AUTOSAR @ BOSCH

C/AI
Automotive Systems Integration
Robert Bosch GmbH

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Outline

- Motivation
- Organization
- Architecture
- Rollout

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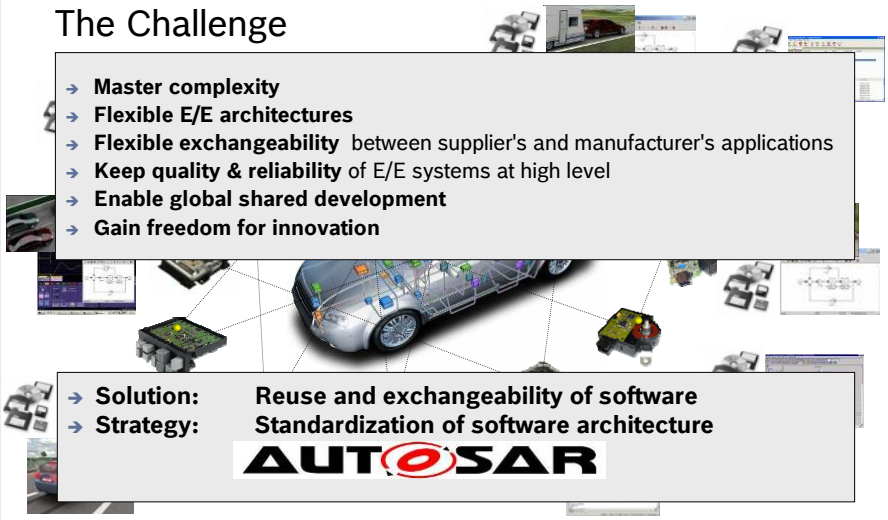
The Challenge



- **Master complexity**
- **Flexible E/E architectures**
- **Flexible exchangeability** between supplier's and manufacturer's applications
- **Keep quality & reliability** of E/E systems at high level
- **Enable global shared development**
- **Gain freedom for innovation**

- **Solution:** **Reuse and exchangeability of software**
- **Strategy:** **Standardization of software architecture**

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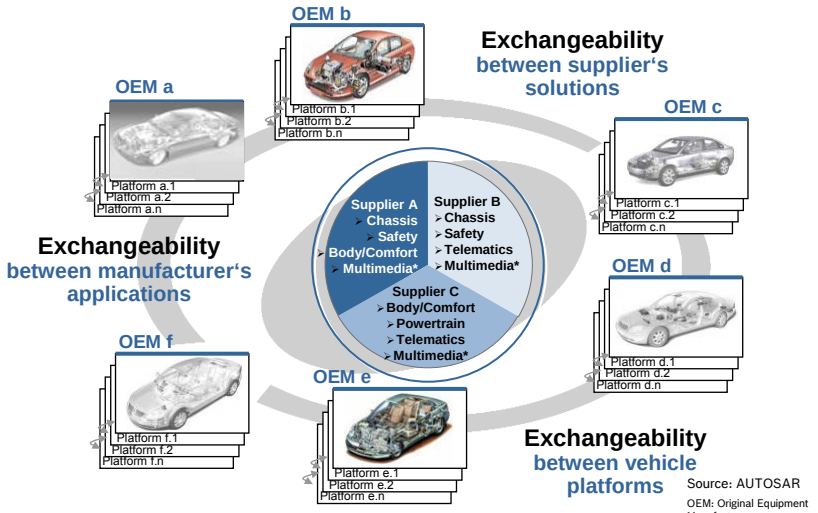
AUTOSAR – Exchangeability



Source: AUTOSAR

OEM: Original Equipment Manufacturer

* Multimedia: Application interfaces only

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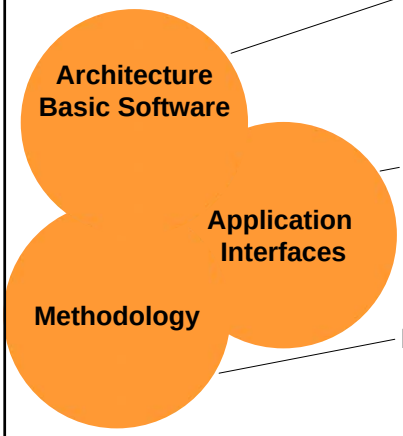
Standardization



Software Architecture

- Specification of a complete basic software layer as integration platform for hardware independent application software.

Application Interfaces

- Specification of standardized interfaces of mature automotive applications from all domains as bases for application software.

Methodology

- Common exchange formats or description templates to enable seamless co-operation during the complete development process.

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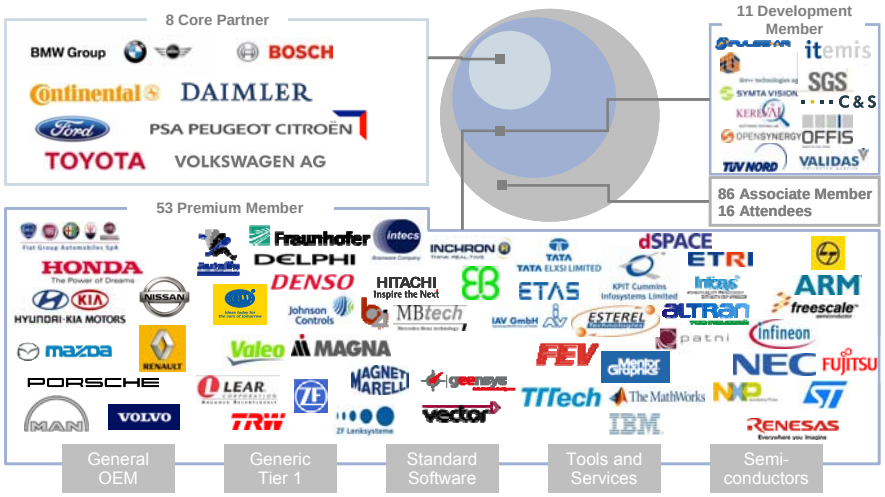
AUTOSAR @ Bosch – Organizational Structure

Status: 15/12/2009



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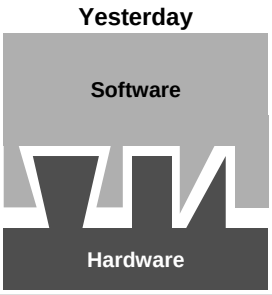
Reuse/Exchange of SW Enabled by Architecture



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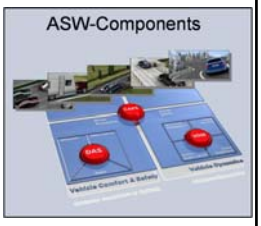
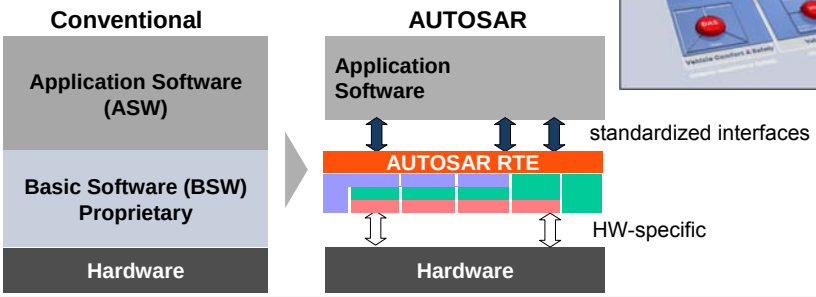
AUTOSAR @ Bosch – Enable Exchangeability

Reuse/Exchange of SW Enabled by Architecture

- Pre-condition for efficient integration of application software
  - Standardized BSW ► AUTOSAR
  - Standardized ASW interfaces ► AUTOSAR
  - Well structured and modular application architecture ► e.g. Bosch





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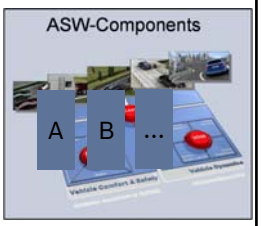

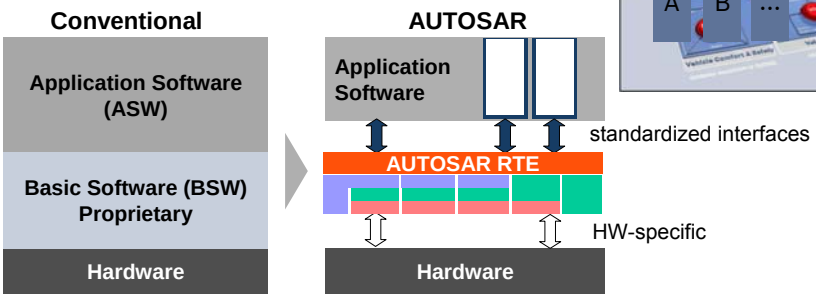

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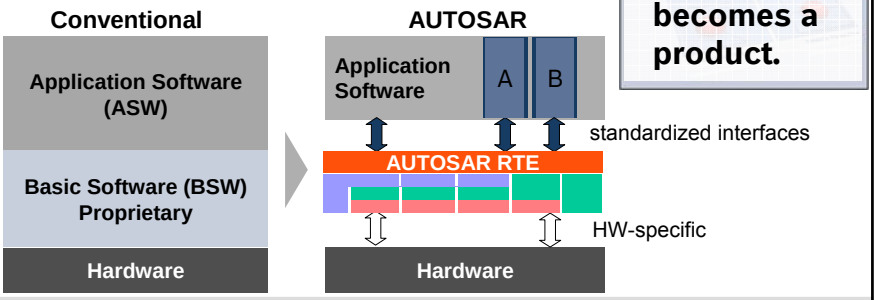
ASW-Components

Automotive Software becomes a product.



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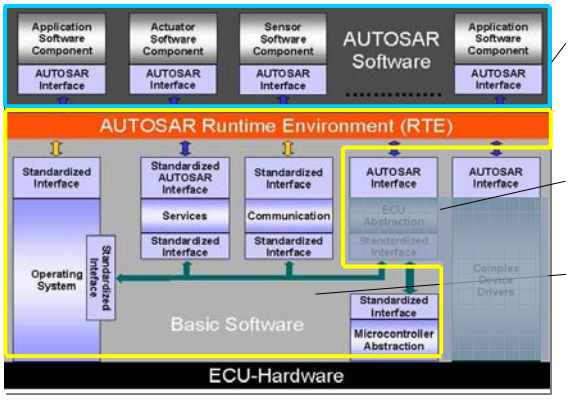
AUTOSAR – Software Architecture / Interfaces



Application Software (ASW)

Standardization of interfaces

Not standardized in AUTOSAR

Basic Software (BSW) +RTE

Standardization of interfaces and behavior

Objective: - Decoupling of Hardware and Application Software
- Relocation / reuse of SW-C* between ECU

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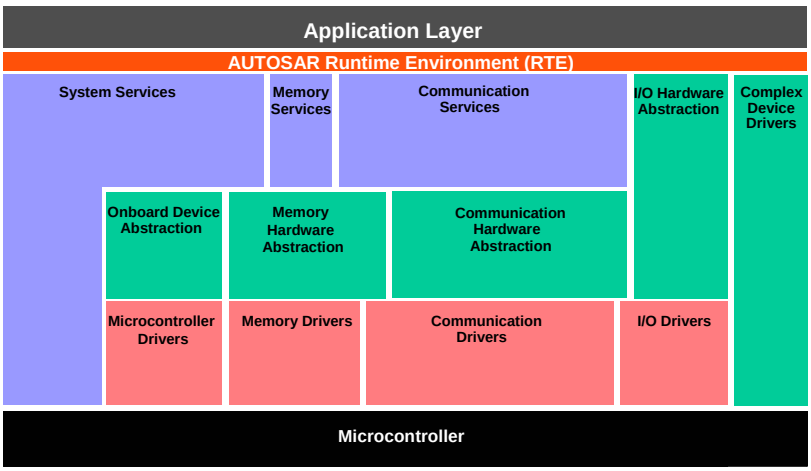
AUTOSAR Software Architecture



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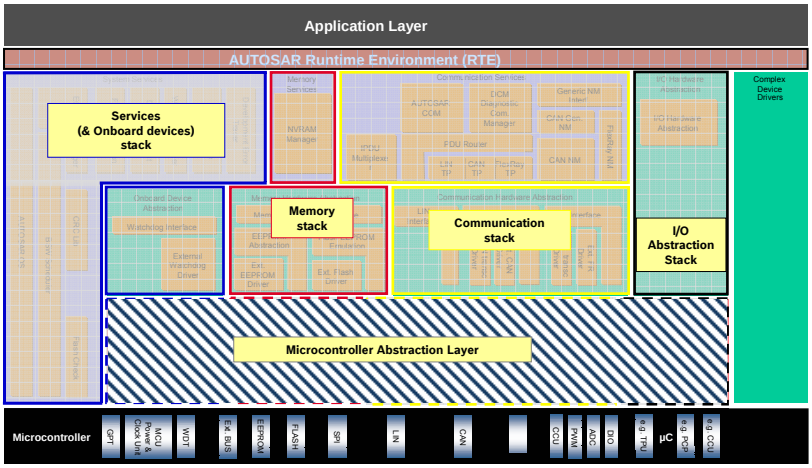
Basic Software



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AUTOSAR – Status

Phase I	Phase II		Phase III
E2006	**E2007**	**M2008**	**E2009**
Release 2.1	Release 3.0	Release 3.1	Release 4.0
	• Resolved release notes • Start-up / Wake-up behavior • Application interfaces	• OBDII (On Board Diagnose)	• Error handling • Functional safety • Libraries • Conformance Test • Multi-Core • Further Application Interfaces

Status / Achievements

- AUTOSAR Rel. 2.1
  AUTOSAR is ready for use in automotive product development
- AUTOSAR Rel. 3.0 / 3.1
  Product development can take fully advantage of mature AUTOSAR specifications

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AUTOSAR – Planning Phase III

Phase III

2010 **2011** **2012**

Release 4.1 is planned for 12/2012

Objectives of Phase III

- Maintain the existing AUTOSAR releases
- Add extensions to the existing specifications to further enhance the exploitation of AUTOSAR for automotive applications
- Incorporate experiences from exploitation

Time plan of AUTOSAR phase III

- AUTOSAR Phase III is contracted and started 01/2010
- In 2010 concept proposals are analyzed and selected for implementation
- In 2011 selected concepts are implemented
- In 2012 implemented concepts are validated,
  - R4.1 will be released in 12/2010

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AUTOSAR Roll Out Plan (2008 - 2012)

Source: AUTOSAR
ECU (Engine Control Unit): EDC(MED)17

Core Partner	2008	2009	2010	2011	2012
BMW Group	■ ..10 AUTOSAR BSW modules as part of Std Core in vehicles, tool / serial support in place			■ Powertrain-, Chassis-, Safety-, Body- ECUs use AUTOSAR architecture	
BOSCH	■ Body Computer with subset of AUTOSAR specs incorporated ■ Instrument Cluster with subset of AUTOSAR specs incorporated	■ ACC ECU using AUTOSAR architecture. ■ Powertrain EDC/ME(D)17 ECUs using AUTOSAR architecture ■ Domain Control Unit using AUTOSAR BSW	■ Chassis ECU using AUTOSAR architecture ■ Body Computer using AUTOSAR architecture		
Continental	■ Complete BSW Stack as Product ■ AUTOSAR Configuration Tool	■ Body ECUs using AUTOSAR architecture ■ Powertrain ECUs using AUTOSAR architecture	■ Chassis ECUs using AUTOSAR architecture		■ Engine Systems Platform based on AUTOSAR architecture
DAIMLER			■ First usage of AUTOSAR modules in vehicles	■ First AUTOSAR compatible ECUs in vehicles	■ Introduction of AUTOSAR architecture and methodology in vehicles
Ford		■ 1-2 AUTOSAR conformant ECUs; first use of conformant tools/methodology	■ Continuous roll-out of ECUs into vehicle architecture increased use of conformant tools / methodology		
OPEL			■ First usage of AUTOSAR modules	■ First use of AUTOSAR architecture ECU	
PSA PEUGEOT CITROËN		■ Powertrain ECU using AUTOSAR architecture	■ Body ECU using AUTOSAR architecture		
TOYOTA			■ First usage of AUTOSAR modules		■ AUTOSAR Architecture ECU
VOLKSWAGEN AG		■ First AUTOSAR modules in series production		■ First complete ECUs in series production	

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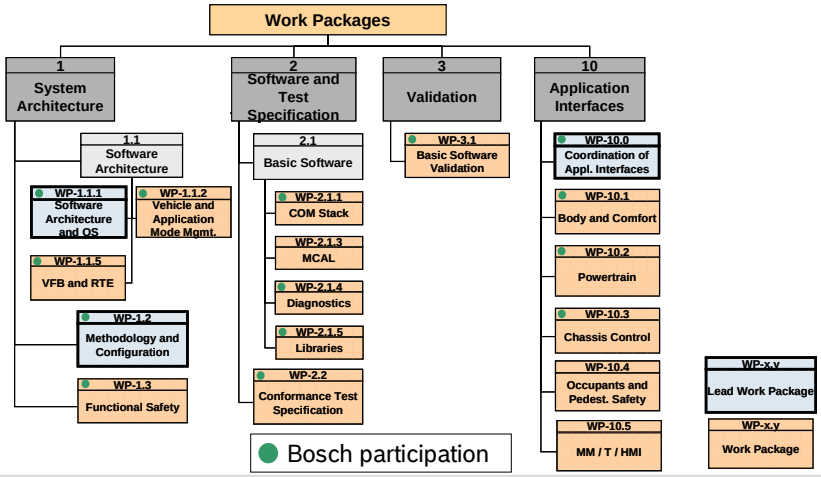
Work Package Breakdown Structure



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Thank You

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