VECTOR

MICROSAR Adaptive

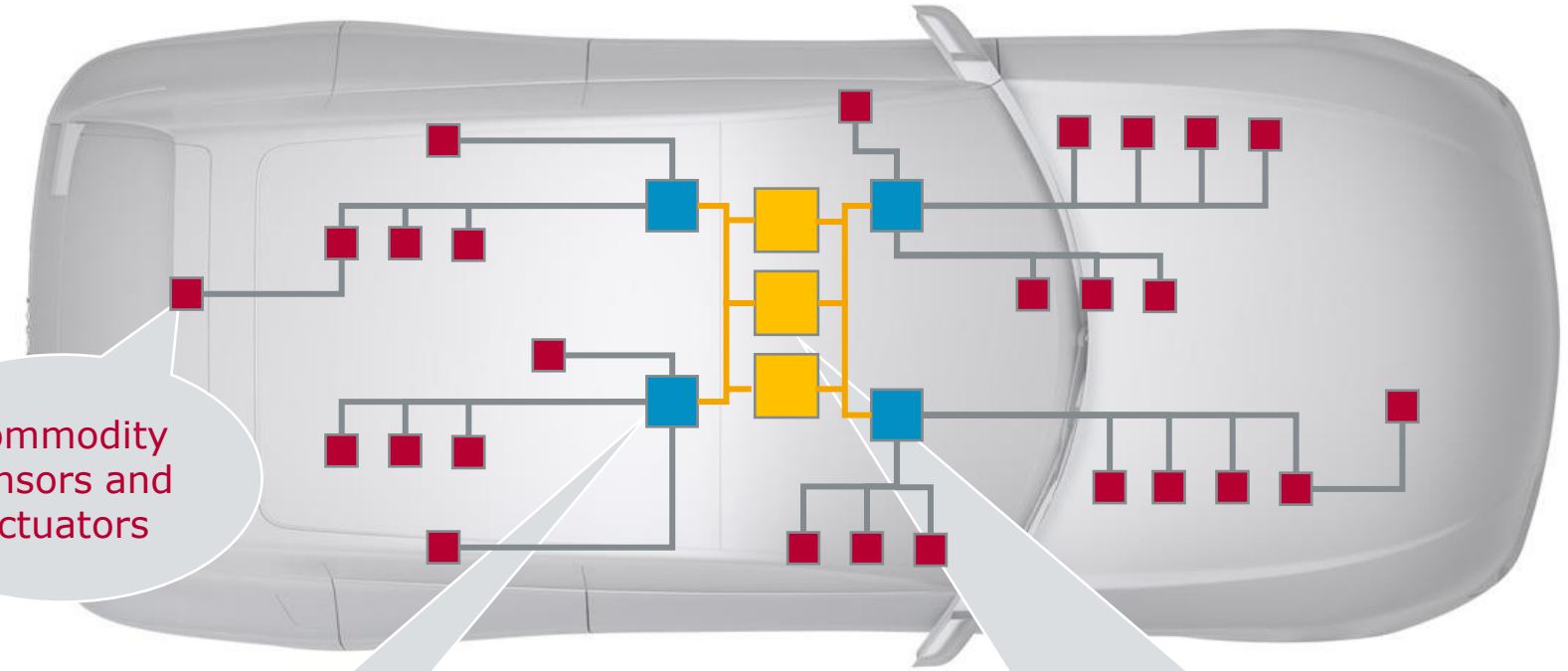
Ready for High Performance Computers

V1.2 | 2023-02-27

Agenda

1.	AUTOSAR Adaptive
2.	MICROSAR Adaptive Product
3.	Tools for MICROSAR Adaptive

Central Computing Architecture



Sensor and Actuator ECU
signal oriented only

Integration ECU
zone oriented

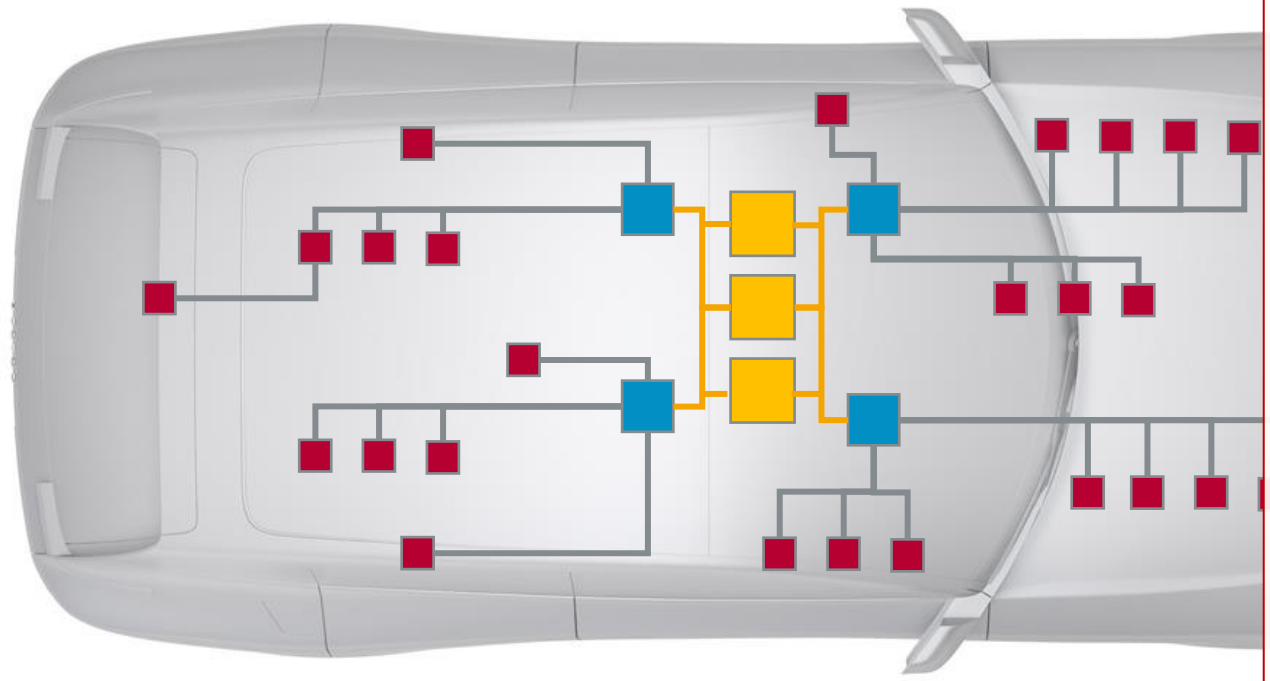
Computing Platform
"Brain ECU"

Commodity sensors and actuators

Take over high-level S/A functions

- Integrates cross-domain functions with many communication technologies
- Central point of innovation
- Same platform for **many car-lines and generations**

Central Computing Architecture



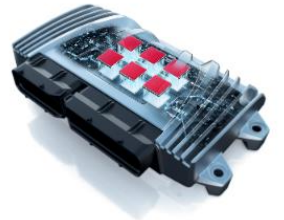
3 types of ECUs:

1. Brain ECUs

- high performance computers based on SoCs
- secure IT-like software acc. ISO 26262
- focus of functional innovation
- linked to the cloud

➔ **Adaptive** (AND **Classic** e.g. for fail-op)

2. Integration ECUs



- typically zone oriented
- lean or rich functionality

➔ **Classic** AND/OR **Adaptive**

3. Sensor and Actuator ECUs

- commodity ECUs
- basic functionality

➔ **Classic**

AUTOSAR Platform Comparison

AUTOSAR Classic Platform (CP)	AUTOSAR Adaptive Platform (AP)
Operating system based on OSEK	Operating system based on POSIX
Developed in C, whole stack compiled and linked in one piece	Developed in C++, applications are separately installable
Applications share single address space (MPU possible)	Applications use their own virtual address space (MMU)

Safety Critical

Computing Power

Modularity

Real Time Requirements

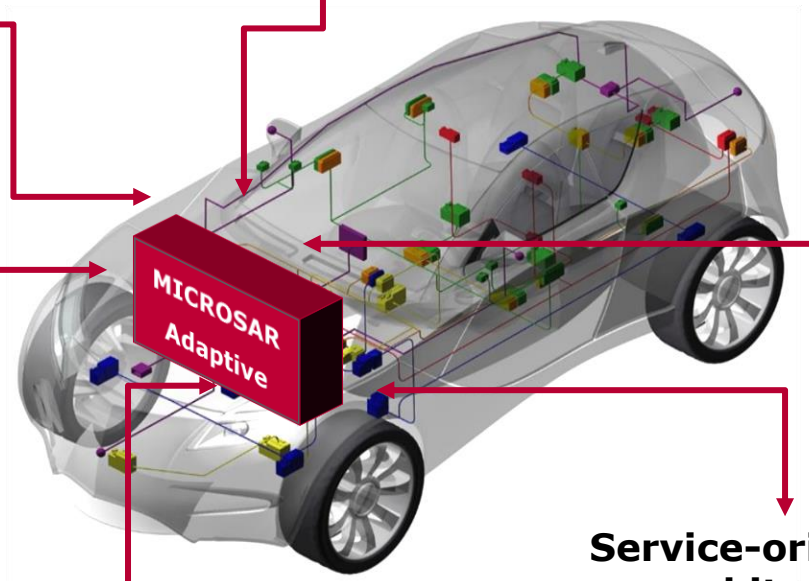
Fast Sartup/Shutdown Time

MICROSAR Adaptive - Being Prepared for the Next-Generation of ECUs

MICROSAR Adaptive is a complete basic software solution up to **ASIL D**

Seamless **interoperability with classic** AUTOSAR ECUs

Development of applications in the ecosystem of **POSIX**-based OS



High performance ECUs hosting applications for automotive use cases

Applications can be installed and started **during runtime**

Service-orientated architecture
→ Modular application support
→ New applications based on existing services

Infotainment

ADAS

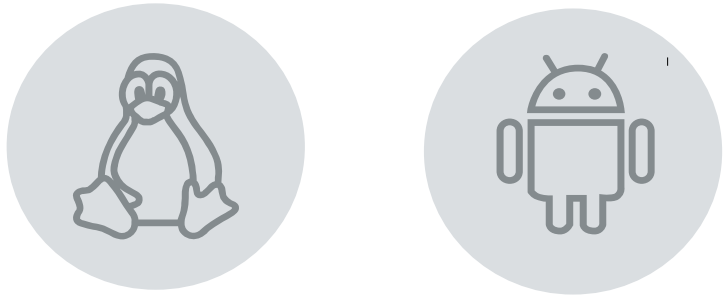
Connectivity

Dynamic Software Platform

Platform Support?

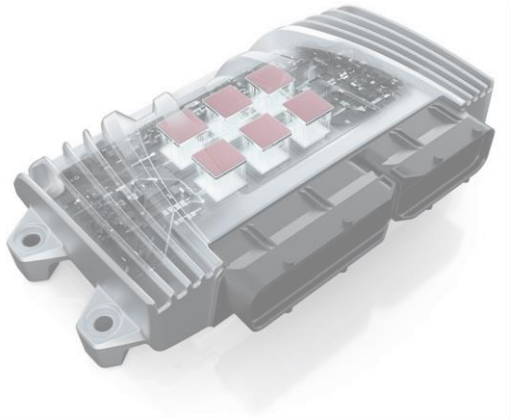
Wide range of supported Operating Systems

- MICROSAR Adaptive is designed to support all major Posix OS on the market
- OS Abstraction Layer reduces effort to adapt to new OS
- Currently supported: QNX (Blackberry), PikeOs (SYSGO), Linux
- Prototypes: VxWorks (Wind River), Integrity (Green Hills), Android

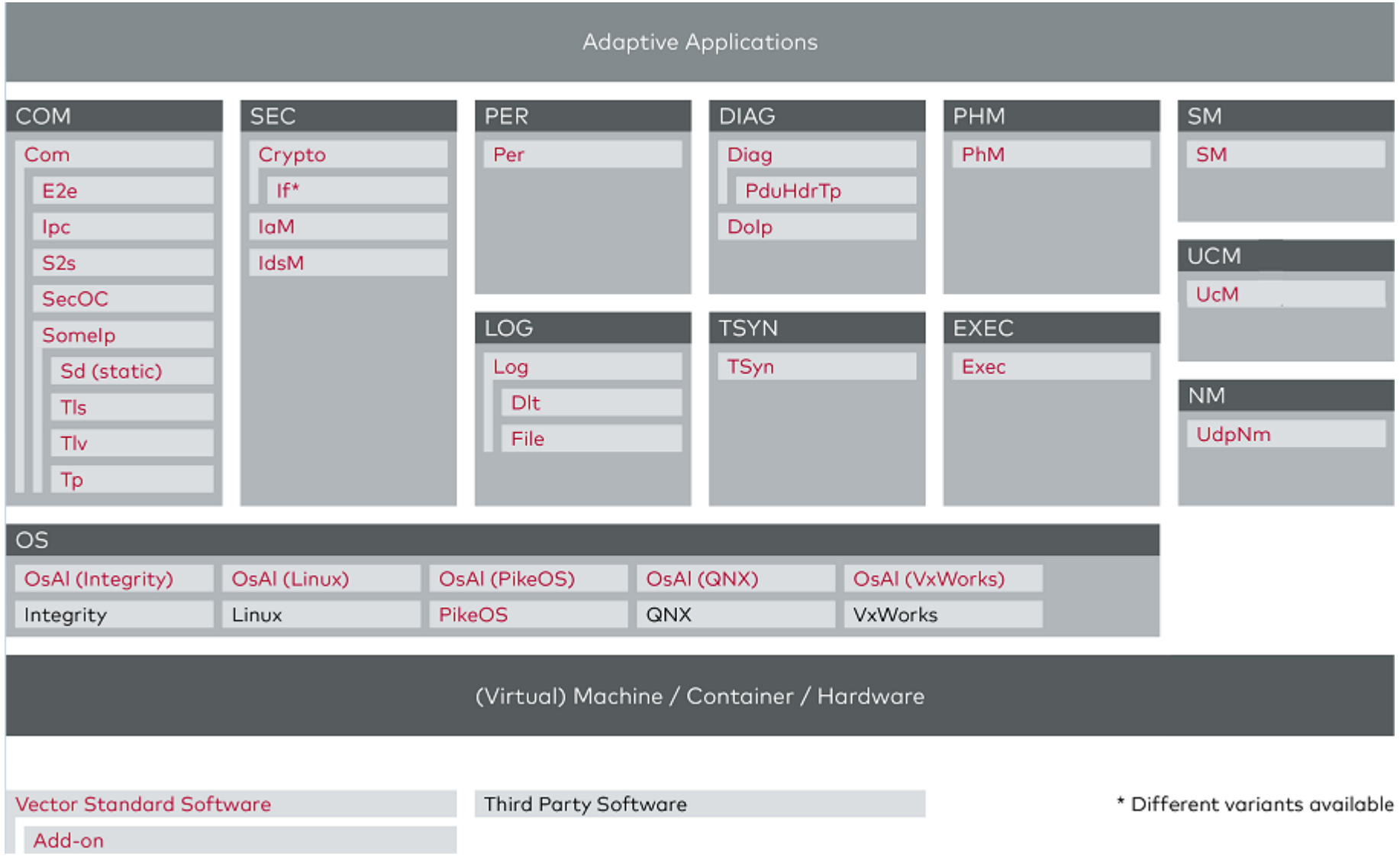


Hardware independent

- OS provides HW abstraction for many devices
- Where required we discuss driver design with silicon vendors
  - E.g.: HSM, TSYN, IPC on SoC
- Exemplary chips:
  - Renesas (R-Car)
  - Qualcomm (Snapdragon)
  - Nvidia (Orin)
  - Samsung (Exynos)



Architecture

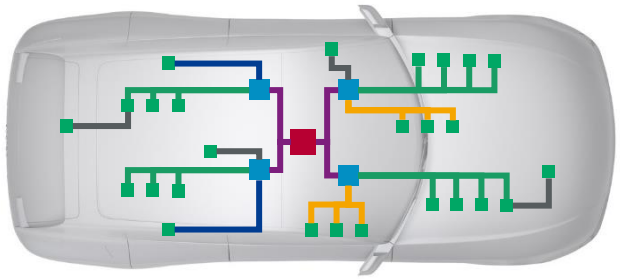


Communication: Basic Communication

Your Challenge

Secure, safe, efficient comms

In-Vehicle communication requires to be secure and safe which can be a daunting task to achieve with SW not designed with these objectives from day one.

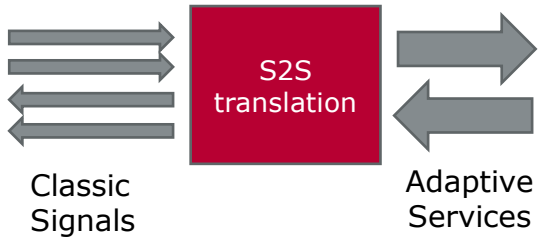


Our Solution

ASR-compliant

MICROSAR Adaptive offers the complete product range for AUTOSAR communication components.

The system approach of AUTOSAR guarantees seamless communication between Adaptive and Classic ECUs.



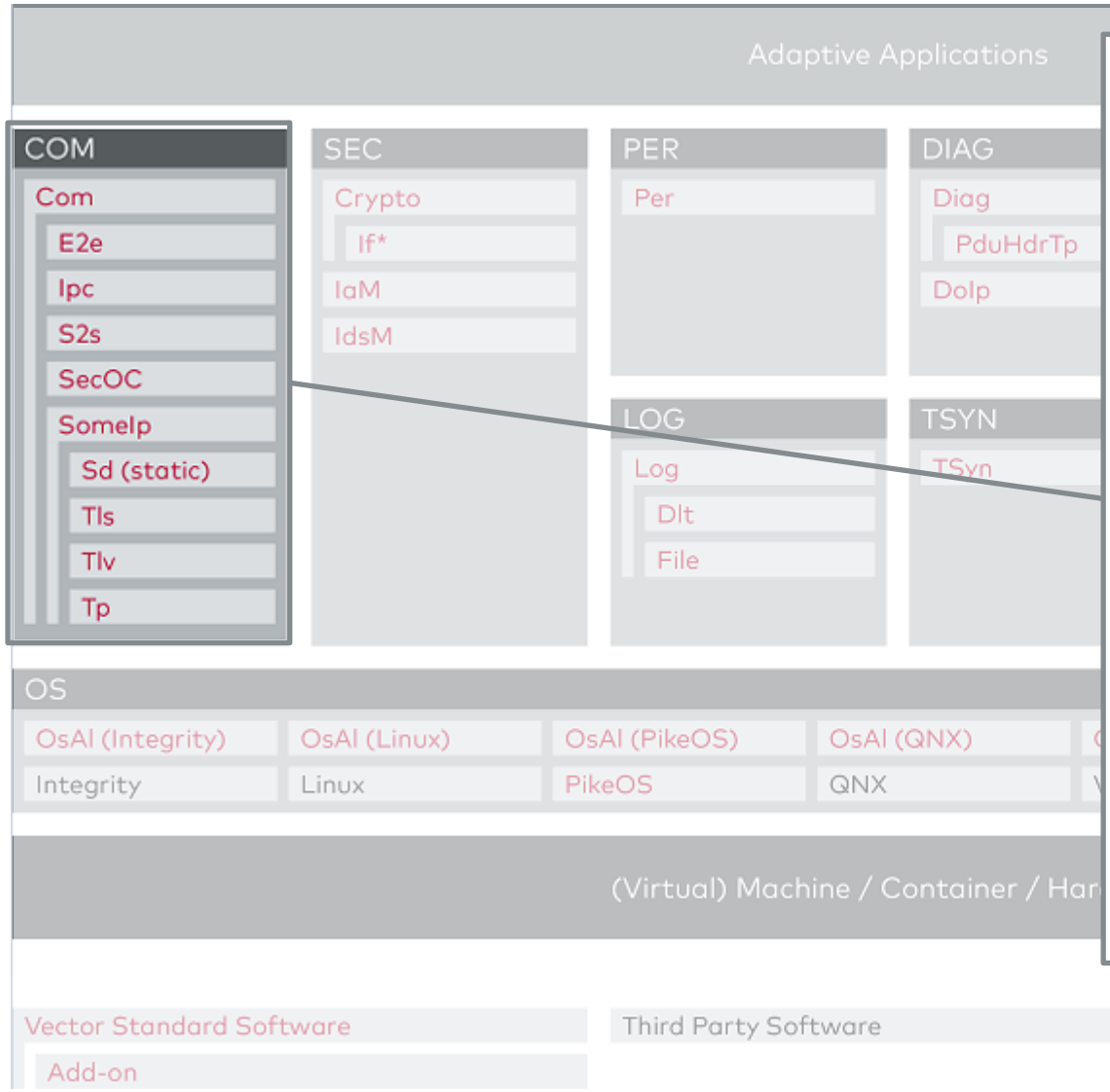
The Advantages

Easy tool support

DaVinci Developer Adaptive allows easy design and validation of AUTOSAR modules to get Adaptive applications running.

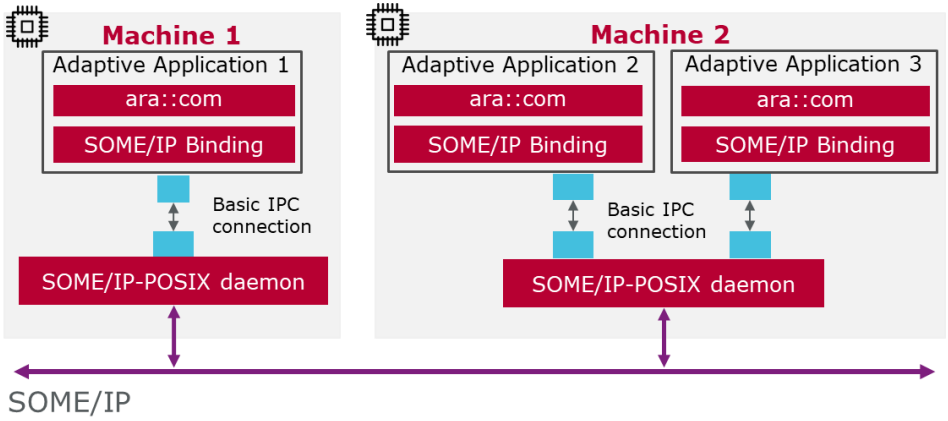
Highlights

- Full AUTOSAR compliant product range
- Smooth system communication between Classic and Adaptive AUTOSAR
- Simple application design with tool support which abstracts complex ARXML modeling



Communication Management (ara::com)

- COM provides the basis for service-based communication between applications and with platform services
- CM abstracts from the underlying protocol or bus (SOMEIP, IPC, …)



Diagnostics: On-board diagnostics via UDS

Your Challenge

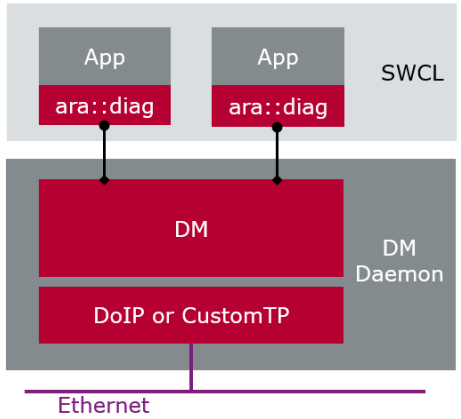
Implement UDS Diagnostics

Implement UDS diagnostics based on ISO 14229 and ISO 13400 and fault memory management in your AUTOSAR Adaptive ECU and communicate over ethernet with an external tester.

Our Solution

MICROSAR Adaptive DM

It supports all AUTOSAR compliant features of ISO 14229-x and realizes manufacturer specific extensions, diagnostic flavors and ethernet based transport protocols.



The Advantages

One solution for all projects

Benefit from our experience to provide a comprehensive diagnostic stack.

Highlights

- AUTOSAR Adaptive compliant diagnostic solution
- Support of common manufacturer diagnostic specification
- Mature toolchain

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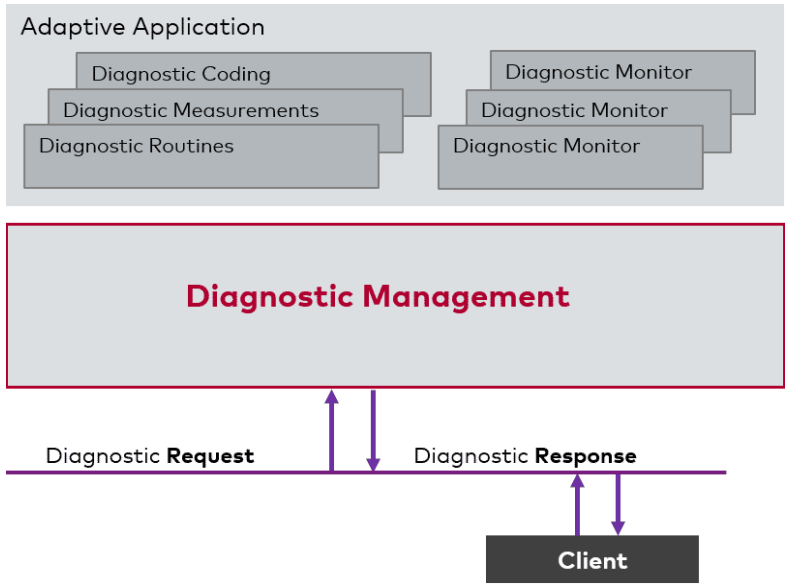
Diagnostics (ara::diag)

- Provides services as specified in Unified Diagnostics (UDS)
  and Diagnostics over IP (DoIP)



Persistency: Non-Volatile Data Storage

Your Challenge

Persisting Non-volatile Data

Storage of non-volatile data is a key functionality of any automotive ECU.

Ensuring reliable persistency of non-volatile data in all ECU states represents a major challenge.

Our Solution

MICROSAR Memory Stack

- Solution for non-volatile data storage
- Supports file-based and key-value based non-volatile data storage

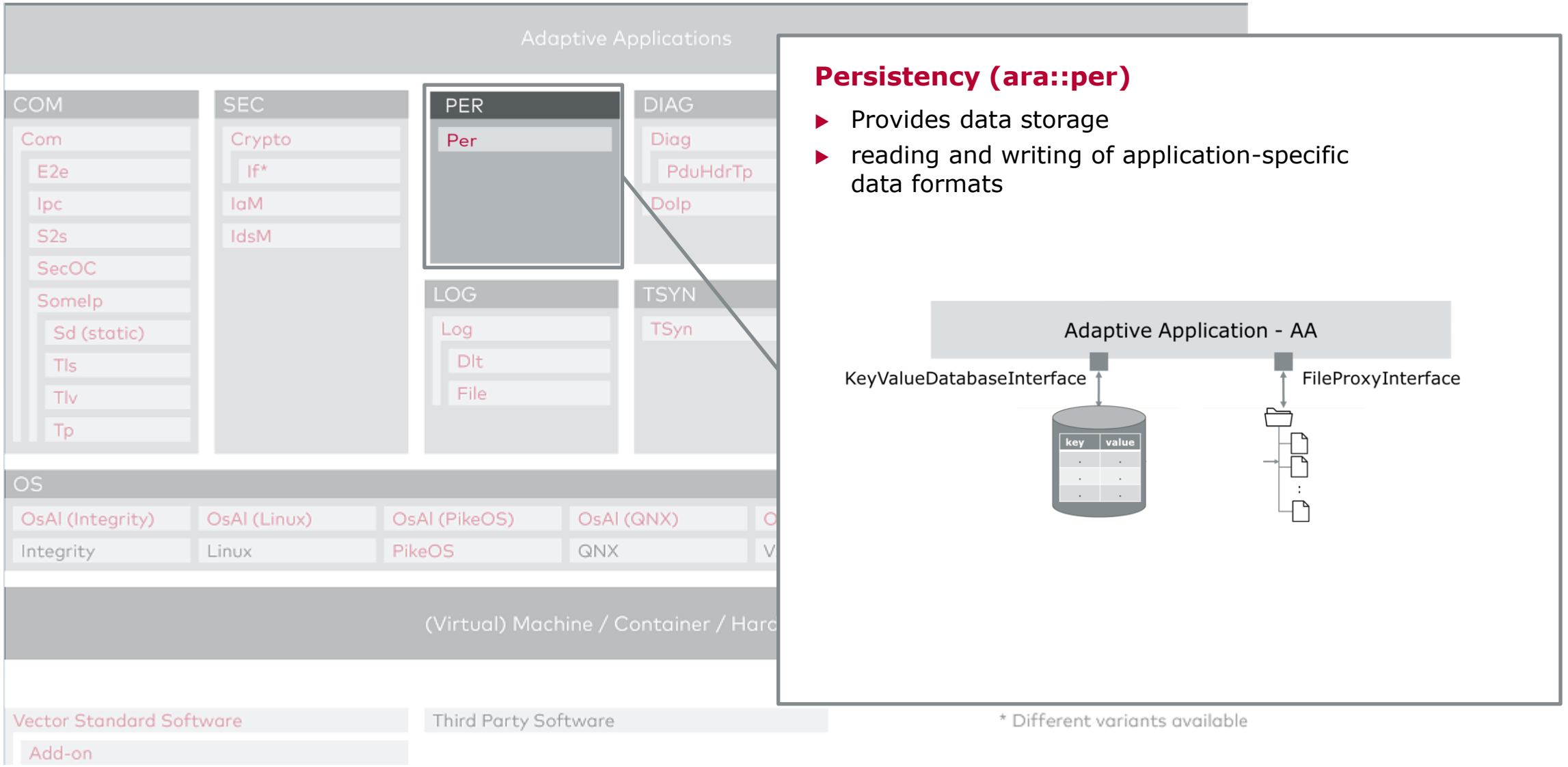
The Advantages

Robust and Flexible

- Efficient and mature solution for non-volatile data storage
- Seamless integration with Vector MICROSAR Adaptive basic software modules and tool chain

Highlights

- All in one solution for key-value- and file-based non-volatile data storage
- Simple design with tool support



Persistency (ara::per)

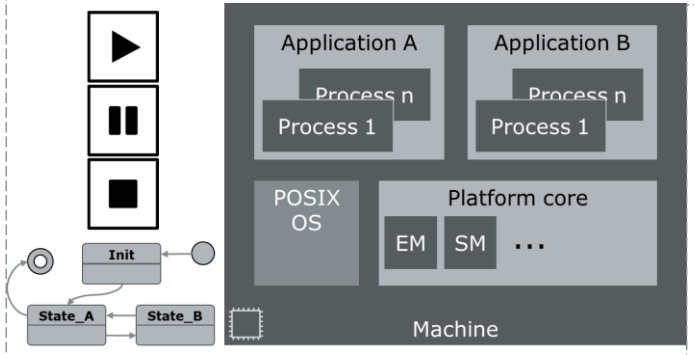
- Provides data storage
- reading and writing of application-specific data formats

Mode Management

Your Challenge

Flexible mode management

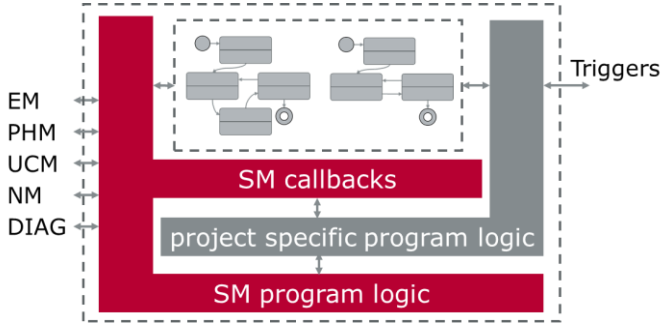
Controlling an Adaptive Machine requires mode handling on different levels.



Our Solution

Execution Management

MICROSAR Adaptive provides Execution Management to control the start/shutdown of Process and SM



The Advantages

Speed up your development

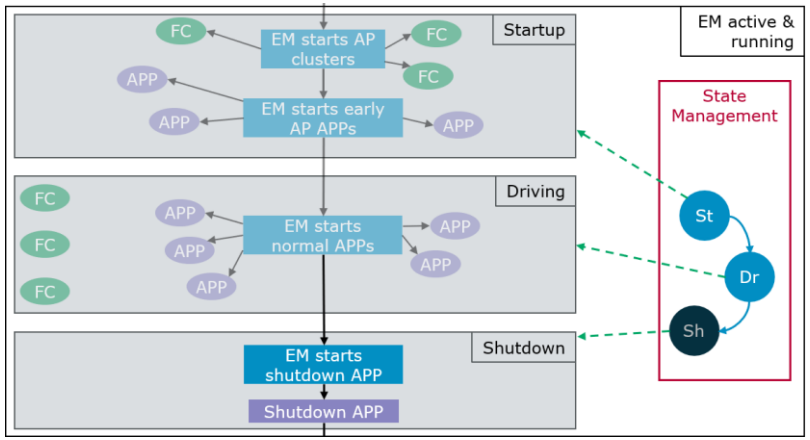
A pre-defined setup for the Machine State is already included in the MICROSAR Adaptive SM package. The control of additional modelled function groups could be added easily with the shipped control libraries.

Highlights

- Configurable pre-defined scenario to startup and shutdown the platform components
- Demo applications for quick start

Execution Management (ara::exec)

- The Execution Management (EM) checks the system for installed applications
- EM configures planning parameters and resource limits



Software Update: Software Download in Application Context

Your Challenge

Dynamic Updates of Adaptive

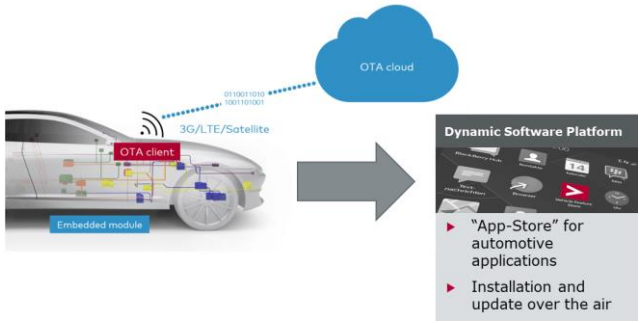
Flexible, dynamic updates shall be supported in an Adaptive system:

- Flexibly add, update or remove user applications on an Adaptive Machine.

Our Solution

Update & Config Management

The functional cluster Update and Configuration Management (UCM) of MICROSAR Adaptive is responsible for updates and system reconfiguration.



The Advantages

Adaptive Software Update

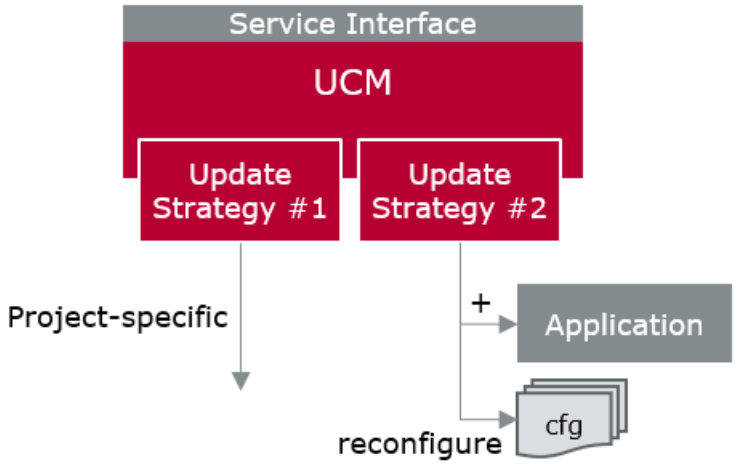
- The UCM in MICROSAR Adaptive is our standard solution to update software which is
  - AUTOSAR-compliant and
  - can be adapted, e.g. for product developments.

Highlights

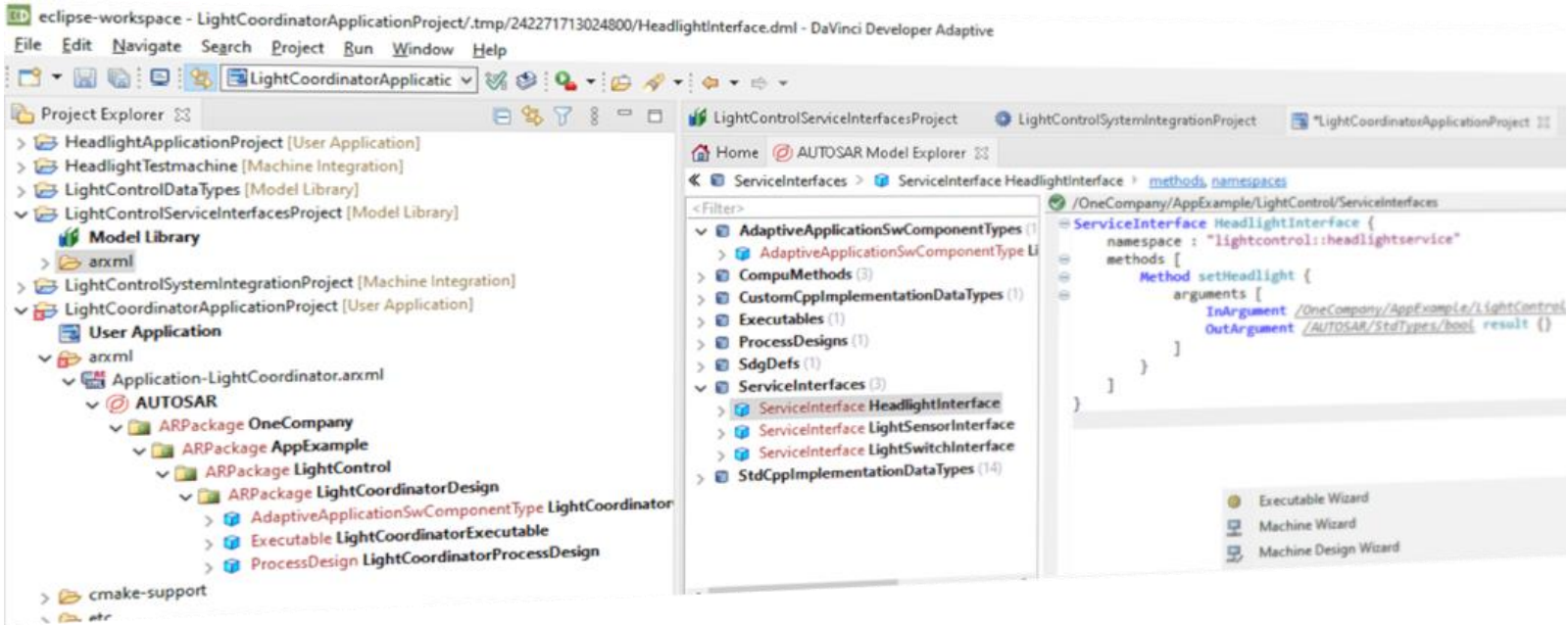
- UCM Client as the interconnection between protocol/transport layer and UCM is customer-specific.
  - Reuse of the diagnostic implementation in MICROSAR Adaptive is possible.

Update & Config Management(ara::ucm)

- installing new software components on ECUs or updating existing software components



DaVinci Developer Adaptive: Application Design



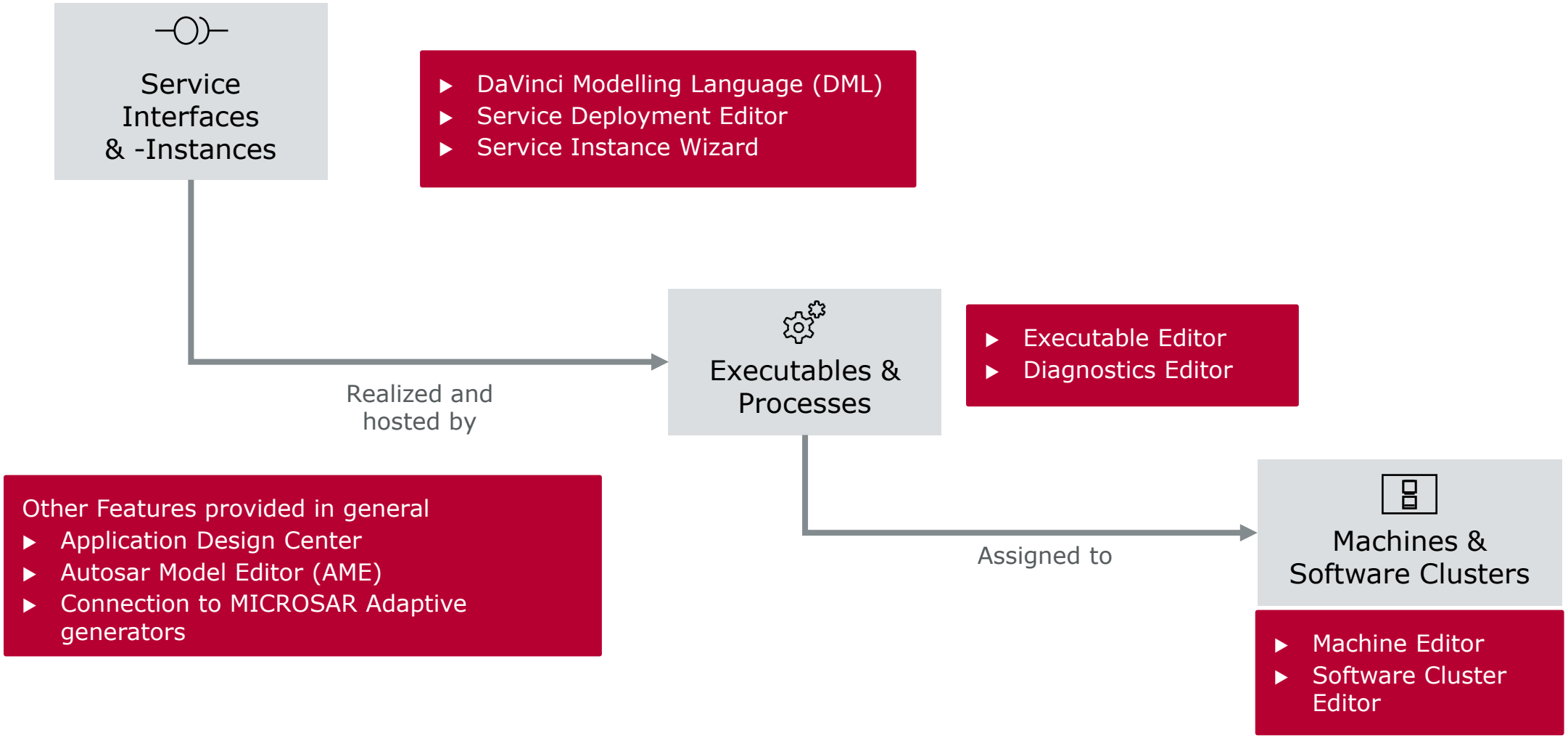
Focus:

- Design of AUTOSAR models to get Adaptive applications running
- Works natively on ARXML files

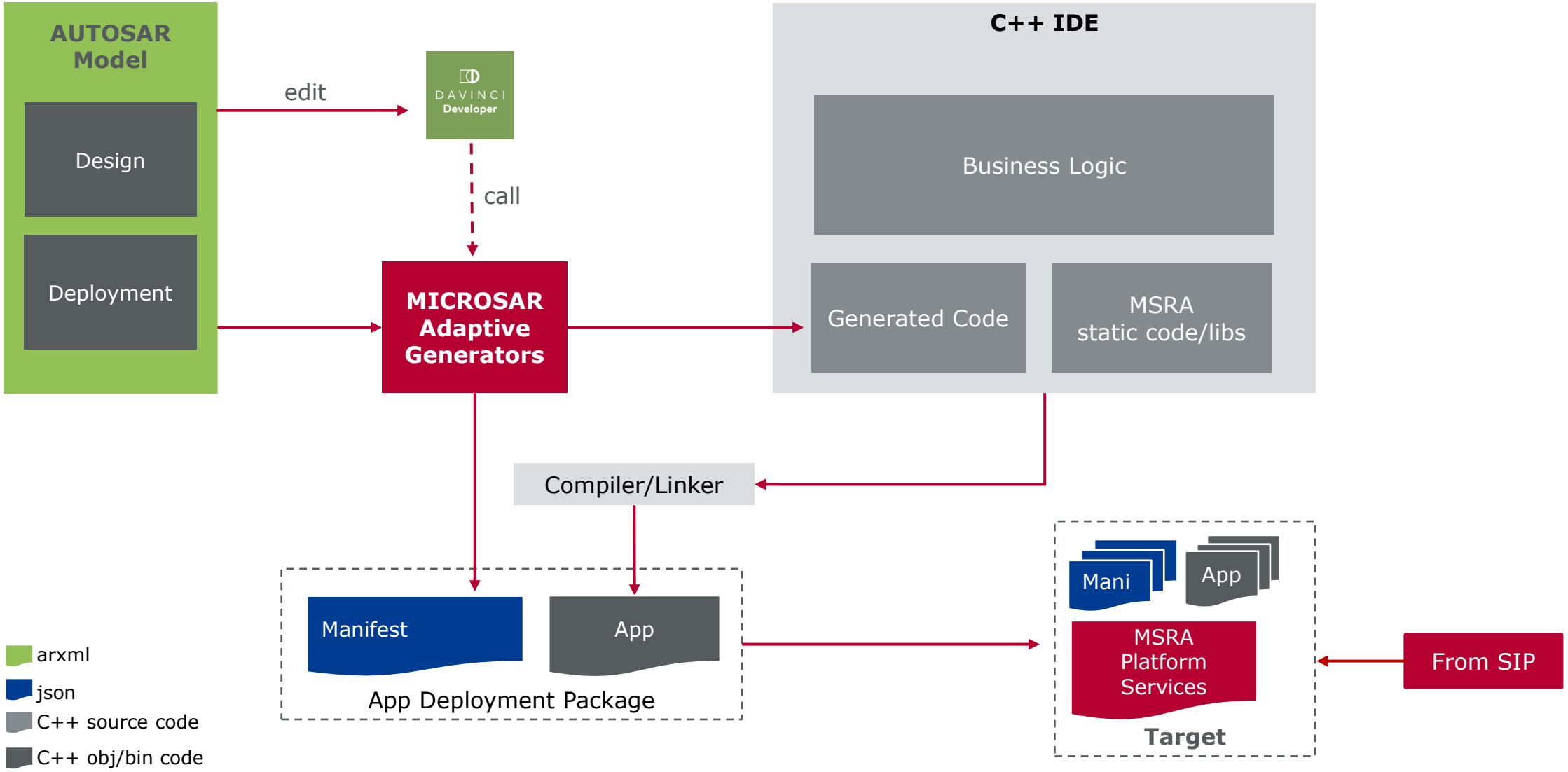
Features:

- Code-style definition of AUTOSAR models with the DaVinci Modelling Language (DML)
- Specialized editors and wizards for most important use cases like service deployment or diagnostics integration
- Integrates with MICROSAR Adaptive to configure vendor specific parameters and trigger generators

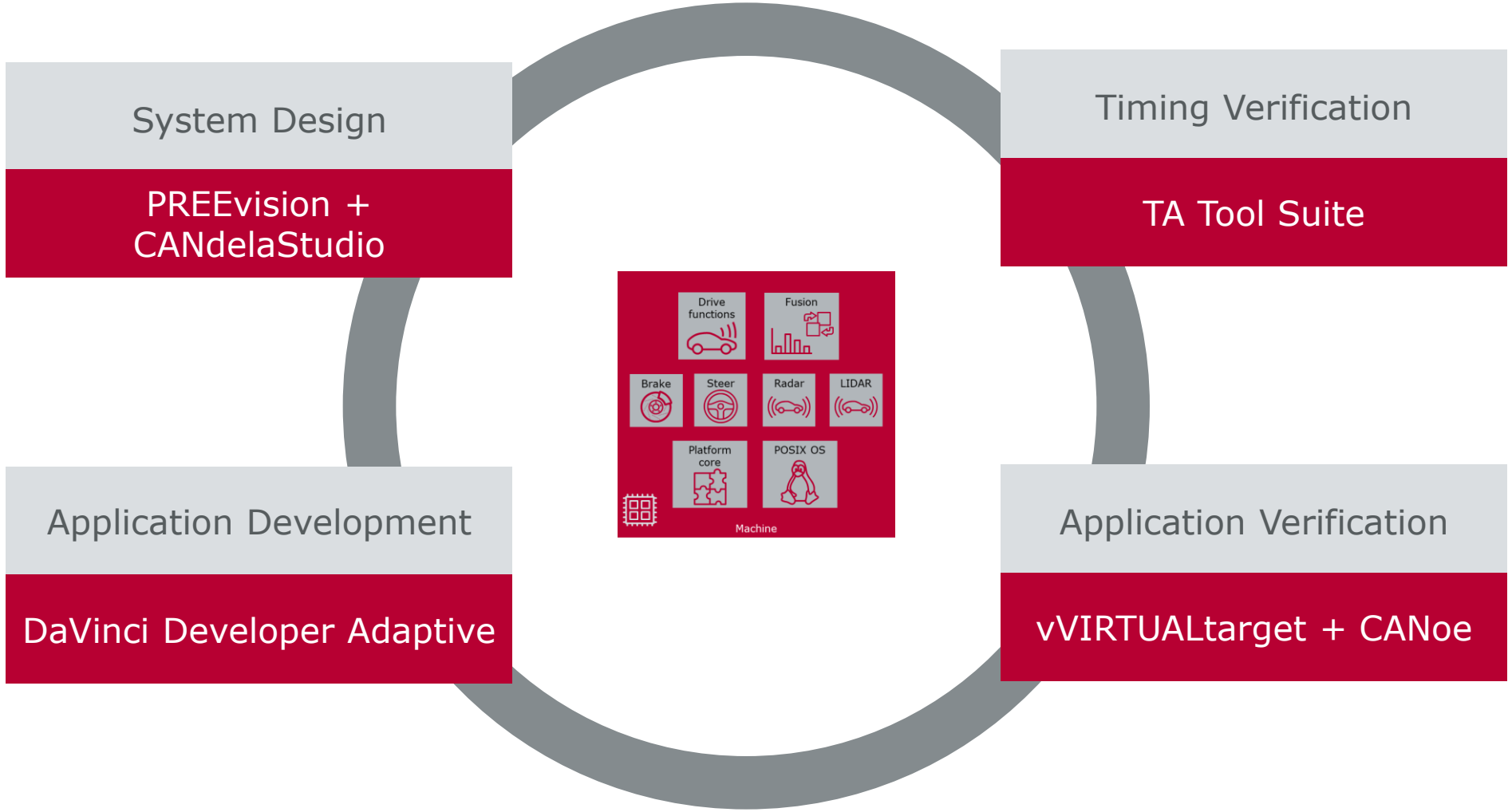
DaVinci Developer Adaptive: Application Design



MICROSAR Adaptive Modeling Workflow



Vector Tools for AUTOSAR Adaptive



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