered by ASAM standards
- Mature
- Proven in practice for 10 - 20 years
- Written by best industry experts
- Wide range of COTS tools available

The Adaptive Paradigm?



Adaptive

- SOP = ECU has minimum feature set
- Applications are added after SOP
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Development
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ECU Data



Impact on ASAM Standards

ASAM MCD-2 D (ODX)

Problem:

How to diagnose/update applications, that may or may not be present in the ECU?

- Discovery or registration of applications and their DTCs
- ECU flashing with the "right" content



Adaptive

- SOP = ECU has minimum feature set
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Development
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Impact on ASAM Standards

Adaptive

ASAM MCD-2 NET (FIBEX)

FIBEX already covers SOME/IP.

- Current project fixes some minor issues.



- SOP = ECU has minimum feature set
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Development
Duration

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ECU Data



Impact on ASAM Standards

All ASAM MCD Standards

Problem:

Memory objects are dynamic, i.e. they

- may or may not exist
 - may have multiple instances
 - may or may not contain data
 - have no fixed address
- Data discovery or registration
- Event-based data logging

Problem:

Objects and frame-based data have totally different formats than time-series data

- Re-definition of calibration protocol (XCP)
- Re-definition of data storage format (MDF)



Adaptive

- SOP = ECU has minimum feature set
- Applications are added after SOP
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Development
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ECU Data



Impact on ASAM Standards

Adaptive

- SOP = ECU has minimum feature set
- Applications are added after SOP

- In-vehicle networks
- Telematics unit to connect with external servers

- Service-oriented communication

- Dynamic memory allocation
- Objects, recorded as event-series
- Frame-based data, recorded as streams

ASAM ODS

Problem:

Objects have totally different formats than time-series data

- Object-oriented ODS base model
- Object-oriented data base

Problem:

Frame-based data have high bandwidth and storage requirements

- Making ODS ready for Big Data



Development
Duration

ECU
Connectivity

Inter-ECU
Communication

Internal
ECU Data

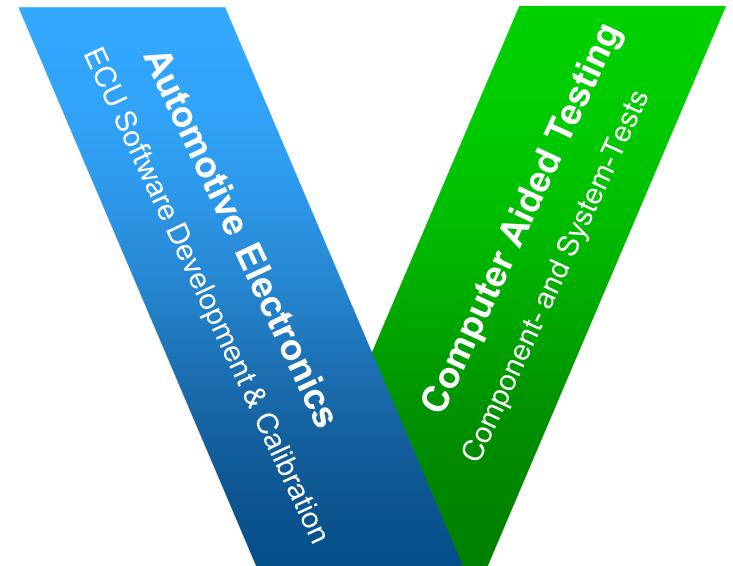
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Summary

New Development-Paradigms for ASAM Standards

- ▶ Applications are added after SOP
- ▶ Telematics unit to connect with external servers
- ▶ Service-oriented communication
- ▶ Dynamic memory allocation
- ▶ Objects, recorded as event-series
- ▶ Frame-based data, recorded as streams



Thank you for your attention

Thomas Thomsen

Global Technology Manager, ASAM e.V.

Phone: +49 (8102) 8061-64

Email: thomas.thomsen@asam.net