



DRIVING EMBEDDED EXCELLENCE



RTA Solutions

Tailor-made Embedded Software

RTA Solutions

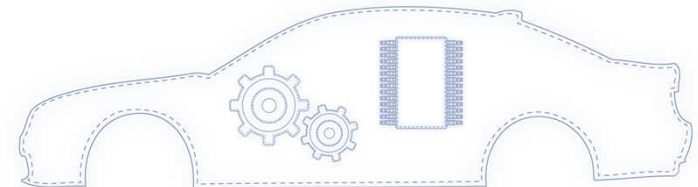
Comprehensive Support for AUTOSAR-based ECU Development

With its unique recognized expertise in the automotive market, ETAS provides full support for any AUTOSAR-based ECU Development – classic and now also adaptive platform!



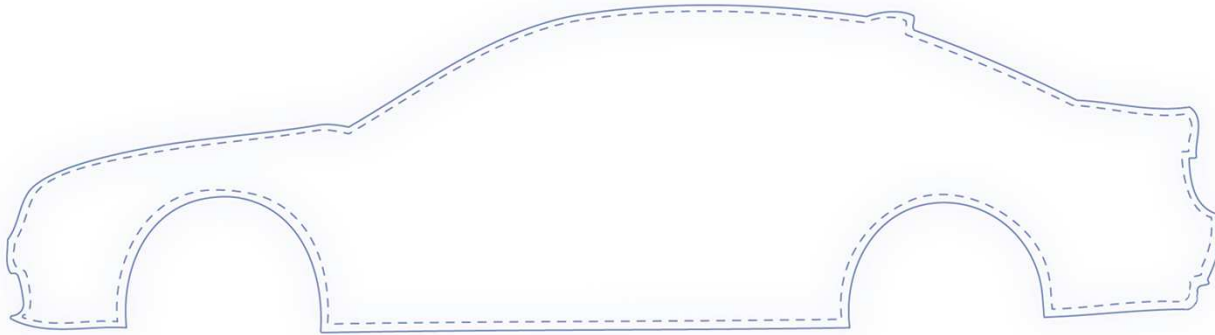
ETAS has a proud legacy of developing high quality, innovative embedded platform software solutions

- 20 years experience in automotive embedded software development
- As of today, more than 1.5 billion ECUs have been produced containing ETAS basic software with 2 million more being produced each week
- Collaborative development with some of the largest tier 1 automotive suppliers in the world
- Continual collaboration with corporate research and international research institutions to ensure state-of-the-art solutions



RTA Solutions

What do we do?



RTA Basic Software and Tools

We enable efficient development and deployment of automotive application software, through the uniquely open and cost-optimized AUTOSAR basic software for both the classic and adaptive AUTOSAR platforms

RTA Engineering Services

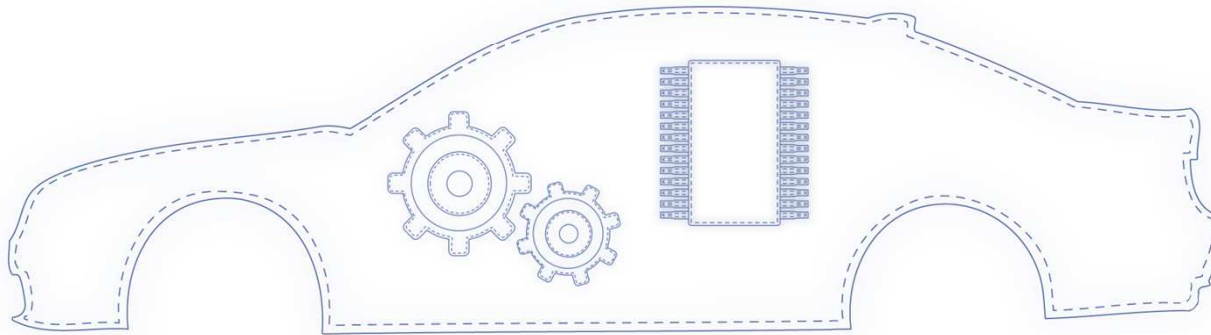
We deliver high quality and cost-effective customer-specific embedded software, through a global team of embedded software specialists

RTA Consulting Services

We provide expert support for optimizing the development processes and overcoming the technical challenges of tomorrow's ECU architectures

RTA Solutions

Basic Software: RTA-BSW for classic AUTOSAR and RTA-VRTE for adaptive AUTOSAR



RTA Basic Software and Tools

We enable efficient development and deployment of automotive application software, through the uniquely open and cost-optimized AUTOSAR basic software for both the classic and adaptive AUTOSAR platforms

Classic Platform **GM Global B SUMs**

OS

Hypervisors

Adaptive Platform

RTE

Tooling

BSW

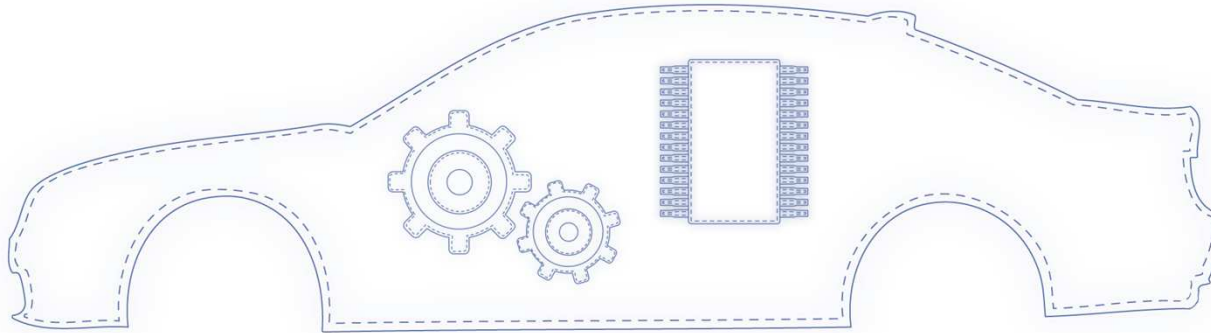
MCALs

Security

Bootloaders

RTA Solutions

RTA Engineering Services



RTA Engineering Services

We deliver high quality and cost-effective customer-specific embedded software, through a global team of embedded software specialists

Safety-relevant SW

Standards

Flexibility

Quality

Competitive pricing

Application SW

Development to spec.

On-site support

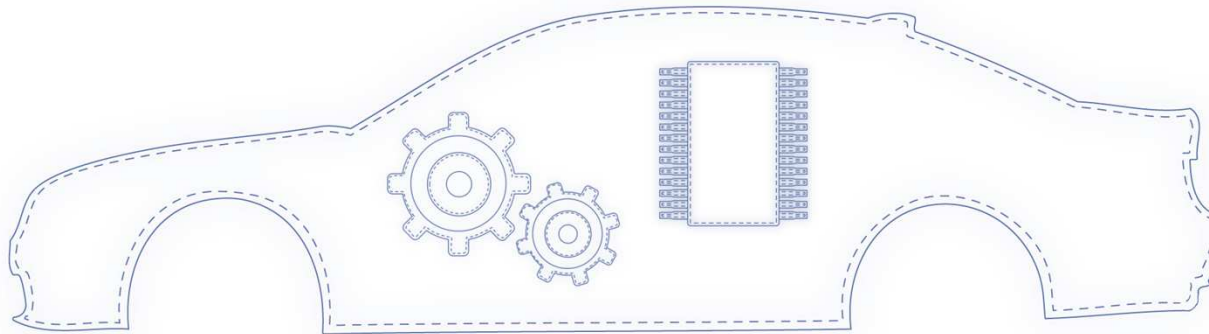
SW integration and test

Tool development

Advanced Development

RTA Solutions

RTA Consulting



RTA Consulting Services

We provide expert support for optimizing the development processes and overcoming the technical challenges of tomorrow's ECU architectures

Standardization

Expertise **Training** **Multi-/Many-Core**

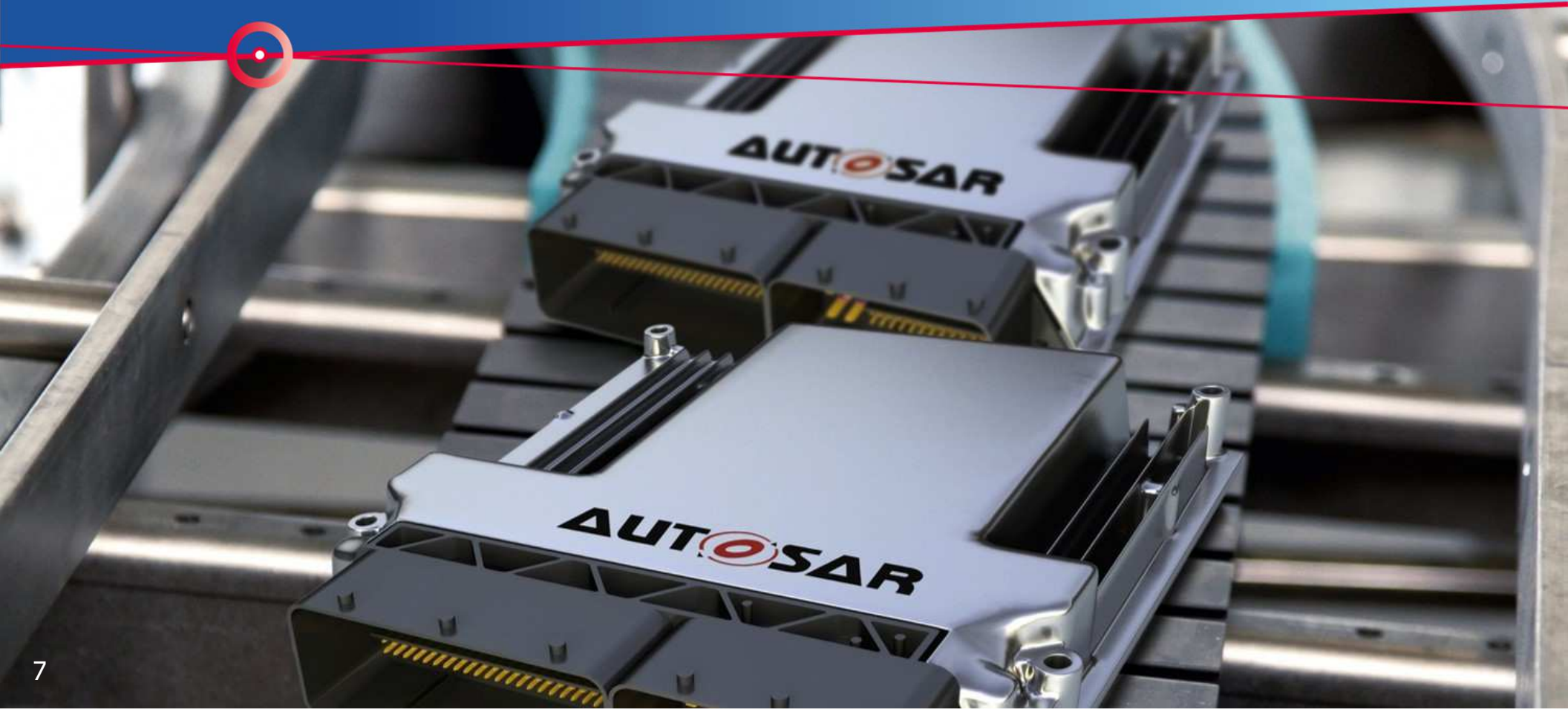
Flexibility **Hypervisor** **Embedded Security**

Assessments **Functional Safety** **Process improvement**

AUTOSAR **Concept demonstrators**

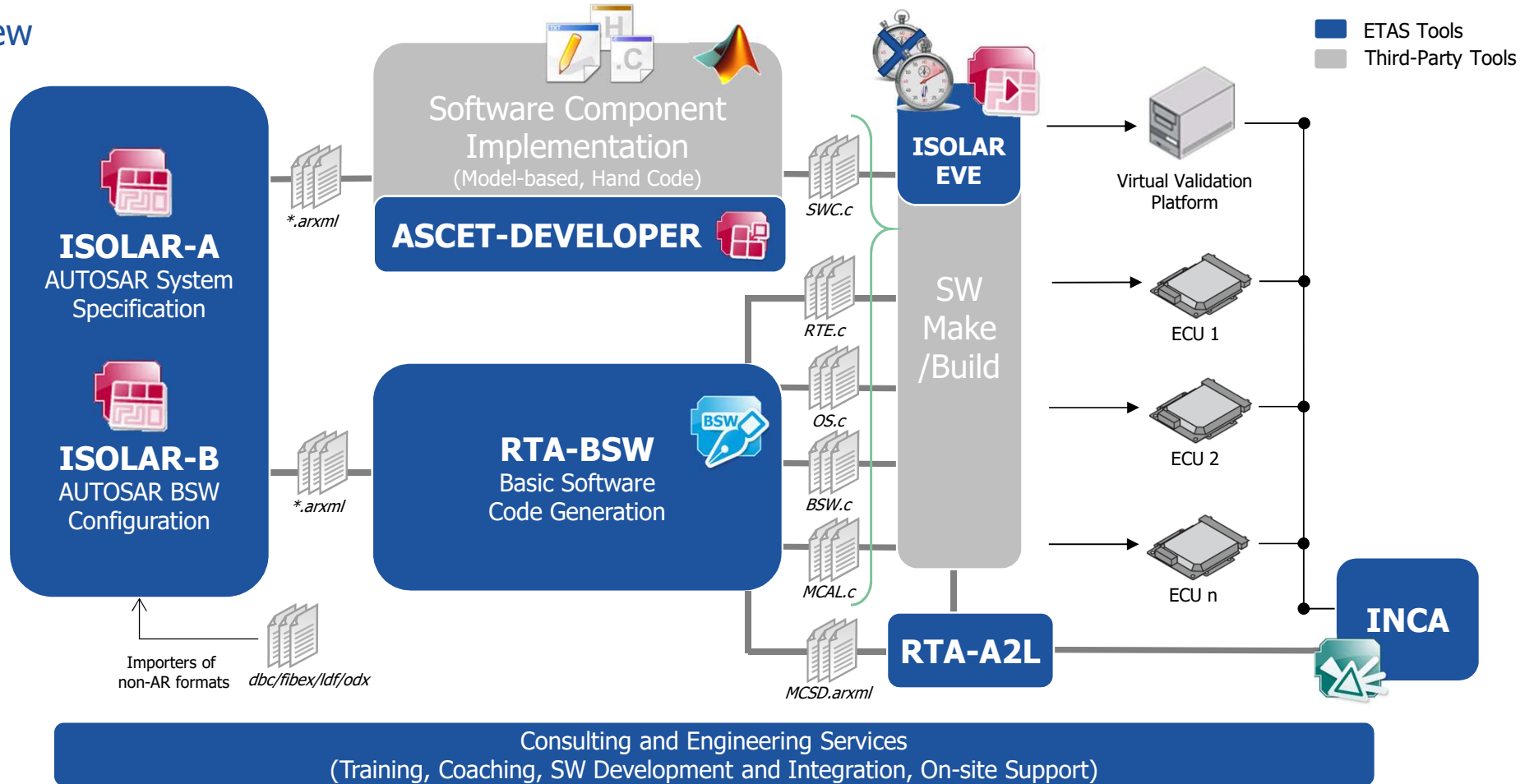
RTA Solutions

AUTOSAR Classic Platform Solutions



AUTOSAR Classic Platform Solutions

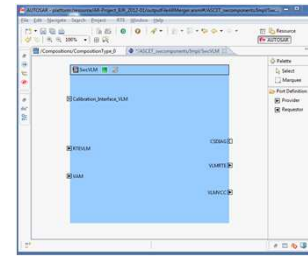
Overview



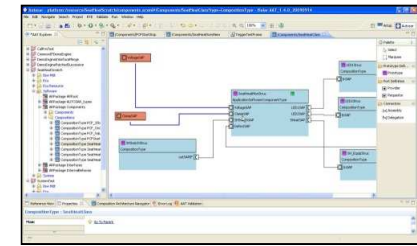
AUTOSAR Classic Platform Solutions

ISOLAR-A and ISOLAR-B: Configuration Tools

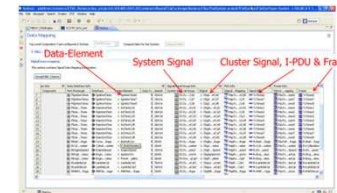
- ISOLAR-A
 - Full solution for configuration following the AUTOSAR methodology
 - Importing legacy formats: DBC, Fibex, LDF, ODX
- ISOLAR-B
 - BSW configuration
- ISOLAR tools easily integrate with your process
 - Speak AUTOSAR XML (.arxml) natively
 - Simple to extend thanks to Eclipse & ARTOP basis
- ISOLAR tools scale to huge projects



SW-Component editor

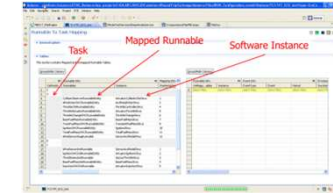


SW Composition editor



Data-Element	System Signal	Cluster Signal, I-PDU & Frame
...

Data-to-Signal mapping



Task	Mapped Runnable	Software Instance
...

Runnable-to-Task mapping



AUTOSAR Classic Platform Solutions

RTA-BSW Stacks and Modules

- RTA-*
 - Code generators for AUTOSAR BSW
 - Packages of AUTOSAR Basic software modules
 - Available today for most all ST microcontrollers combinations with further ports available on request.
- RTA-SEC
 - Qualified security stack for HSMs
 - ST SPC58NE84 "Eiger" Cut 1
 - ST Chorus SPC58EC80 Chorus 4M
 - ST Chorus SPC58EG84 Chorus 6M
 - ST SPC58NN84 „Bernina“ Cut 1

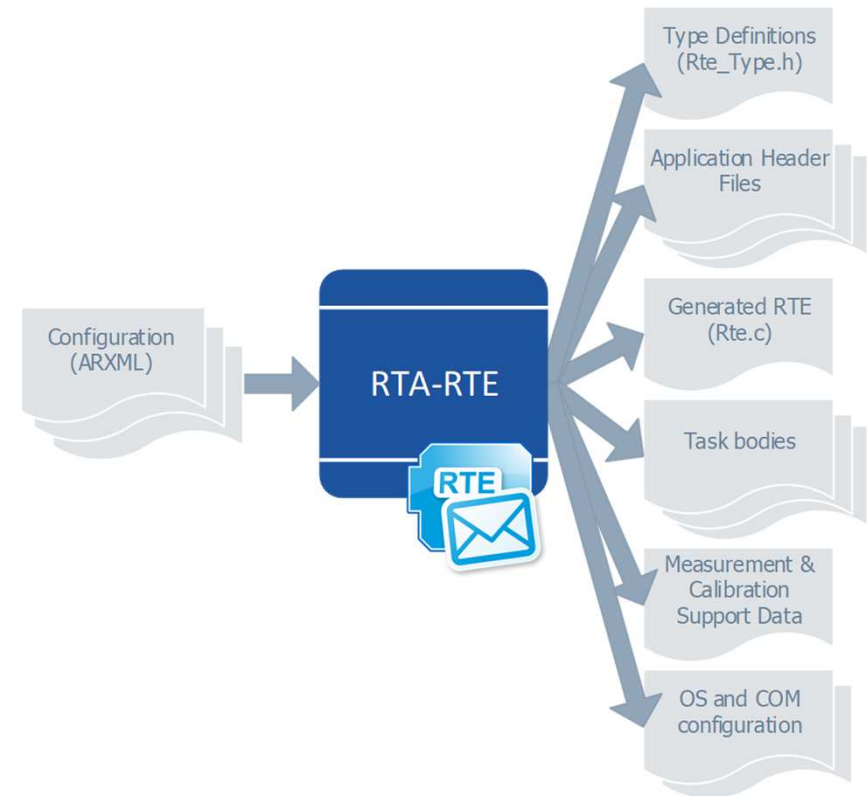


AUTOSAR Basic Software developed and provided by ETAS and third-parties.

AUTOSAR Classic Platform Solutions

RTA-RTE

- RTA-RTE was the first commercial implementation of the AUTOSAR RTE specification
- PC-based, command-line RTE Generation tool
 - Comprehensive coverage of the AUTOSAR specifications
 - R3.x, R4.0, ...
 - Robust, production quality performance
 - Flexible support for different use cases
- RTA-RTE products are already used in series production projects
 - Passive safety,
 - Powertrain, and,
 - Body Electronics
 - Clusters (HMI)



AUTOSAR Classic Platform Solutions

RTA-OS

- RTA-OS is the world's smallest and fastest AUTOSAR OS implementation
- Used in series production for over 20 years
- Deployed in over 1.25 Billion ECUs world wide
- Support for multicore ECUs with optimized RTA-IOC implementation
- TÜV-SÜD certified for use in ECU developments up to and including ISO26262 ASIL-D

RTA-OS: The smallest AUTOSAR OS in the world, so small it fits here:

```
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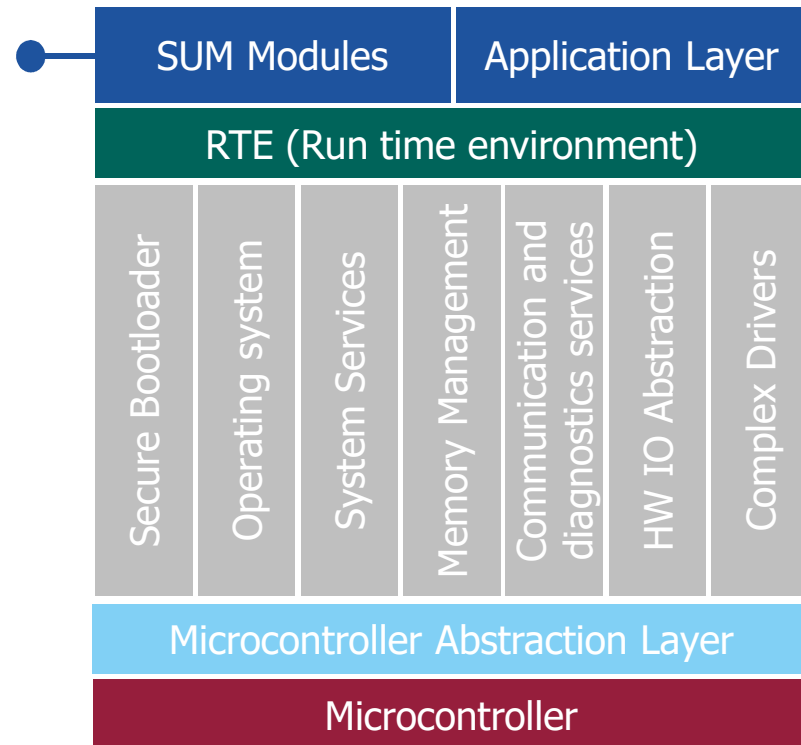


AUTOSAR Classic Platform Solutions

Other Solution Components

- **RTA-FBL**
 - Flash Boot Loader
- Plug-in for ISOLAR-B
- CAN/UDS support
- Generates FBL code from FBL specific configuration
 - Reduced effort to create FBL
- Requires OEM-specific add-ons for custom boot loading needs

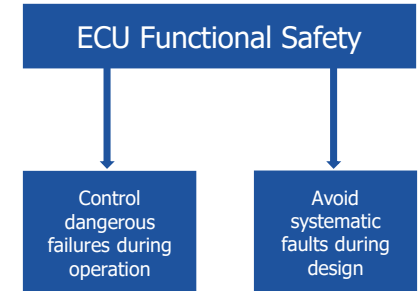
- **GMSUM**



RTA Solution

RTA-Safety

RTA basic software components provide the foundation for full ASIL-D
ECU Software Stack Qualification



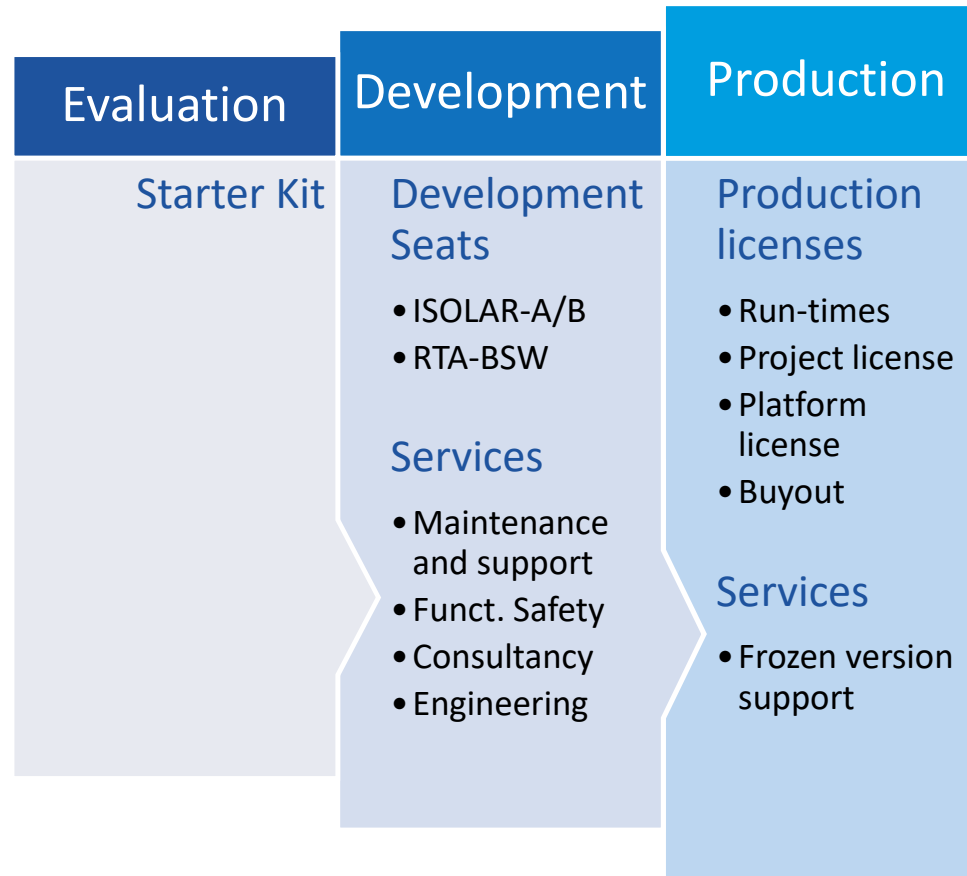
ETAS safety package in a nutshell

- Safety manuals for defining all required tasks to **achieve** and **maintain** the desired ASIL
- Safety case demonstrating ETAS software developed according to ISO26262
- TUV Sud certificates for RTA-OS and RTA-RTE

- [Optional] Identification of any **gap** between safety requirements and supported BSW features for achieving full compliance
- [Optional] Consulting support for customer-specific safety requirements
- [Optional] Consulting for safety reviews including BSW configuration

RTA-BSW

RTA-BSW and ISOLAR-A/B Business Model



RTA-BSW

RTA-BSW Starter Kit for ST

- Ready-to-use complete AUTOSAR reference application
- Configured for GHS compiler and SPC58NN development board
- Includes:
 - evaluation licenses for:
 - RTA-BSW (incl. OS, RTE, CAN, etc.)
 - ISOLAR-A & BCT (or ISOLAR-B)
 - SPC58NN MCAL

ETAS



RTA-BSW Starter Kit
Complete AUTOSAR Reference Application

At a Glance

- Complete, working AUTOSAR reference application
- Editable basic software (BSW) configuration files
- Full source code for all application software (ASW) modules
- Full source code for all BSW modules (including operating system)
- Enables generation of A2L files to support calibration
- Included training

Overview
The ETAS RTA-BSW Starter Kit is a ready-to-use, complete AUTOSAR reference application intended for users who want to have access to and want to experiment with an AUTOSAR application capable of running on a real or virtual target system.

To enable users to generate the reference application, the RTA Starter Kit provides all of the necessary software tools and evaluation licenses, together with example application software and example configuration. It features a full AUTOSAR basic software stack, including runtime environment (RTE), operating system (OS), COM, MEM and DIAG stacks including a microcontroller abstraction layer (MCAL) for a specific microcontroller/compiler combination.

The RTA-BSW Starter Kit also provides the ability to generate A2L files from the configuration, if the example application is used with an XCP-based calibration tool (such as ETAS INCA).

The RTA Starter Kit has been designed to run on representative hardware or on a virtual environment (see overview for currently supported platforms).

Reference Application
The reference application that is generated from the RTA Starter Kit demonstrates:

- Tool workflows (including configuration from legacy formats such as DBC)
- CAN communication (including the UDS diagnostic protocol)
- Diagnostic event management
- Non-volatile memory management
- Mode management
- Watchdog management
- E2E (end-to-end communication protocol)
- Calibration via XCP using a generated A2L file



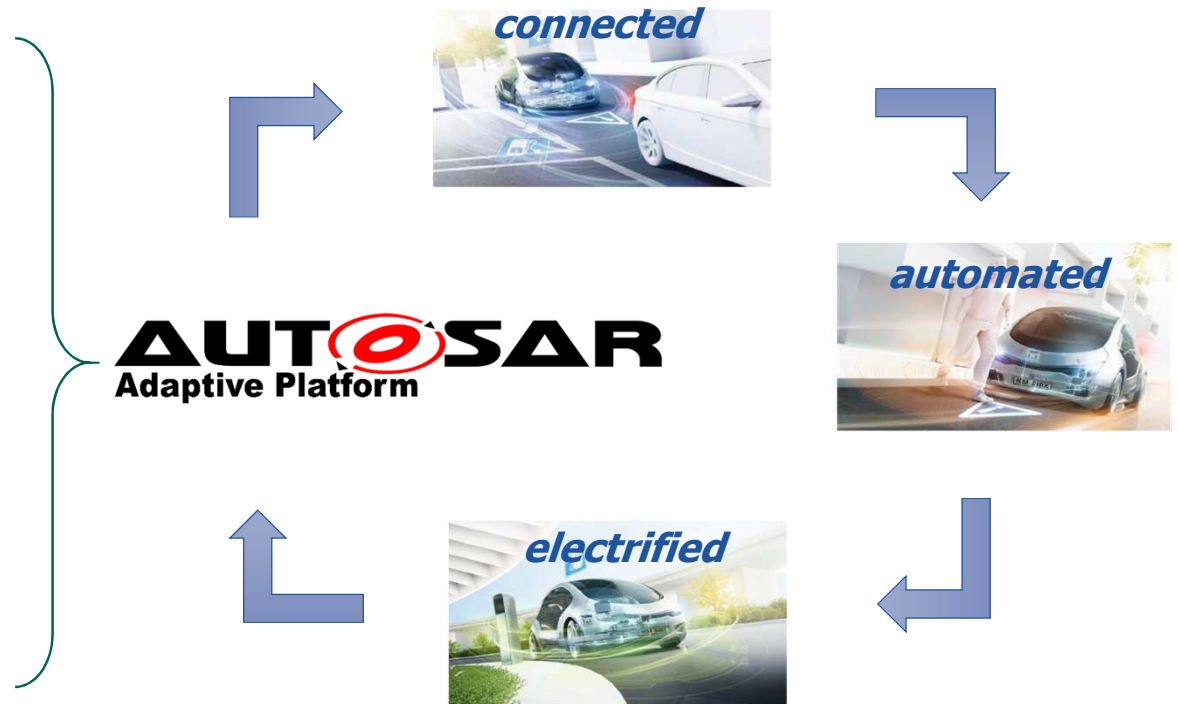
RTA-VRTE

Adaptive AUTOSAR++

Changes & Challenges in Modern Automotive Software

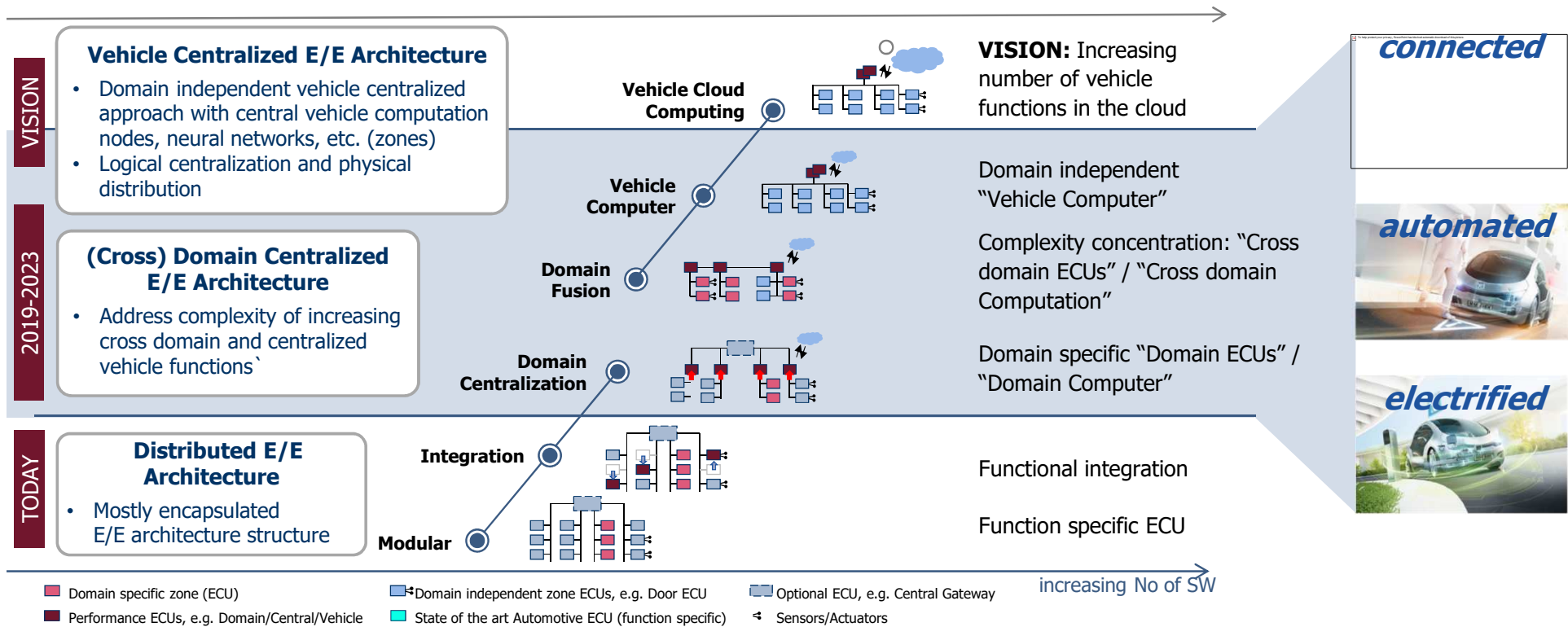
Motivating the AUTOSAR Adaptive Platform

- “Software eats the world” in automotive too!
- Increased demands for
 - High performance / large data computing
 - High bandwidth (switched / flexible) communication, permanent updates
 - Integrated / Domain ECUs (saving weight / cost)
- Heterogeneous architectures
 - Specialized co-processors



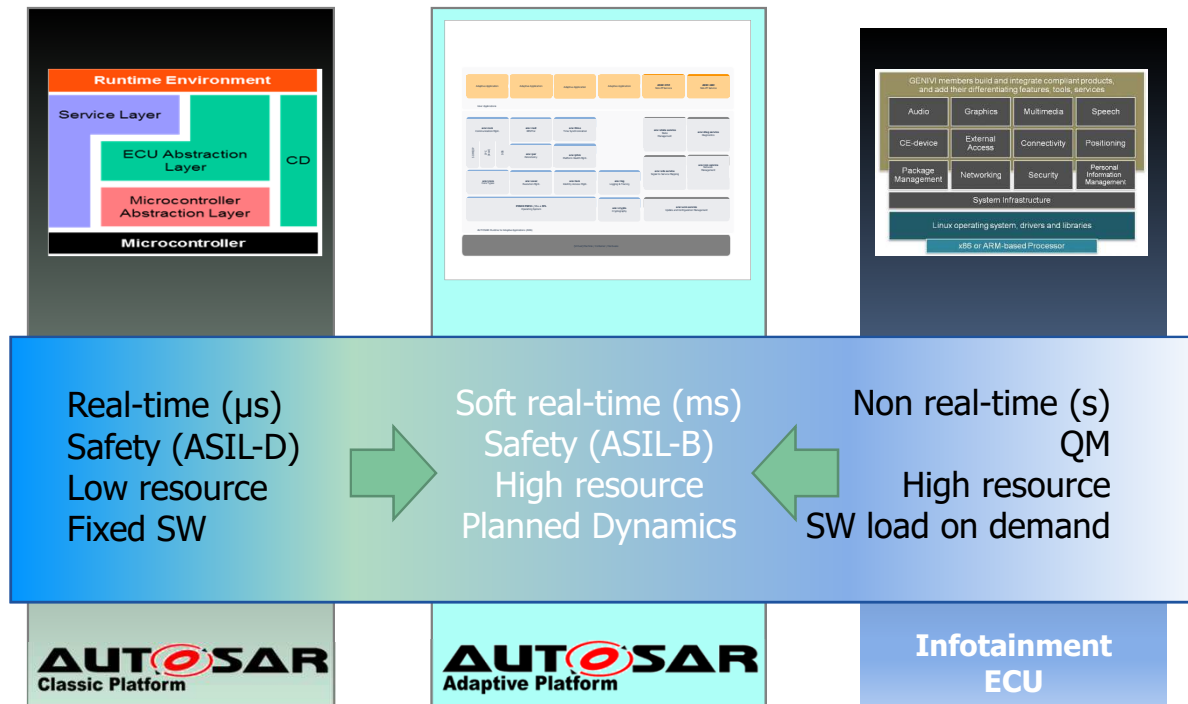
Evolution of E/E architecture

The Solution Space



The Adaptive Platform - characteristics

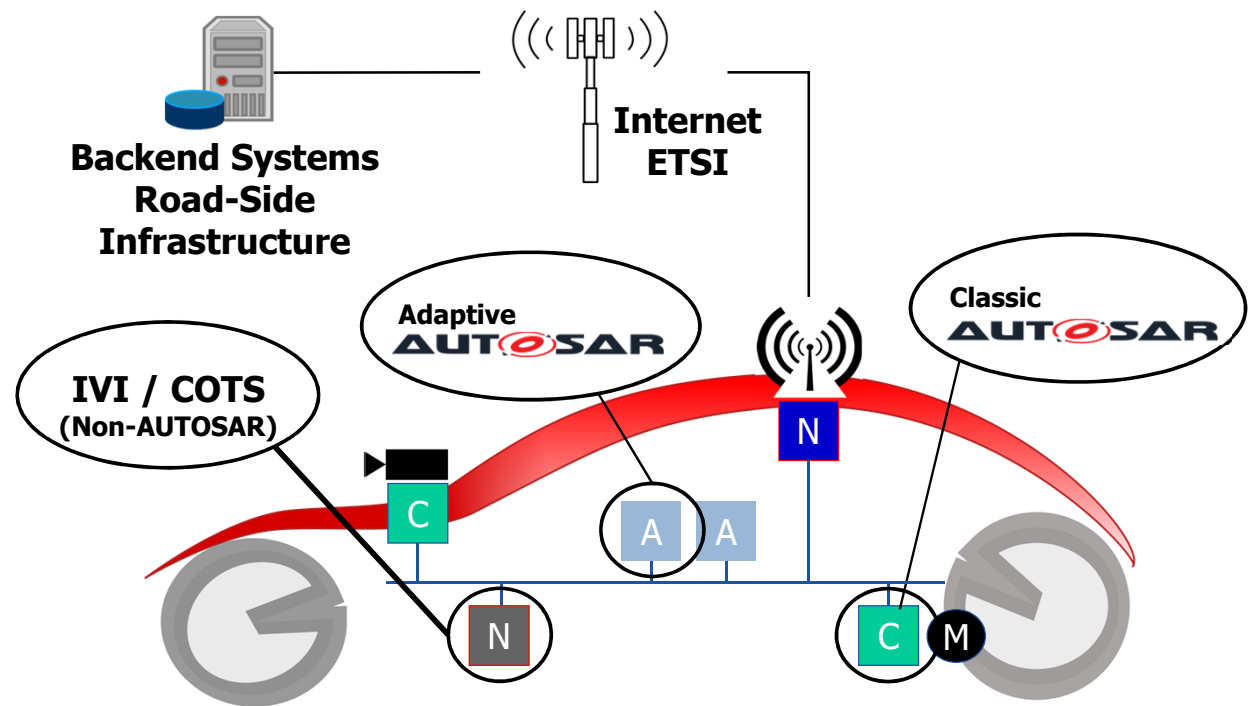
- The **Adaptive AUTOSAR** Platform (AP) is designed to bridge the gap between Classic Platform (CP) and Infotainment
- Key Adaptive AUTOSAR Characteristics
 - Service oriented architecture (adaptive / dynamic: Ready for ongoing updates)
 - Soft real-time
 - Deadlines in ms range
 - Some safety requirements
 - ASIL-B
 - High resource availability
 - Micro-processor
 - Dynamic OS



The Adaptive Platform – spread in the E/E architecture

Coexistence with (deeply embedded) classic Autosar

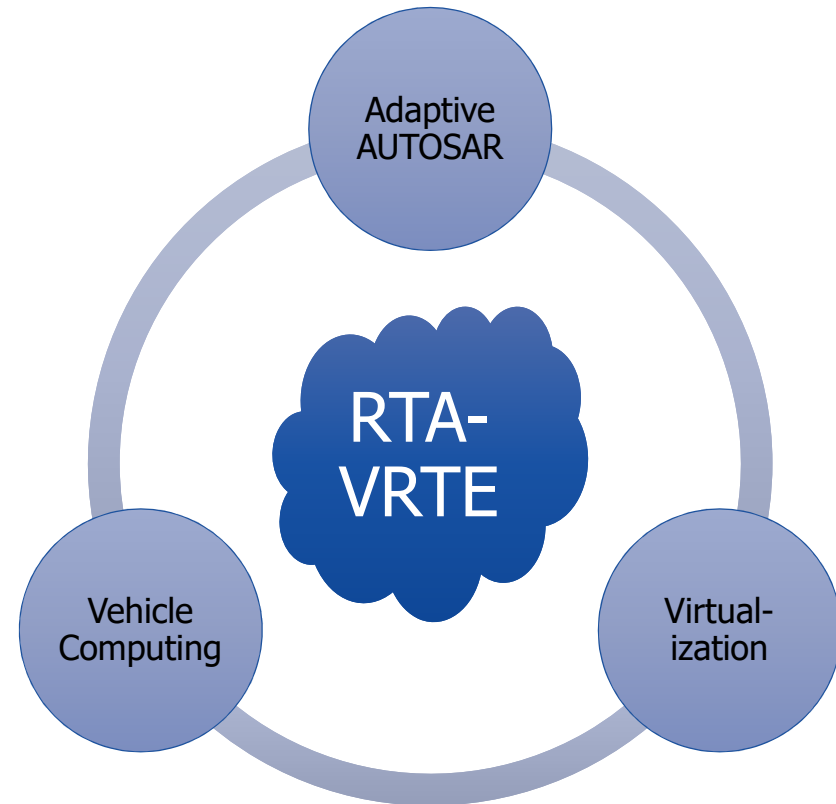
- Adaptive and Classic AUTOSAR will co-exist within a vehicle
 - Adaptive ECUs support dynamic SW change, highly parallel architectures
 - Classic ECUs for high safety, real-time SW within a severely resource constrained ECUs
- Adaptive ECUs <10% of ECUs within vehicle
 - A high-end vehicle might have ~120 ECUs of which **5-10 might use Adaptive ECUs**
 - But size (8 MB vs 8 GB) and value are in another dimension



VRTE is more than just Adaptive Autosar

RTA-VRTE and Adaptive AUTOSAR

- Adaptive AUTOSAR doesn't address all issues (yet)
 - Vehicle computation
 - Domain controller ECUs
- ETAS, together with Bosch, is building RTA-VRTE to address these additional challenges
 - Adaptive AUTOSAR
 - Standardized applications
 - Hypervisor for virtualization
 - Multiple safety and functional domains
 - Vehicle computing support
 - Lifecycle management
 - Update management
 - Personalization





DRIVING EMBEDDED EXCELLENCE



Thank you

RTA Solutions