

„ECU development with AUTOSAR“

An introduction for AUTOSAR beginners

AUTOSAR Webinar 2013-03-12

> General Information

Why AUTOSAR

Introduction to AUTOSAR

Vector AUTOSAR Solution

OEM Solutions

Characteristics of MICROSAR

Your speaker today:



Christian Runge

Working for the Vector Product Line Embedded
Software as Senior Account Manager

MICROSAR, CANbedded, Flashing, Real-Time
Operating Systems and related services

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Email: christian.runge@vector.com

- ▶ Duration: approx. 30 minutes
- ▶ Questions:
 - > Please use the Q&A features of Webex
 - > Question will be answered after the presentation
 - > Or send us later on your questions
- ▶ A link to the presented slides will be sent by e-mail to all registered participants after this event

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Why AUTOSAR

The challenge:

- ▶ E/E **complexity** is growing fast
- ▶ Quantity of **software** is exploding
- ▶ Many different **hardware platforms** are used
- ▶ Development **processes** and **data formats** are not harmonized

The main objective of **AUTOSAR**

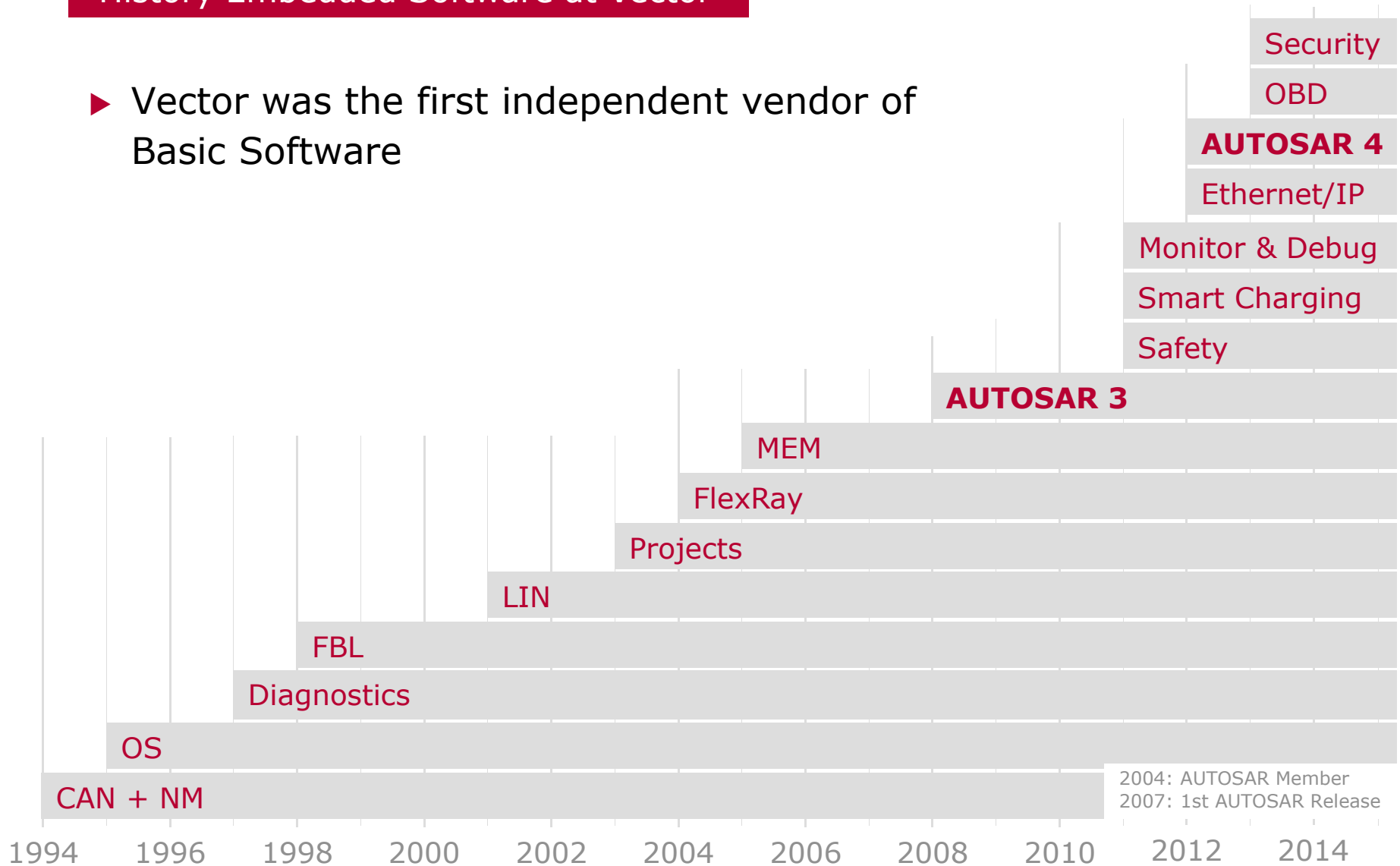
→ **Improve software quality and reduce costs by re-use**

- ▶ Re-use of functions across carlines and across OEM boundaries
- ▶ Re-use of basic software
- ▶ Re-use of development methods and tools

Why AUTOSAR

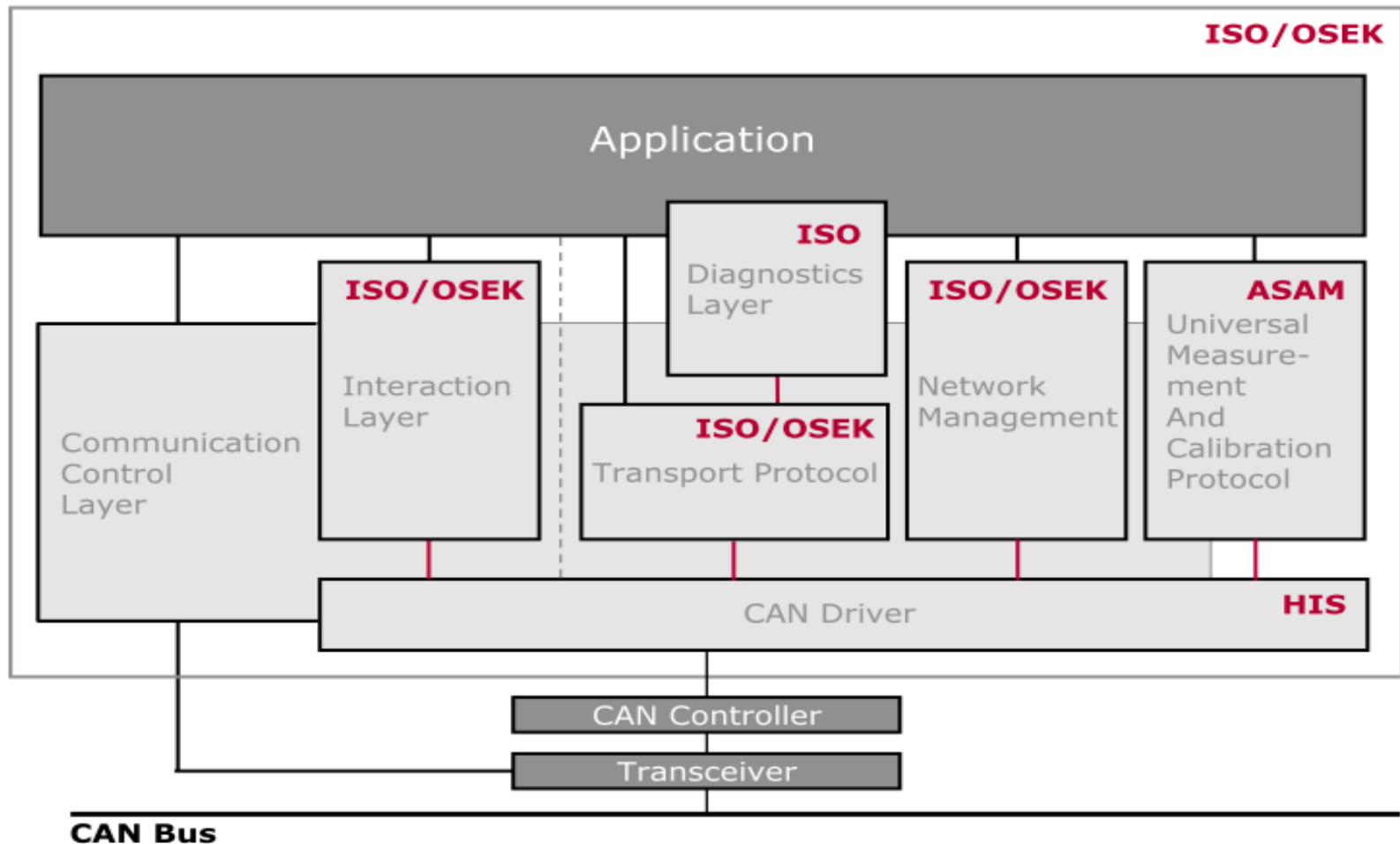
History Embedded Software at Vector

- ▶ Vector was the first independent vendor of Basic Software



Why AUTOSAR

Example CANbedded Communication Stack



HIS (German: Hersteller Initiative Software) ('OEM software initiative')
an interest group consisting of the car manufacturers Audi, BMW, DaimlerChrysler

General Information

Why AUTOSAR

> Introduction to AUTOSAR

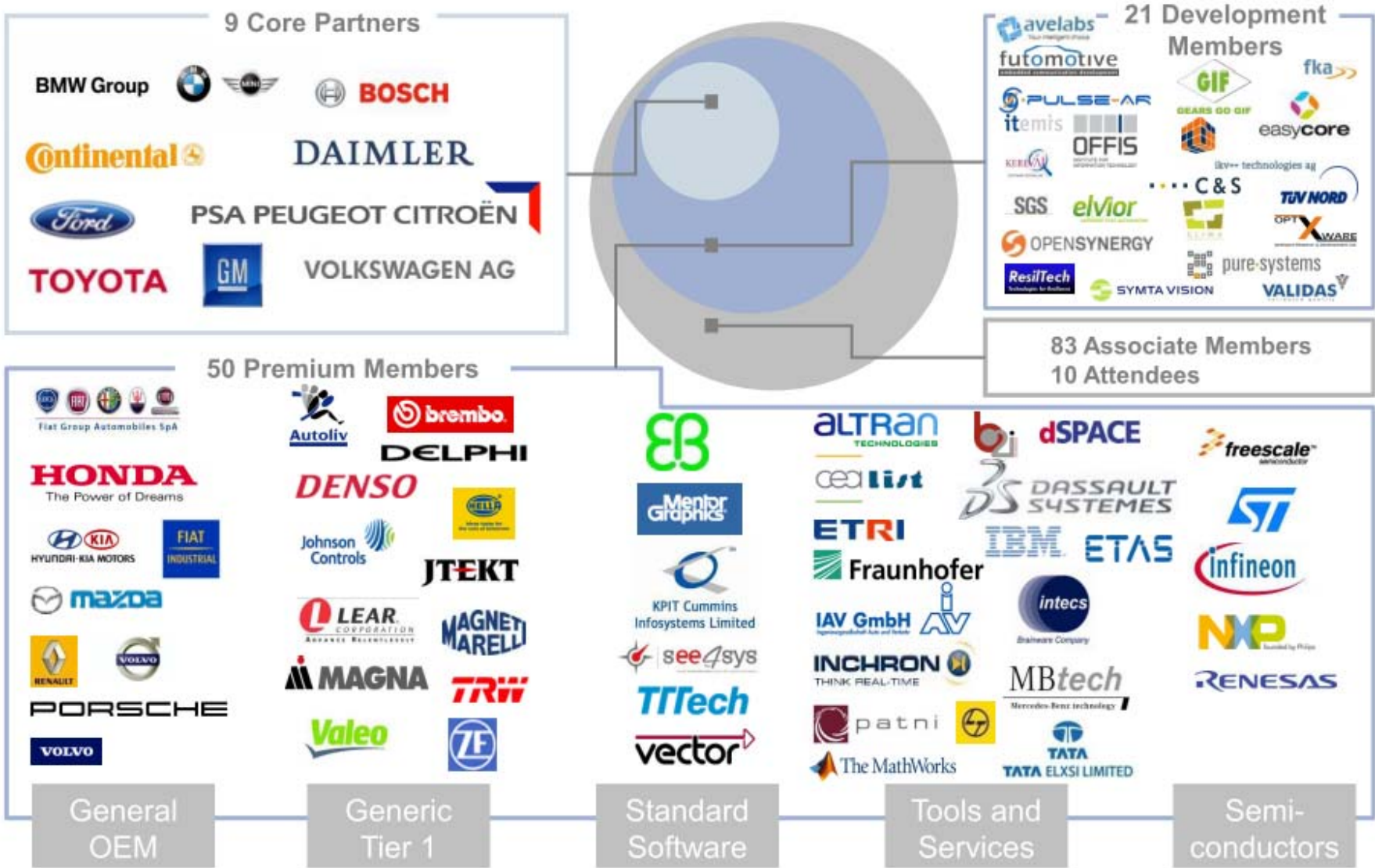
Vector AUTOSAR Solution

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Characteristics of MICROSAR

Introduction to AUTOSAR

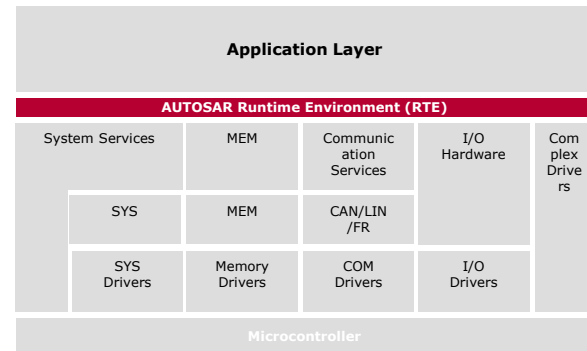
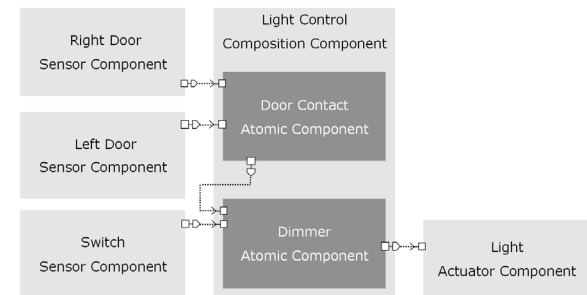
AUTOSAR Partnership



Introduction to AUTOSAR

Targets and Goals

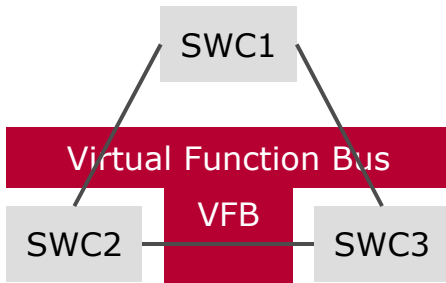
- ▶ Standardize Development Process and exchange formats
 - >>> Methodology + Templates
- ▶ Standardize Functionality
 - >>> Functional Interfaces
- ▶ Specify a clear interface between basic software modules and application
 - >>> RTE
- ▶ Define open reference architecture for ECU software
 - >>> Basic Software



Introduction to AUTOSAR

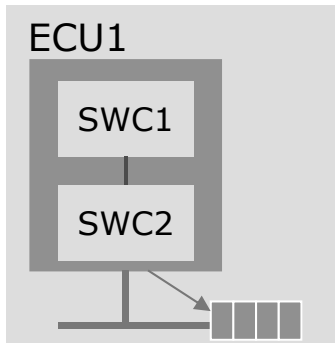
AUTOSAR Workflow

Complete SW functionality of the vehicle is defined as a system of SWCs...



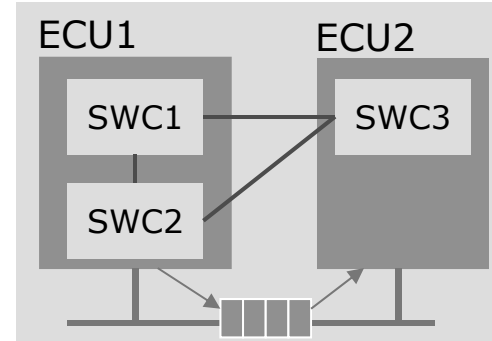
Software Component Description*

An extract is created for each ECU...



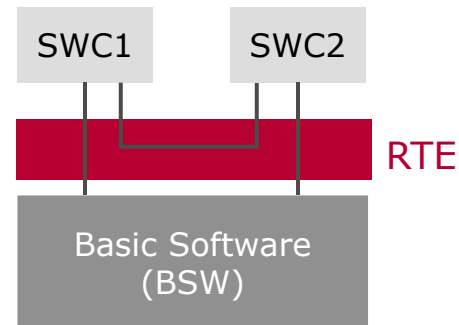
Extract of System Description*

..and distributed to ECUs



System Description*

The ECU is configured based on the ECU Extract.



ECU Configuration Description (ECUC)*

* **AUTOSAR**

AUTOSAR ...

... is a key enabler for high performance electronic systems

... is a broadly used standard in Europe

AUTOSAR 3.x:

- ▶ First specification: 2007
- Mature solution used for series production 2010ff
- Adaptations necessary → OEM-specific extensions

AUTOSAR 4.x:

- ▶ First specification: 2009
- First mature specification: 2012 (4.0.3)
- 4.0.3 is the right version for development start in 2012
- New functions: safety, variant handling, Ethernet/IP, multicore, ...

General Information

Why AUTOSAR

Introduction to AUTOSAR

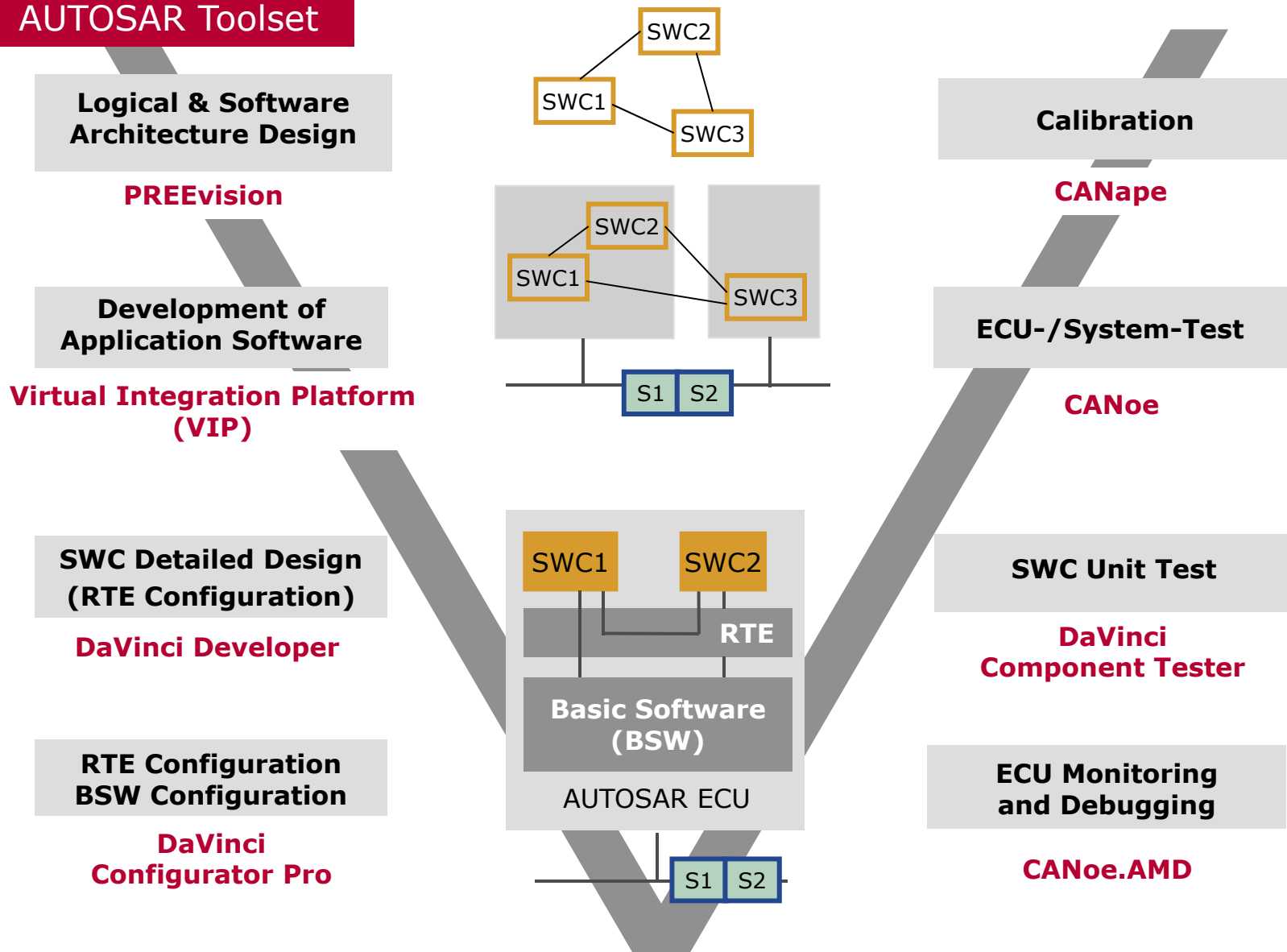
> Vector AUTOSAR Solution

OEM Solutions

Characteristics of MICROSAR

Vector AUTOSAR Solution

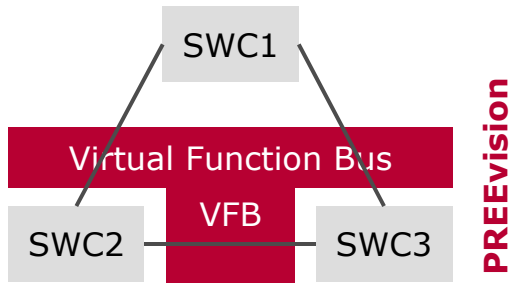
AUTOSAR Toolset



Vector AUTOSAR Solution

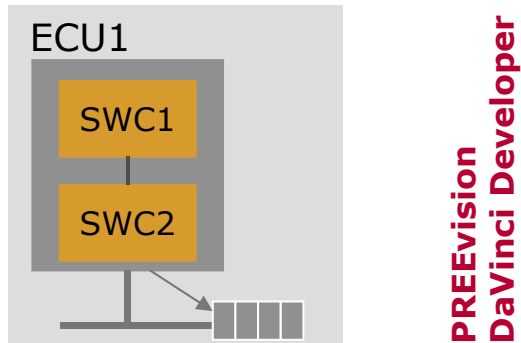
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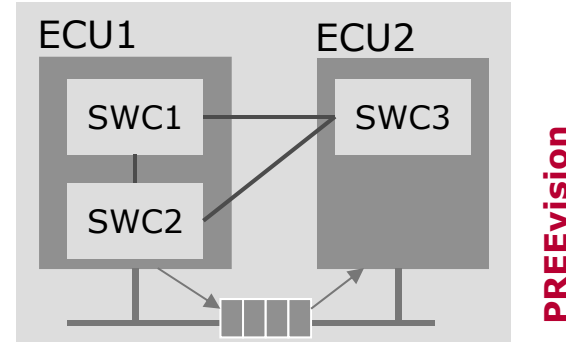
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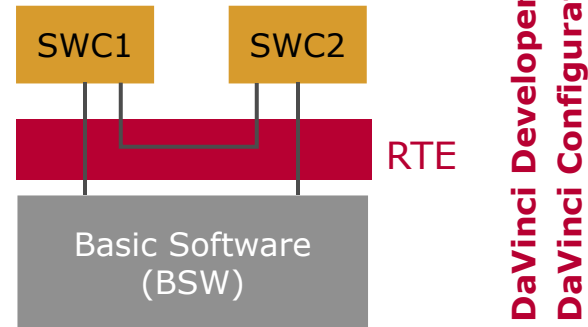
Extract of System Description*

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System Description*

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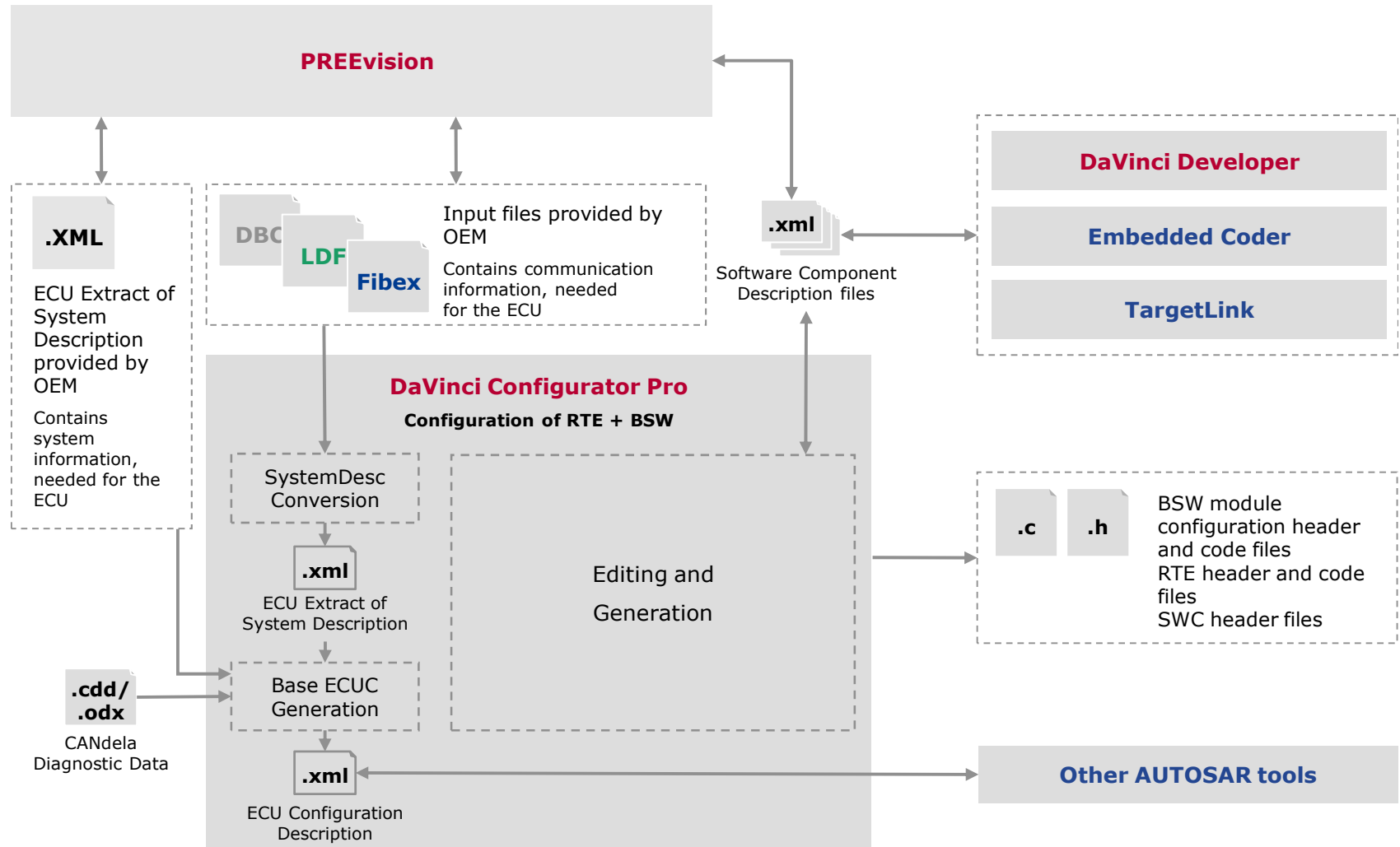


ECU Configuration Description (ECUC)*

* AUTOSAR

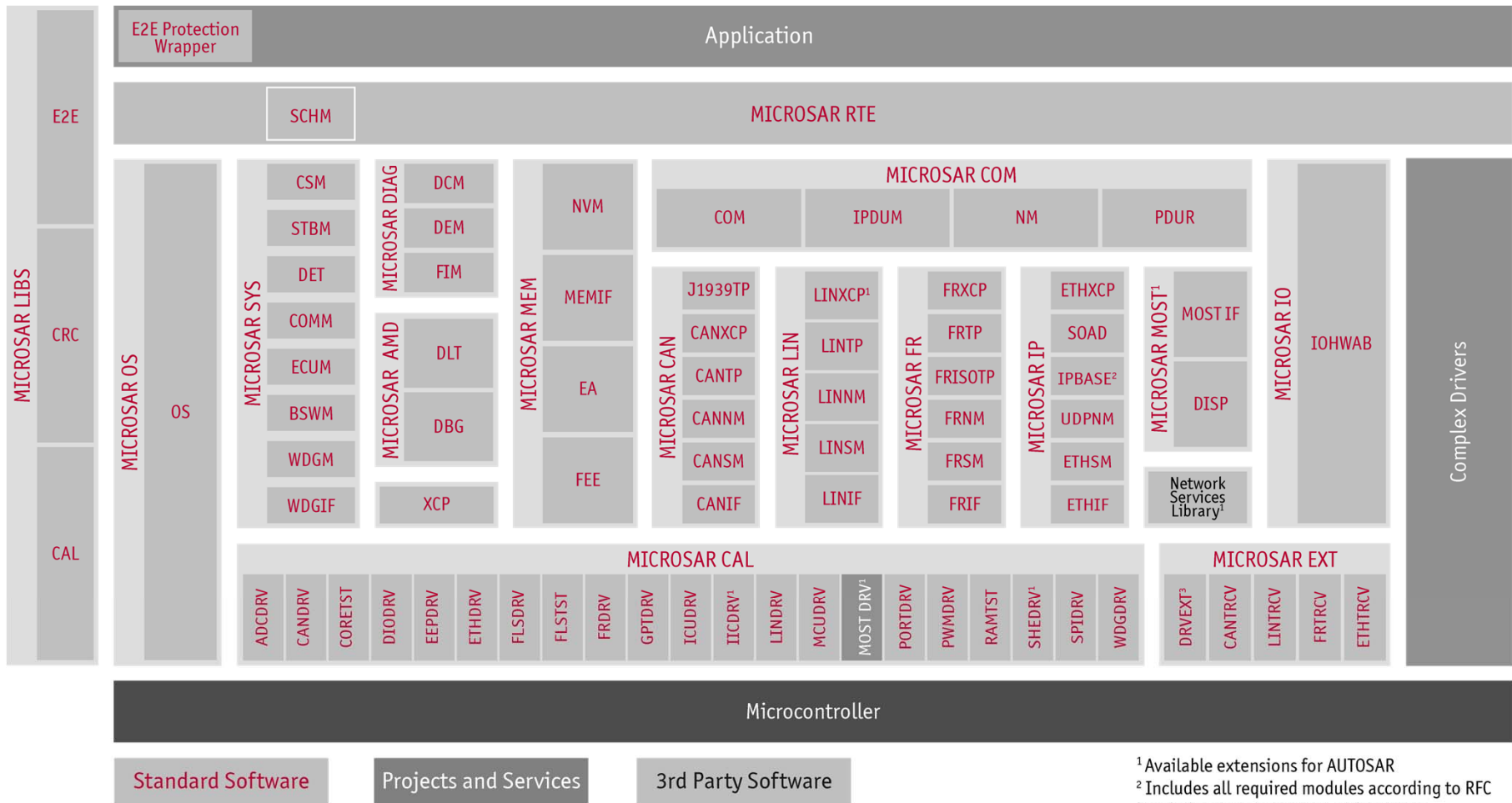
Vector AUTOSAR Solution

Workflow AUTOSAR 4.x



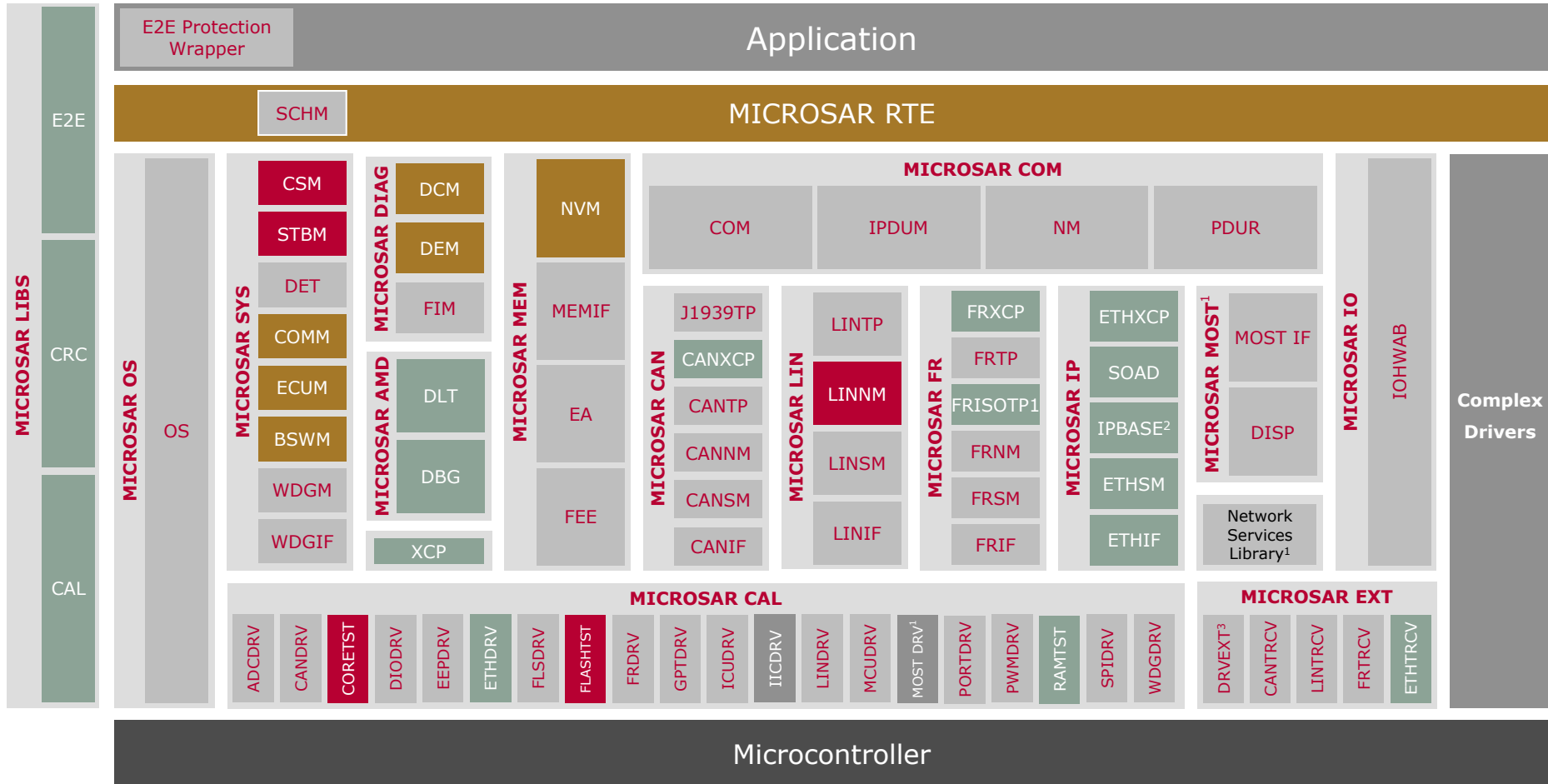
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MICROSAR Basic Software – Architecture



Vector AUTOSAR Solution

Differences between MICROSAR 3 and MICROSAR 4



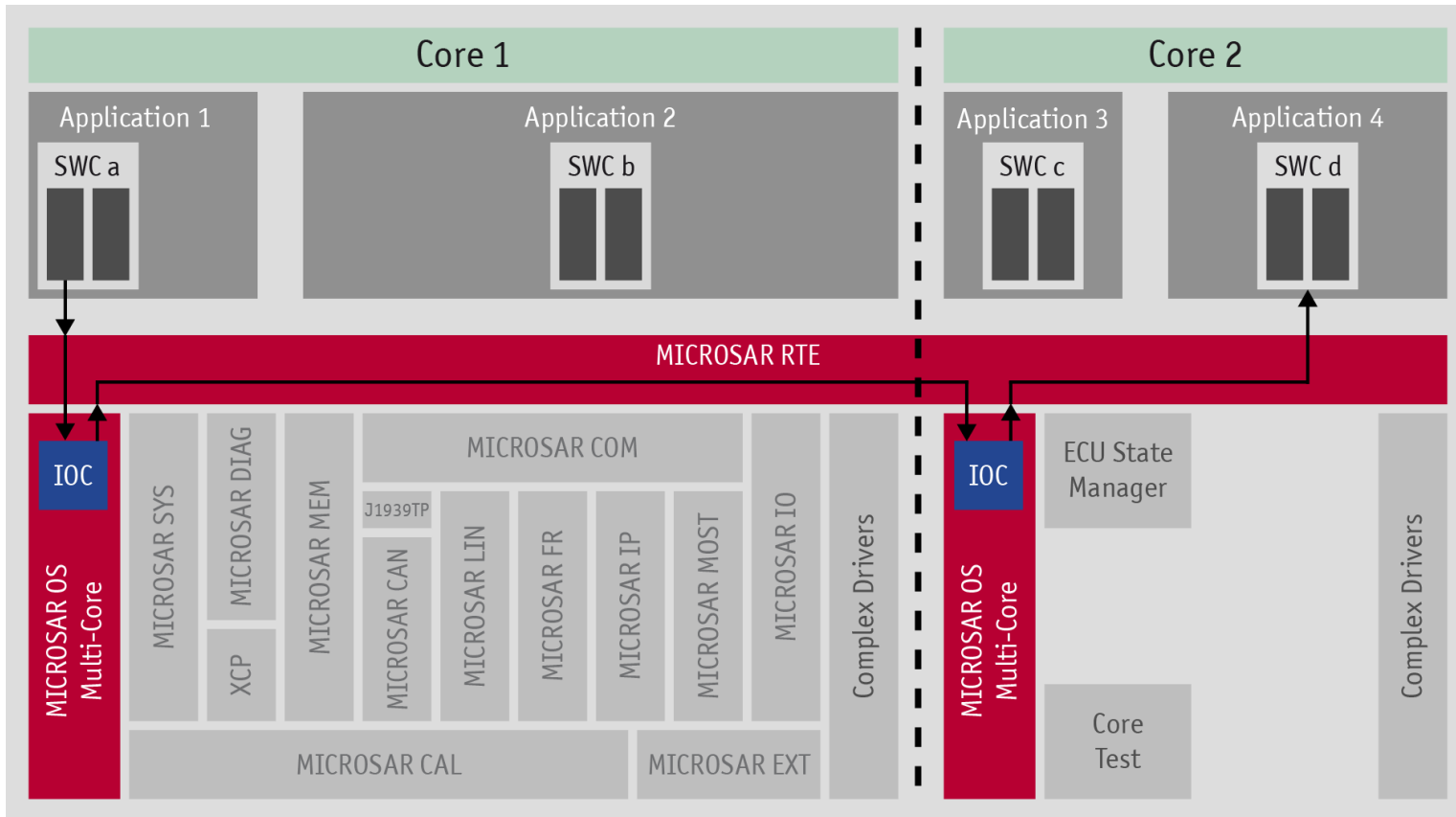
Standard Software	Project and services	3rd Party Services
ASR 4.0 already realized	New relevant ASR4 modules	Modified seriously for ASR4

¹ Available extensions for AUTOSAR
² Includes all required modules according to RFC
³ Includes EEPEXT, FLSEXT, and WDGEXT



Vector AUTOSAR Solution

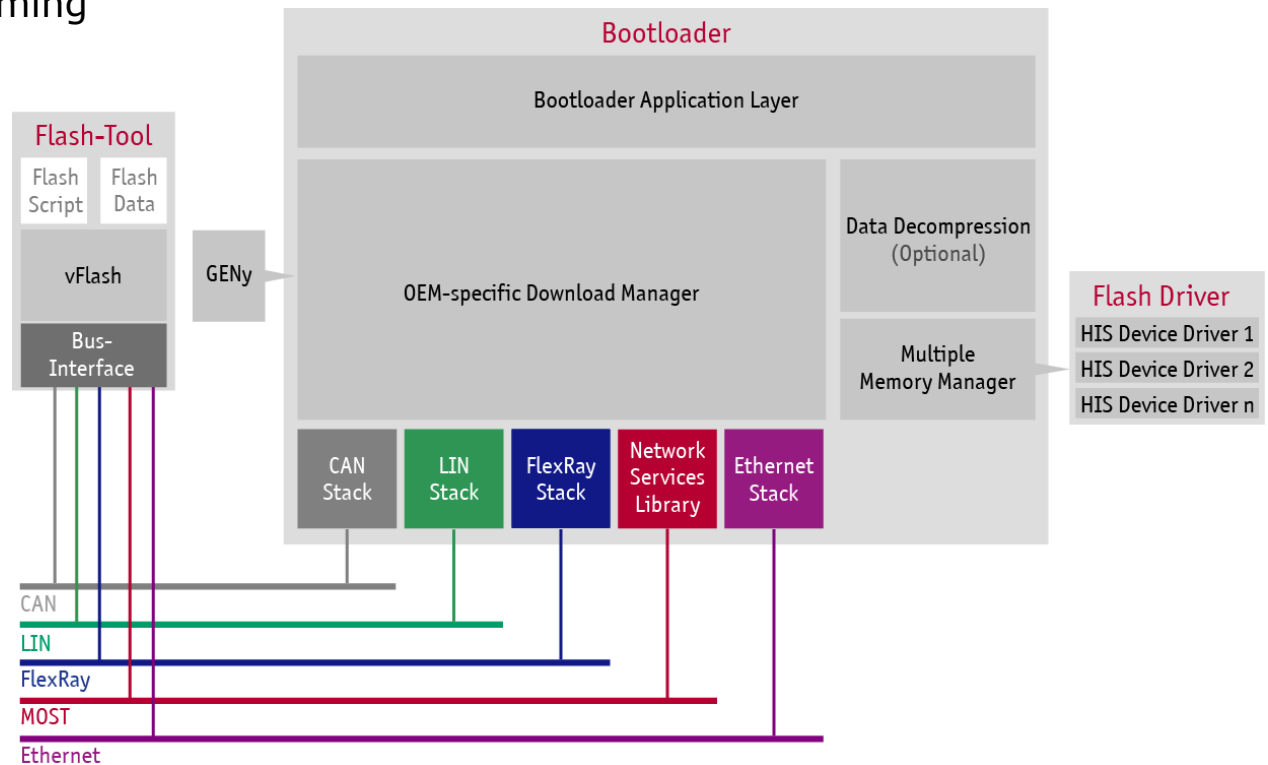
Multicore Solution



Vector AUTOSAR Solution

Flash Boot Loader

- ▶ Vector is authorized FBL supplier for all OEMs using AUTOSAR
- ▶ Extended Features
 - ▶ Multi processor, multiple memory devices
 - ▶ Pipelined Programming
 - ▶ Security
 - ▶ Gateway
 - ▶ Compression
 - ▶ ...



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Vector AUTOSAR Solution

> **OEM Solutions**

Characteristics of MICROSAR

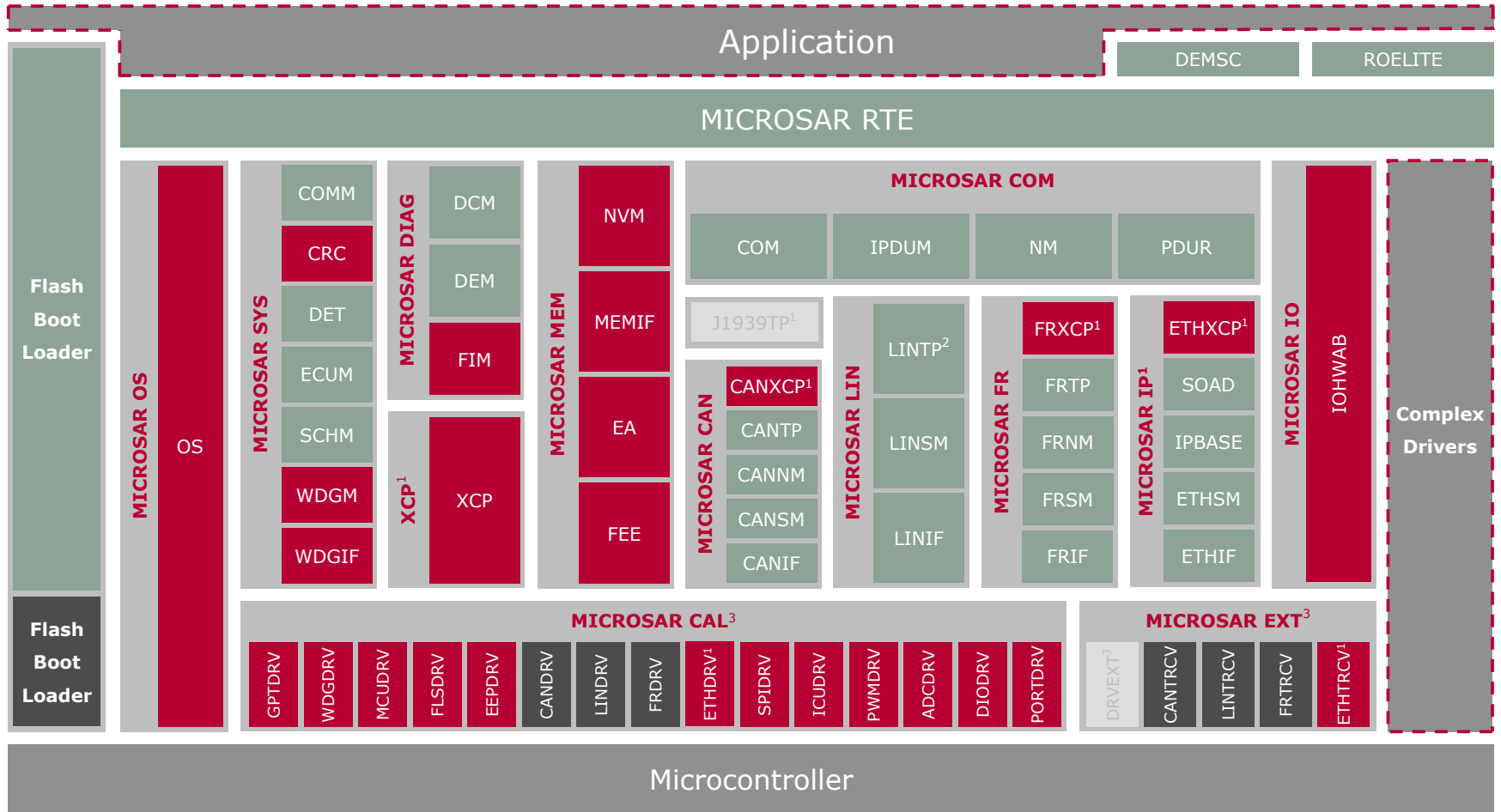
- ▶ SOP of a complete AUTOSAR solution (BSW + RTE)

	2010	2011	2012	2013	2014	2015	2016	...
AUTOSAR 3.x								
AUTOSAR 4.x								

- ▶ AUTOSAR 3.x is used in serial production projects by:
 - ▶ Audi & Volkswagen
 - ▶ BMW
 - ▶ Daimler
 - ▶ Fiat / Chrysler
 - ▶ Volvo Trucks...
- ▶ AUTOSAR 4.x is used in serial production projects by:
 - ▶ BMW
 - ▶ Volvo Car
- ▶ Use of AUTOSAR 4.x is announced by
 - ▶ Ford
 - ▶ GM
 - ▶ PSA
 - ▶ Toyota

OEM Solutions

Daimler SLP10 Overview



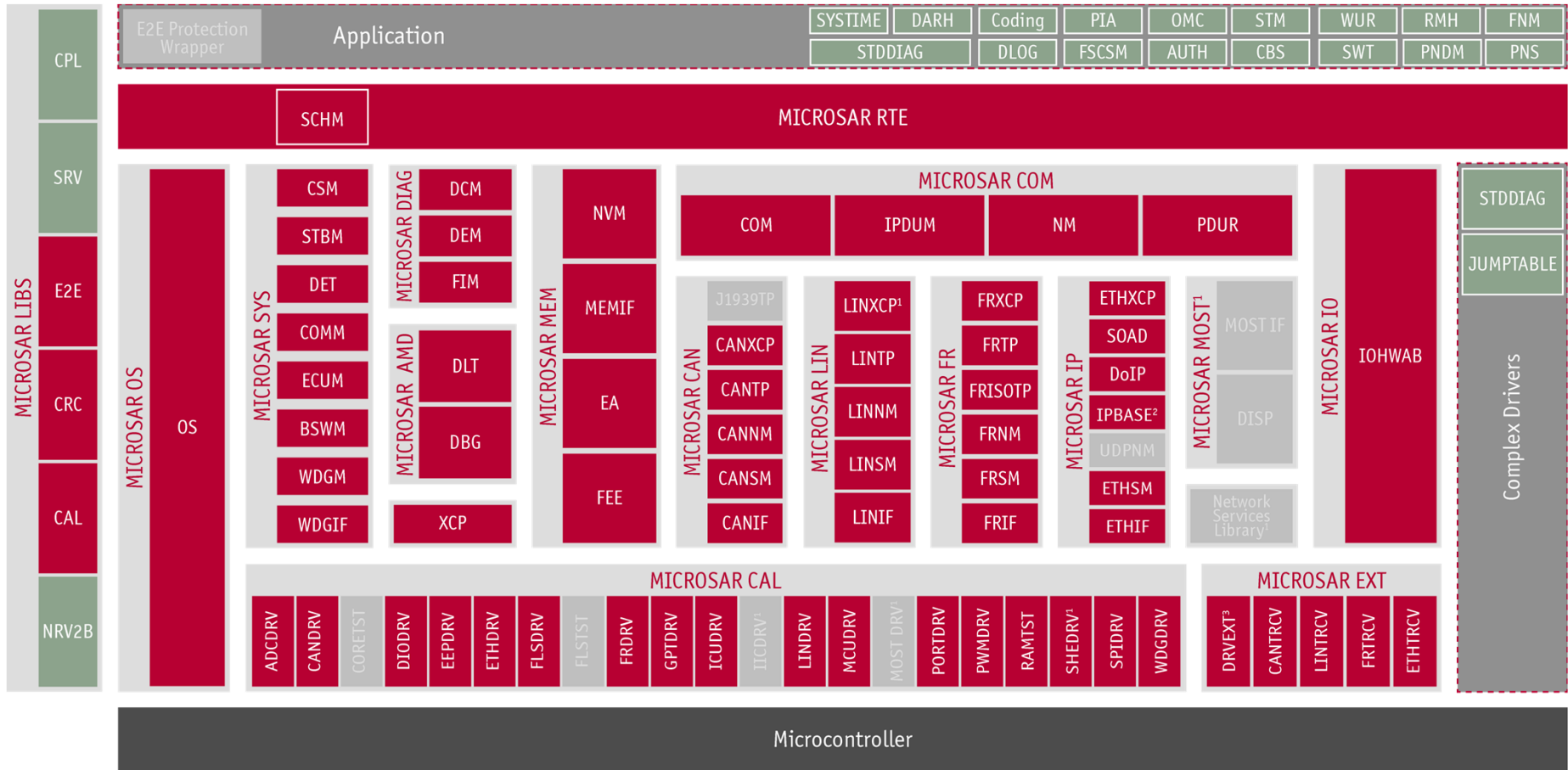
Daimler SLP
 Vector MICROSAR product
 Not used for OEM

Daimler HLP available for preferred platforms
 Service by Vector

¹Available extensions for AUTOSAR 3.x
²Option included in LINIF
³Hardware dependent

OEM Solutions

BMW BAC4.0 Overview



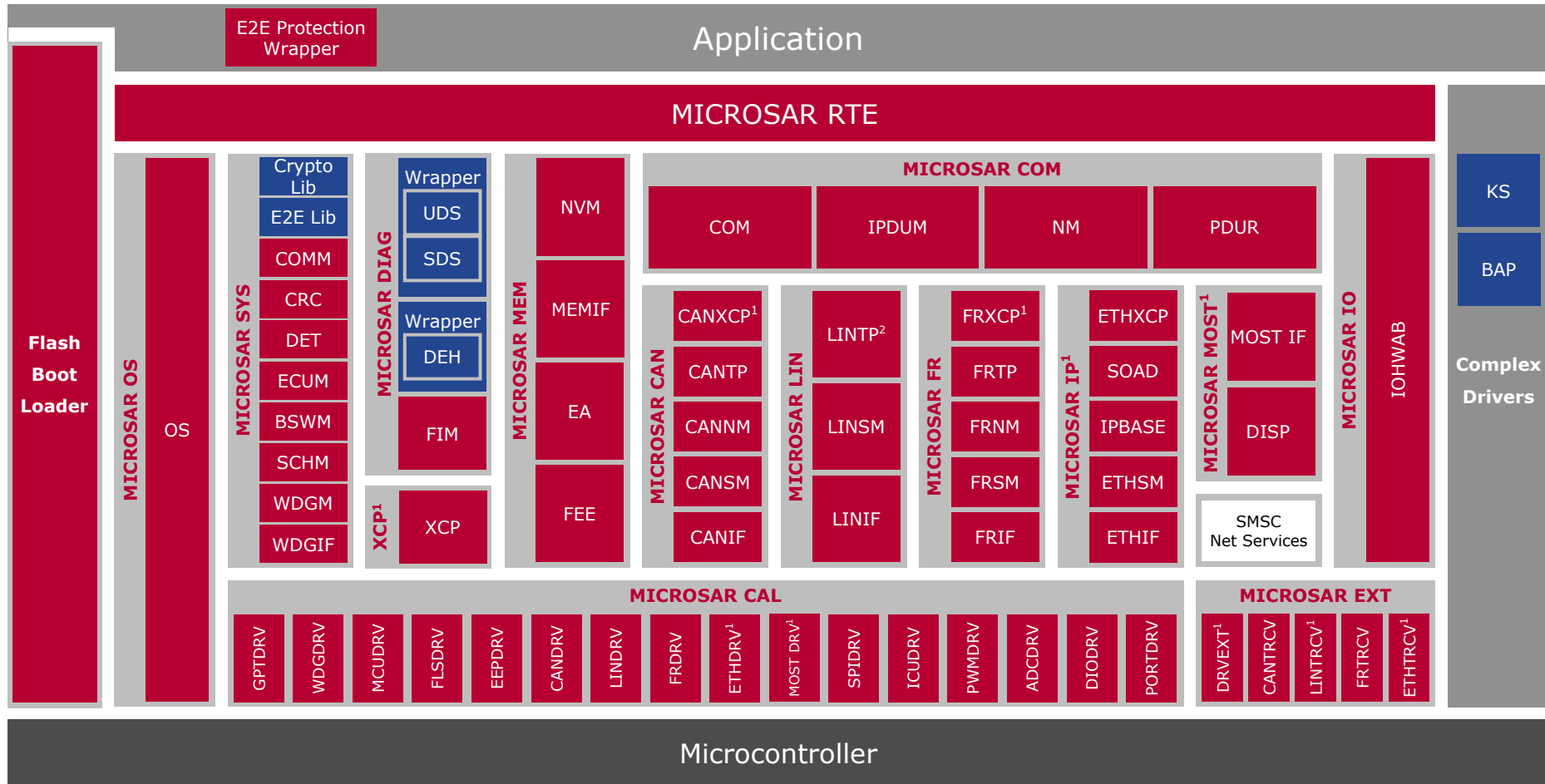
¹ Available extensions for AUTOSAR

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³ Includes EEPEXT, FLSEXT, and WDGEXT

OEM Solutions

VW MQB Overview



■ Vector Product

□ 3rd Party

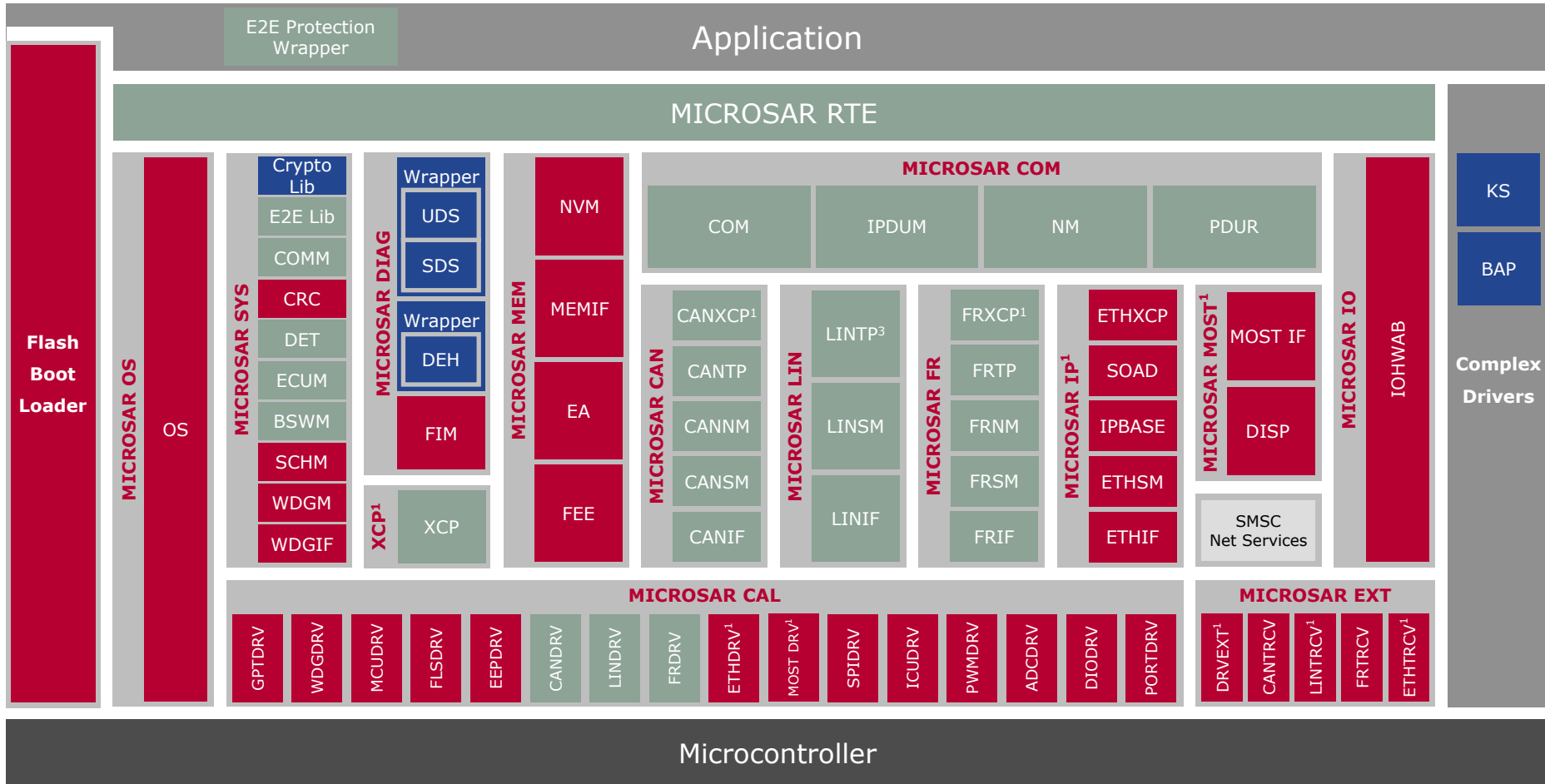
■ 3rd Party distributed by VW

¹ Available extensions for AUTOSAR 3.1

² Option included in LINIF

OEM Solutions

Audi MLBevo Overview

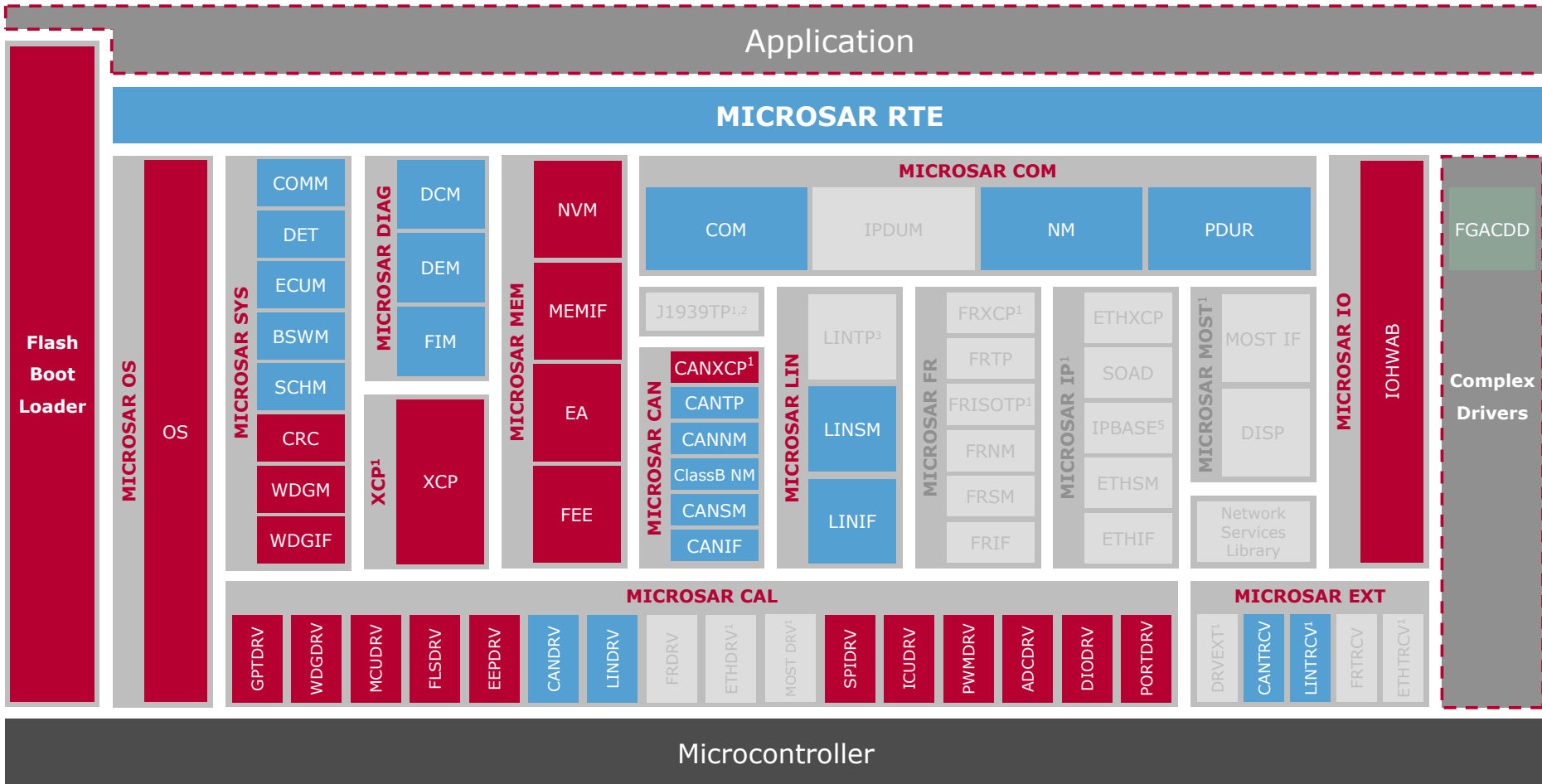


- AUTOSAR Stack MLBevo
- Not used for OEM
- AUTOSAR Modules Vector
- 3rd Party
- 3rd Party distributed by Audi

¹ Available extensions for AUTOSAR 3.x
² BAM and CMTD Option available
³ Option included in LINIF

OEM Solutions

FIAT FGA Overview

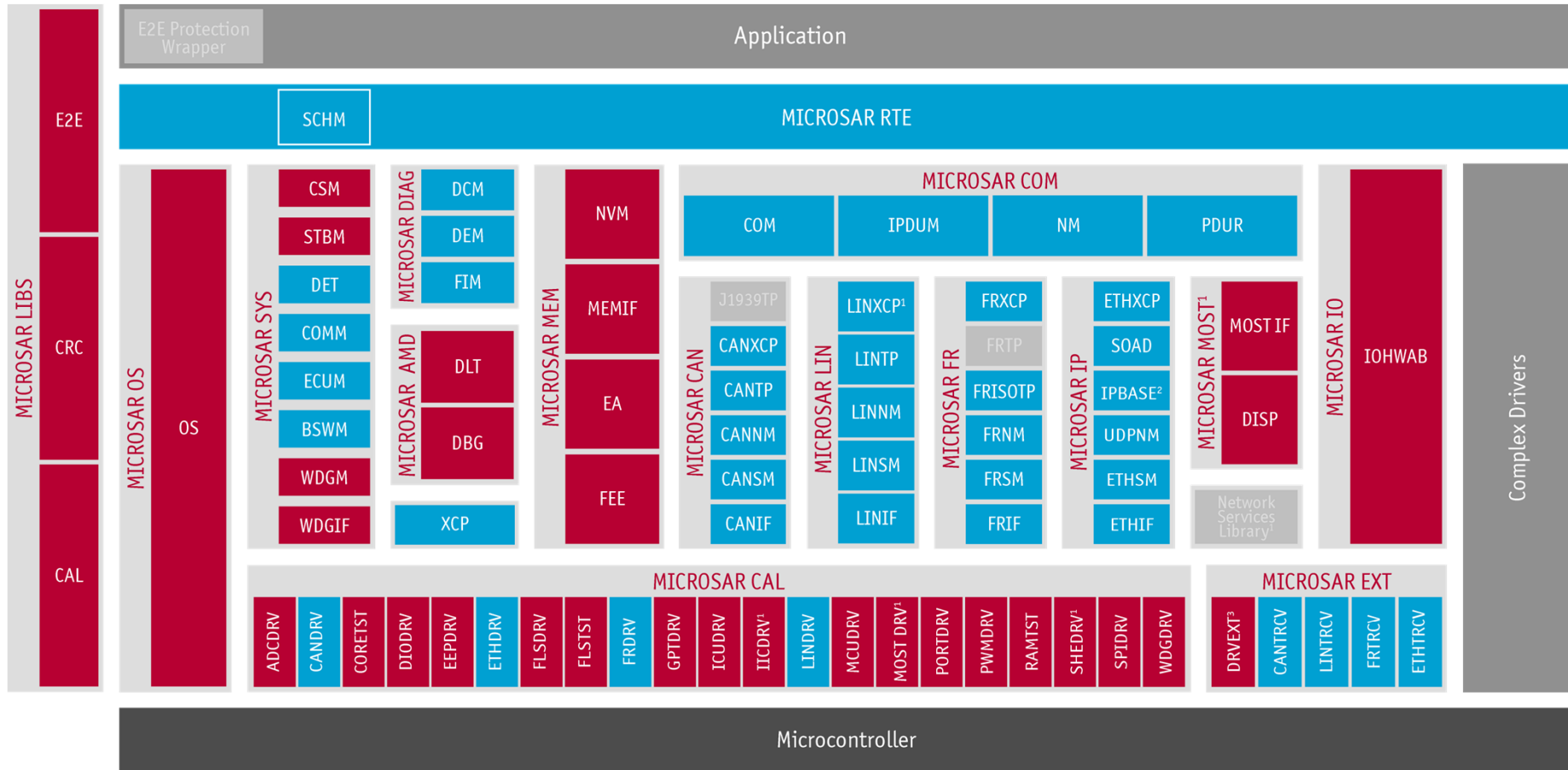


- FGA AUTOSAR Stack
- FGA module
- Not used by FGA
- Vector MICROSAR product
- Service by Vector

¹ Available extensions for AUTOSAR 3.x
² BAM and CMDT Option available
³ Option included in LINIF
⁴ Includes CAL, CPL and CRC
⁵ Includes Socket, DHCP (Client), UDP, TCP, ICMP, ARP and IPV4

OEM Solutions

Volvo Car AUTOSAR 4.x



- Vector MICROSAR product
- Not used by OEM
- VCC required modules

¹ Available extensions for AUTOSAR
² Includes all required modules according to RFC
³ Includes EEPEXT, FLSEXT, and WDGEXT

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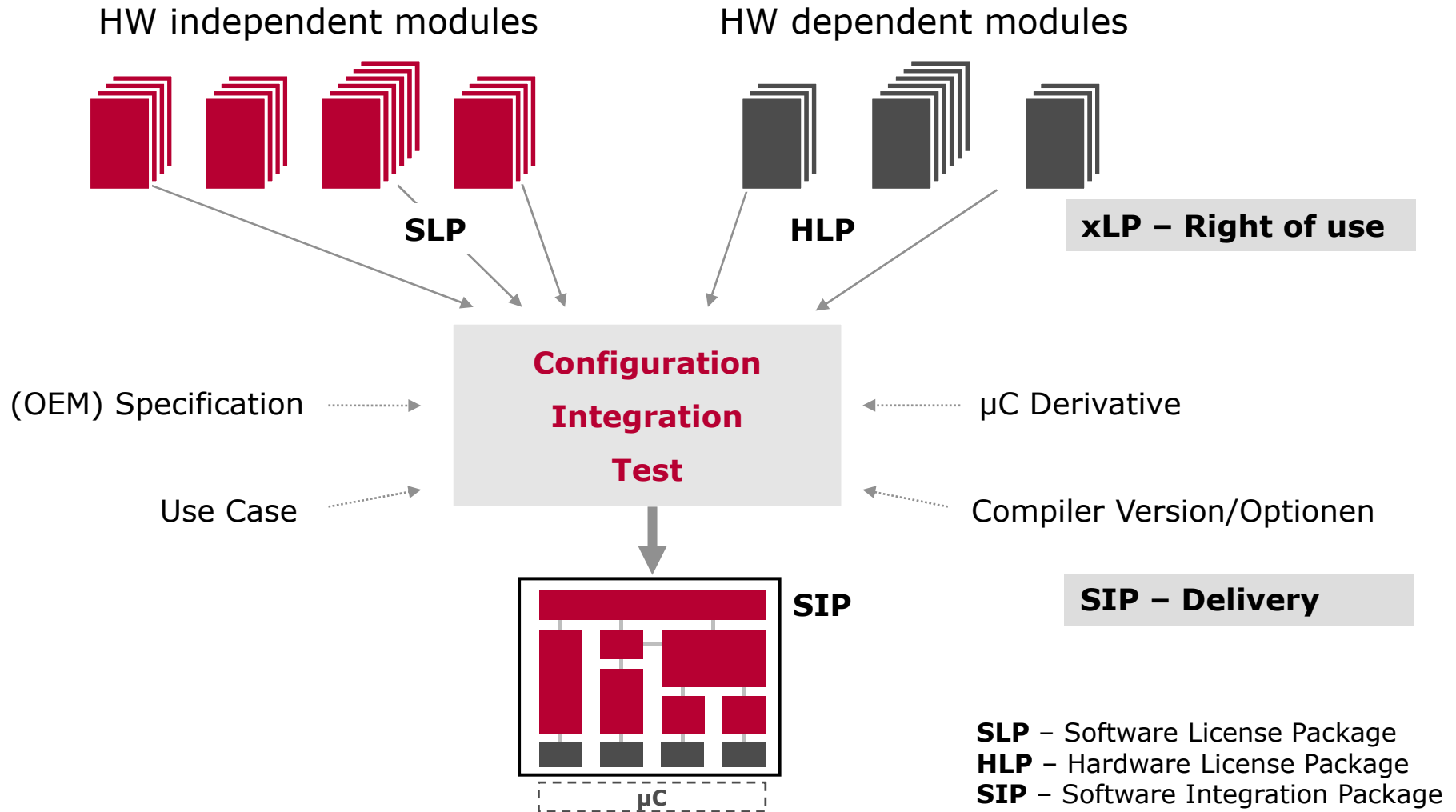
Vector AUTOSAR Solution

OEM Solutions

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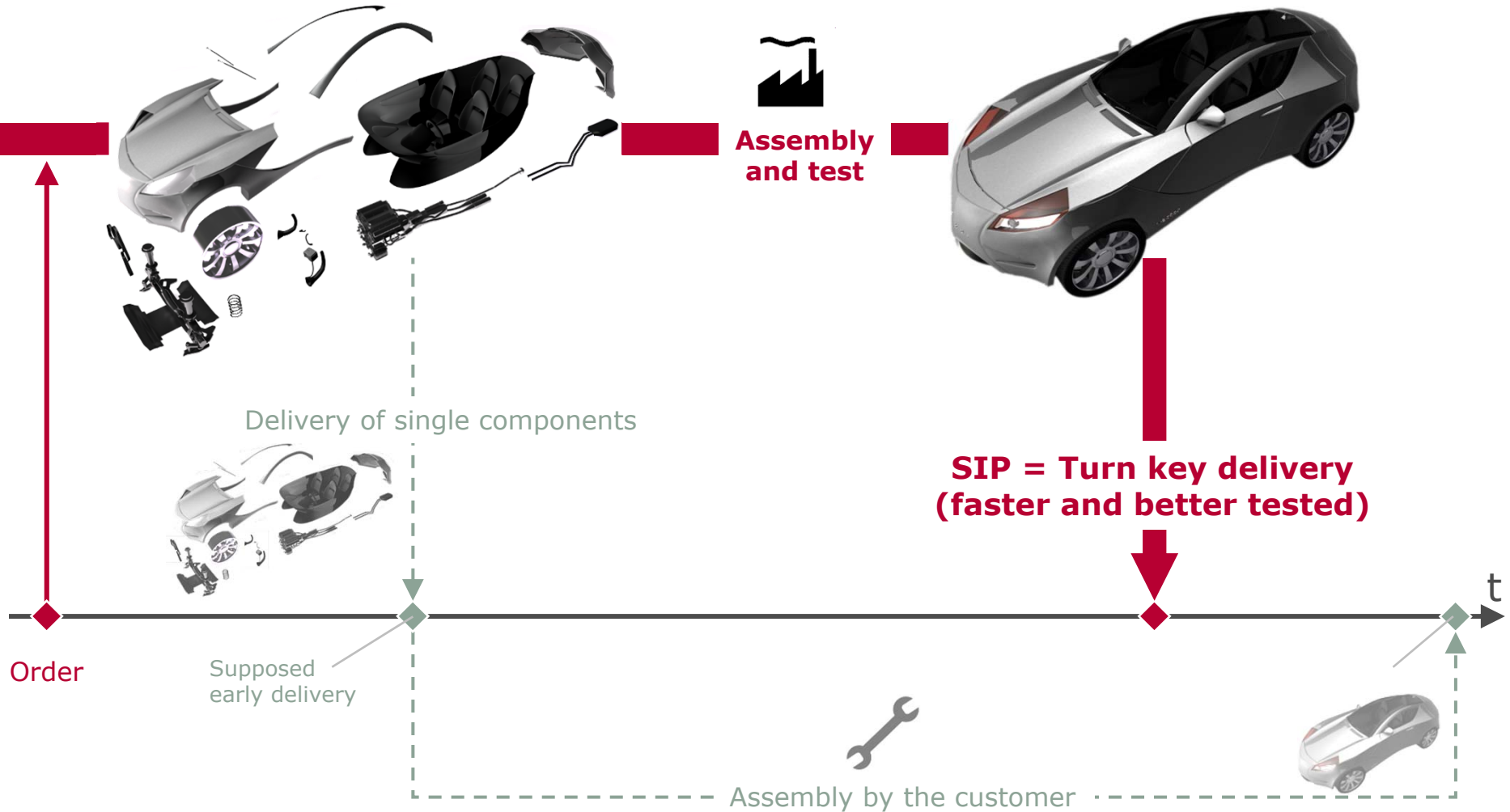
Characteristics of MICROSAR

MICROSAR Basic Software – SLP + HLP + SIP



Characteristics of MICROSAR

Why buying a SIP?



Tier1s profit from a powerful set of building blocks and get additionally an individually tailored and tested product → SIP (Software Integration Package)

▶ **Integration**

- ▶ ... of required modules properly configured
- ▶ ... of 3rd party modules (by OEM and semiconductor vendor)

▶ **Test**

- ▶ ... of all modules in an integrated subsystem
- ▶ ... on target hardware with target compiler
- ▶ ... of our customer's use case

▶ **Release** of delivery based on ...

- ▶ ... OEM specific communication description
- ▶ ... additional customer specific formats (ODX, cdd,...)
- ▶ ... additional OEM requirements (Pre-configuration as agreed with OEM)

▶ Quick **Startup**

- ▶ Startup manual for each OEM
- ▶ Reduction of configuration space for Tier1

▶ **Maintenance**

- ▶ Individual SIP specific issue reporting
- ▶ Patch and update deliveries > 15 years

Characteristics of MICROSAR

Savings

▶ High end configuration tool

▶ Sophisticated memory solution („AUTOSAR++“)

▶ Warranty/liability related to single deliveries

▶ Delivery related issue reporting

▶ Delivery & test optimized for HW and use case

▶ Three MICROSAR releases per year

▶ OEM specifics „ahead and beyond AUTOSAR“

▶ Support of OEM specific workflows

▶ TÜV certified functional safety acc. AUTOSAR

- ▶ Solution provided by the world market leader
- ▶ Solution for all OEMs available
- ▶ SPICE-3 quality

Tier1 savings:

→ 3 weeks/project/year

→ 1 week/project/year

→ 1 week/project/year

→ 2 weeks/project/year

→ 2 weeks/project/year

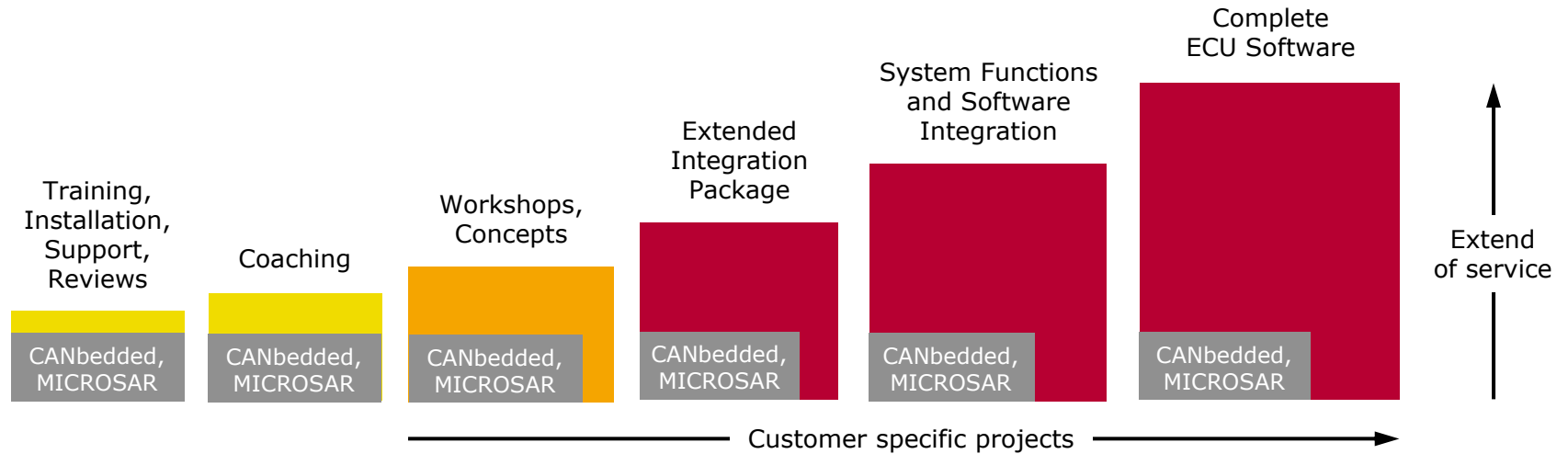
→ 2 weeks/project/year


total:


11 weeks/project/year


Characteristics of MICROSAR


Services



 Embedded Standard Software

 Product Services

 Technical Consulting

 Engineering Services

Characteristics of MICROSAR

MICROSAR - Vector's AUTOSAR Embedded Software

Vector provides standard software since 1995

- ▶ > 50 OEM solutions supported
- ▶ > 100 μ C / compiler pairs supported
- ▶ > 1000 deliveries per year

Vector supports AUTOSAR since 2004

- ▶ contributing to specification
- ▶ 1st delivery of AUTOSAR 3 BSW in Mar.2008
- ▶ > 200 serial production projects

Vector provides a mature AUTOSAR solution

- ▶ > 800 person years of engineering invested
- ▶ 1st SOP in 2010
- ▶ most used solution in the world



Vector provides BSW+RTE for all OEMs using AUTOSAR

- ▶ all OEMs choosing a BSW supplier decided for Vector (Volvo AB, Daimler, Audi, Asian OEMs)
- ▶ Vector is approved by BMW, Fiat, Volkswagen and Volvo Car

Thank you for your attention.

For detailed information about Vector
and our products please visit

www.vector.com

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