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Table of Content

1	Scope of the document	6
2	How to read this document.....	7
2.1	Conventions used.....	7
2.2	Acronyms and Abbreviations	7
3	Requirements Tracing	8
4	Requirements Specification.....	10
4.1	Architecture	10
4.2	Adaptive Platform	25
4.3	Classic Platform.....	30
4.4	Methodology	33
4.5	Non-functional Requirements.....	39
4.6	Acceptance Testing.....	41
4.7	Processes	47
5	References	50

1 Scope of the document

Each partner has committed to the overall project objectives (PO) of AUTOSAR. The objectives are listed in the AUTOSAR Standard Info Pack V3.3 or in subsequent documents. AUTOSAR Standard Info Pack is an official communication paper of development partnership.

These objectives are not directly usable and have to be refined in order to generate the specific technical requirements. For this purpose, the AUTOSAR Main Requirements are established as a fundamental base to derive these specific requirements.

The goal of this document is to define the main requirements of AUTOSAR including its link to the AUTOSAR objectives.

The term AUTOSAR is used as a synonym of the development partnership and the technical product AUTomotive Open System ARchitecture.

2 How to read this document

Each requirement has its unique identifier starting with the prefix “RS_Main_” (for “Main Requirement”). For any review annotations, remarks or questions, please refer to this unique ID rather than chapter or page numbers!

2.1 Conventions used

- The representation of requirements in AUTOSAR documents follows the table specified in [TPS_STDT_00078]. In requirements, the following specific semantics are used (taken from Request for Comment RFC 2119 from the Internet Engineering Task Force IETF)
- The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119. Note that the requirement level of the document in which they are used modifies the force of these words.
- MUST: This word, or the terms "REQUIRED" or "SHALL", mean that the definition is an absolute requirement of the specification.
- MUST NOT: This phrase, or the phrase „SHALL NOT“, means that the definition is an absolute prohibition of the specification.
- SHOULD: This word, or the adjective "RECOMMENDED", mean that there may exist Valid reasons in particular circumstances to ignore a particular item, but the full implications must be understood and carefully weighed before choosing a different course.
- SHOULD NOT: This phrase, or the phrase "NOT RECOMMENDED" mean that there may exist Valid reasons in particular circumstances when the particular behavior is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behavior described with this label.
- MAY: This word, or the adjective „OPTIONAL“, means that an item is truly optional. One vendor may choose to include the item because a particular marketplace requires it or because the vendor feels that it enhances the product while another vendor may omit the same item. An implementation, which does not include a particular option, MUST be prepared to interoperate with another implementation, which does include the option, though perhaps with reduced functionality. In the same vein an implementation, which does include a particular option, MUST be prepared to interoperate with another implementation, which does not include the option (except, of course, for the feature the option provides.)

2.2 Acronyms and Abbreviations

All acronyms and abbreviations used throughout this document are included in the official AUTOSAR glossary [Glossary]. For respective explanation please see there.

3 Requirements Tracing

The following table references the requirements specified in **[RS_ProjectObjectives]** and links to the fulfilments of these.

Requirement	Description	Satisfied by
RS_PO_00001	AUTOSAR shall support the transferability of software.	RS_Main_00060, RS_Main_00100, RS_Main_00122, RS_Main_00123, RS_Main_00124, RS_Main_00130, RS_Main_00140, RS_Main_00150, RS_Main_00220, RS_Main_00270, RS_Main_00310, RS_Main_00400, RS_Main_00410, RS_Main_00440, RS_Main_00445, RS_Main_00450, RS_Main_00460, RS_Main_00480, RS_Main_00507, RS_Main_00513, RS_Main_01001, RS_Main_01002, RS_Main_01003
RS_PO_00002	AUTOSAR shall support the scalability to different vehicle and platform variants.	RS_Main_00060, RS_Main_00121, RS_Main_00122, RS_Main_00123, RS_Main_00124, RS_Main_00130, RS_Main_00140, RS_Main_00230, RS_Main_00310, RS_Main_00360, RS_Main_00400, RS_Main_00511, RS_Main_01001, RS_Main_01005
RS_PO_00003	AUTOSAR shall support a broad variety of functional domains.	RS_Main_00001, RS_Main_00002, RS_Main_00190, RS_Main_00280, RS_Main_00285, RS_Main_00410
RS_PO_00004	AUTOSAR shall define an open architecture for automotive software.	RS_Main_00001, RS_Main_00002, RS_Main_00049, RS_Main_00050, RS_Main_00080, RS_Main_00106, RS_Main_00170, RS_Main_00220, RS_Main_00260, RS_Main_00261, RS_Main_00285, RS_Main_00320, RS_Main_00410, RS_Main_00430, RS_Main_00440, RS_Main_00445, RS_Main_00450, RS_Main_00460, RS_Main_00505, RS_Main_00510, RS_Main_00513, RS_Main_01004, RS_Main_01008
RS_PO_00005	AUTOSAR shall support the development of dependable systems.	RS_Main_00010, RS_Main_00011, RS_Main_00012, RS_Main_00030, RS_Main_00170, RS_Main_00260, RS_Main_00261, RS_Main_00285, RS_Main_00340, RS_Main_00350, RS_Main_00435, RS_Main_00480, RS_Main_00490, RS_Main_00501, RS_Main_00503, RS_Main_00510, RS_Main_00514, RS_Main_01007
RS_PO_00006	AUTOSAR shall support sustainable utilization of natural resources.	RS_Main_00026, RS_Main_00049, RS_Main_00050, RS_Main_00200, RS_Main_00285, RS_Main_01005
RS_PO_00007	AUTOSAR shall support the collaboration between various partners.	RS_Main_00060, RS_Main_00080, RS_Main_00100, RS_Main_00106, RS_Main_00121, RS_Main_00122, RS_Main_00123, RS_Main_00124, RS_Main_00125, RS_Main_00126, RS_Main_00127, RS_Main_00128, RS_Main_00129, RS_Main_00160, RS_Main_00161, RS_Main_00180, RS_Main_00250, RS_Main_00251, RS_Main_00300, RS_Main_00301, RS_Main_00310, RS_Main_00320, RS_Main_00330, RS_Main_00400, RS_Main_00420, RS_Main_00480, RS_Main_00500
RS_PO_00008	AUTOSAR shall standardize basic software functionality of automotive ECUs.	RS_Main_00001, RS_Main_00002, RS_Main_00120, RS_Main_00122, RS_Main_00123, RS_Main_00124, RS_Main_00125, RS_Main_00435, RS_Main_00510
RS_PO_00009	AUTOSAR shall support applicable international automotive standards	RS_Main_00011, RS_Main_00012, RS_Main_00030, RS_Main_00170, RS_Main_00260, RS_Main_00261, RS_Main_00285, RS_Main_00290, RS_Main_00350,

	and state-of-the-art technologies.	RS_Main_00420, RS_Main_00430, RS_Main_00435, RS_Main_00490, RS_Main_00505, RS_Main_00507
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4 Requirements Specification

4.1 Architecture

4.1.1 [RS_Main_00001] AUTOSAR shall provide a software platform for deeply embedded systems

Type:	Valid
Description:	AUTOSAR shall provide a software platform called AUTOSAR Classic Platform, which targets the domain of deeply embedded systems.
Rationale:	Many automotive applications are deeply embedded in the physical world and have high demands regarding predictability, safety and responsiveness.
Use Case:	Drive and brake by wire systems
Applies to:	CP
Dependencies:	--
Supporting Material:	--

](RS_PO_00003, RS_PO_00004, RS_PO_00008)

4.1.2 [RS_Main_00002] AUTOSAR shall provide a software platform for high performance computing platforms

Type:	Valid
Description:	AUTOSAR shall provide a software platform called AUTOSAR Adaptive Platform, which targets the domain of automotive applications with high demands regarding computing power and memory.
Rationale:	Advanced automotive applications require a huge amount of resources (computing power and memory). To develop efficiently such systems a software platform with different characteristics as required for RS_Main_00001 is required e.g. different scheduling strategies, dynamic memory management etc.
Use Case:	Development of applications for automated driving and advanced driving assistance systems
Applies to:	AP, FO
Dependencies:	--
Supporting Material:	--

](RS_PO_00003, RS_PO_00004, RS_PO_00008)

4.1.3 [RS_Main_00400] AUTOSAR shall provide a layered software architecture

Type:	Valid
Description:	AUTOSAR shall provide a software architecture, which distinguishes between Application Software, a Runtime Environment and Basic Software.
Rationale:	The Runtime Environment defines a standardized programming interface for the Application Software. This enables the reallocation and reuse of Software Components.
Use Case:	Relocation of yaw rate control from one ECU to another.
Applies to:	CP,
Dependencies:	--
Supporting Material:	--

](RS_PO_00001, RS_PO_00002, RS_PO_00007)

4.1.4 [RS_Main_00150] AUTOSAR shall support the deployment and reallocation of AUTOSAR Application Software

Type:	Valid
Description:	AUTOSAR shall develop means to enable reallocation of AUTOSAR Application Software at the following points in time: <ul style="list-style-type: none"> • Design-time: During development of the ECUs • Run-time: Time between start-up and shut-down of the software stack • Life-time: Time after start of production
Rationale:	Enable the reallocation of Application Software to different ECUs.
Use Case:	<ul style="list-style-type: none"> • OEM provides safety or security related software for installation onto vehicle • OEM provides additional QM software for installation onto vehicle • Developer performs agile development of vehicle functions • Reallocation of yaw rate control from one ECU to another at development-time • Optimization of overall system architecture. • Update of (single) Adaptive Application or update of specific configurations over the air
Applies to:	AP, CP, FO
Dependencies:	RS_Main_00140, RS_Main_00141
Supporting Material:	--

](RS_PO_00001)

4.1.5 [RS_Main_00060] AUTOSAR shall provide a standardized software interface for communication between Applications

Type:	Valid
Description:	As the interface definition for applications is a prerequisite for reuse of software AUTOSAR shall provide such a standardized interface.
Rationale:	From an applications point of view the interface to other AUTOSAR Application Software of one AUTOSAR Platform shall be identical, independent whether the Software Components are located <ul style="list-style-type: none"> • on the same ECU on the same core • on the same ECU on another core • on the same ECU on another microcontroller • on another ECU
Use Case:	Application Software development independent from the underlying communication system.
Applies to:	AP, CP, FO
Dependencies:	--
Supporting Material:	--

](RS_PO_00001, RS_PO_00002, RS_PO_00007)

4.1.6 [RS_Main_00140] AUTOSAR shall provide network independent communication mechanisms for applications

Type:	Valid
Description:	AUTOSAR shall support the development of Application Software independently from the underlying communication systems specific to each Platform.
Rationale:	Independency from the underlying communication system is a prerequisite to support the reallocation of Software Components across ECUs that belong to the same Platform type.
Use Case:	Relocation of SW component from ECU A with CAN-Bus to ECU B with FlexRay.
Applies to:	CP, AP, FO
Dependencies:	--
Supporting Material:	--

](RS_PO_00001, RS_PO_00002)

4.1.7 [RS_Main_00410] AUTOSAR shall provide specifications for routines commonly used by Application Software to support sharing and optimization

Type:	Valid
Description:	AUTOSAR shall support the development of Application Software by providing standardized libraries with commonly used functions.
Rationale:	Share routines between different Applications. Use of optimized routines by Applications integrated in different ECUs.
Use Case:	Relocation of SW component from ECU A to ECU B with a different microcontroller.
Applies to:	CP, AP
Dependencies:	--
Supporting Material:	--

](RS_PO_00001, RS_PO_00003, RS_PO_00004)

4.1.8 [RS_Main_00190] AUTOSAR shall support interoperability with non-AUTOSAR software on the same ECU

Type:	Valid
Description:	Reuse of existing legacy software shall be supported by AUTOSAR. Integration of legacy software in an ECU compliant to AUTOSAR shall be supported.
Rationale:	A smooth migration to AUTOSAR requires that existing software can be reused.
Use Case:	Reuse of existing driver software for a new ECU that is developed according to AUTOSAR. Communication with non-AUTOSAR software systems.
Applies to:	CP, AP, FO
Dependencies:	--
Supporting Material:	--

](RS_PO_00003)

4.1.9 [RS_Main_00330] AUTOSAR shall support the principle of information hiding

Type:	Valid
Description:	AUTOSAR shall provide protection mechanisms for internal information of Applications.
Rationale:	Well-defined interfaces and data flow between AUTOSAR Application Software.
Use Case:	Reduce impact of modifications within a Software Component.
Applies to:	CP, AP, FO
Dependencies:	--
Supporting Material:	--

](RS_PO_00007)

4.1.10 [RS_Main_00011] AUTOSAR shall support the development of reliable systems

Type:	Valid
Description:	AUTOSAR shall provide mechanisms for <ul style="list-style-type: none"> • error prevention • error detection • error handling in order to support the development of reliable systems, which are properly functioning over time.
Rationale:	Reliability is one possibility to achieve safety without decreasing availability.
Use Case:	Reduction of repair time of a vehicle in field service.
Applies to:	CP, AP
Dependencies:	--
Supporting Material:	--

](RS_PO_00005, RS_PO_00009)

4.1.11 [RS_Main_00230] AUTOSAR shall support network topologies including gateways

Type:	Valid
Description:	AUTOSAR shall support net topologies with different in-vehicle network technologies. Interconnection of these networks via gateways, bridges, or repeaters shall be supported.
Rationale:	ECUs communicate via different communication systems.

Use Case:	Support of today's network topologies of E/E-architectures in series production.
Applies to:	CP, AP
Dependencies:	--
Supporting Material:	--

](RS_PO_00002)

4.1.12 [RS_Main_00501] AUTOSAR shall support redundancy concepts

Type:	Valid
Description:	In engineering, redundancy is the duplication of critical components or functions of a system with the intention of increasing reliability of the system. AUTOSAR shall support the following functions needed to implement active redundancy: <ul style="list-style-type: none"> • Fault detection • Fault isolation • Reconfiguration
Rationale:	Applications like highly automated driving requires the probability of a system failure to be extraordinarily small.
Use Case:	Driver temporarily/partially passes responsibility for driving task to vehicle (ADAS/HAD) Highly Automated Driving High availability, fail-operational systems
Applies to:	AP, CP
Dependencies:	--
Supporting Material:	http://en.wikipedia.org/wiki/Redundancy_(engineering) http://en.wikipedia.org/wiki/Active_redundancy

](RS_PO_00005)

4.1.13 [RS_Main_00012] AUTOSAR shall provide a software platform to support the development of highly available systems.

Type:	Valid
Description:	AUTOSAR shall support the development of highly available systems at the level of a full vehicle: A mixed system consisting of Classic and Adaptive Platforms shall establish measures to support availability. Availability of the Adaptive platform is defined as the probability that platform services will operate satisfactorily at a given point in time when used in a realistic operating environment. It excludes both preventive and corrective maintenance downtime. So, the service is operational and servicing the applications. Downtime of the platform service e.g. during a software update or restart of the application providing the service shall not count as being available.
Rationale:	Facilitate the development of highly available systems by

	using AUTOSAR platforms.
Use Case:	Highly available systems are required for automated driving applications, and also support customer expectations.
Applies to:	AP, CP
Dependencies:	--
Supporting Material:	--

](RS_PO_00005, RS_PO_00009)

4.1.14 [RS_Main_00511] AUTOSAR shall support virtualization

Type:	Valid
Description:	AUTOSAR shall support virtualization in a way that it can be hosted and executed as a guest operating system in a virtualized environment.
Rationale:	It shall be possible to run AUTOSAR on top of existing hypervisor solutions.
Use Case:	Development of ECUs which contain infotainment as well as control functionality
Applies to:	CP, AP
Dependencies:	--
Supporting Material:	--

](RS_PO_00002)

4.1.15 [RS_Main_00010] AUTOSAR shall support the development of safety related systems.

Type:	Valid
Description:	<p>AUTOSAR Platforms shall support commonly used safety mechanisms. This includes but is not limited to:</p> <ul style="list-style-type: none"> • Mechanisms to ensure freedom of interference for Adaptive Applications, Functional Cluster, Software Components and Basic Software Modules • Safe inter ECU communication • Measures to implement fail operational systems • Templates to support the configuration and documentation of safety relevant aspects <p>However, it cannot ensure safety for systems. This is to be ensured on system level.</p>
Rationale:	Facilitate the development of safety related systems by using AUTOSAR platforms. Platforms designed for the support of safety related systems are needed for safety related ECUs like digital engine control units and electronic power steering systems.
Use Case:	Driver temporarily/partially passes responsibility for driving task to vehicle (ADAS/HAD)

	OEM provides safety or security related software for installation onto vehicle High availability, fail-operational systems
Applies to:	CP, AP
Dependencies:	--
Supporting Material:	--

](RS_PO_00005)

4.1.16 [RS_Main_00420] AUTOSAR shall use established software standards and consolidate de-facto standards for basic software functionality

Type:	Valid
Description:	The different solutions for basic software functionalities shall be consolidated to a single standard. Whenever possible AUTOSAR shall make use of existing standards provided that they meet the given requirements.
Rationale:	Historically, OEMs and the big Tier1 have created proprietary standard core solutions, with partly different functionality. To achieve a common standard, which is accepted and used by all of the participating partners these solution shall be consolidated by AUTOSAR. If an agreed common solution supported by OEMs and Tier 1 already exists, this solution shall be adopted by AUTOSAR in order to ease reuse of existing software.
Use Case:	OSEK Operating System in AUTOSAR ECUs. Partial Networking. Network Management. POSIX
Applies to:	CP, AP
Dependencies:	--
Supporting Material:	--

](RS_PO_00007,RS_PO_00009)

4.1.17 [RS_Main_00440] AUTOSAR shall standardize access to non-volatile memory

Type:	Valid
Description:	An important functionality of Basic Software is the access to non-volatile memory. The AUTOSAR platforms shall provide support access (read / write / management) to non-volatile memory.
Rationale:	Application Software needs to store data, which is available after a restart.
Use Case:	Storage of error codes
Applies to:	AP, CP
Dependencies:	--
Supporting Material:	--

](RS_PO_00001, RS_PO_00004)

4.1.18 [RS_Main_00445] AUTOSAR shall standardize access to crypto-specific HW and SW

Type:	Valid
Description:	The AUTOSAR platforms shall support access to crypto and security related Hardware and define Software to access those.
Rationale:	Software Components need to encrypt, authenticate and store data in a secure memory for protection against malicious entities.
Use Case:	Security
Applies to:	AP, CP
Dependencies:	--
Supporting Material:	--

](RS_PO_00001, RS_PO_00004)

4.1.19 [RS_Main_00460] AUTOSAR shall standardize methods to organize mode management on Application, ECU and System level

Type:	Valid
Description:	The AUTOSAR Basic Software shall provide mode management mechanisms for Application Software to control or react on modes of the ECU / vehicle
Rationale:	The behavior of Application Software highly depends on the overall mode of the ECU and/or the System. Therefore the overall mode management has to be standardized to achieve the same behavior if Application Software is transferred from one ECU to another ECU or from one System to another System.
Use Case:	Degradation of application functionality in certain power modes.
Applies to:	AP, CP
Dependencies:	--
Supporting Material:	--

](RS_PO_00001, RS_PO_00004)

4.1.20 [RS_Main_00514] AUTOSAR shall support the development of secure systems

Type:	Valid
Description:	<p>AUTOSAR shall specify a layered automotive security approach defining security measures and properties for specific layers. Layers can be:</p> <ul style="list-style-type: none"> • Individual ECU, • In-vehicle network, • E/E-Architecture, • Connected vehicle. <p>Detailed technologies required will have to be determined by design of secure architecture</p> <p>An ECU typically is equipped with software and applications from different sources. The software needs to cooperate and communicate. However more than one owner of protected IP is involved. AUTOSAR shall therefore provide a platform such that IP is still only accessible by the corresponding owner; e.g. no key which is shared by more than one IP owner allows access to IP and each individual IP is secured by individual keys, e.g. for reflashing, download of ECU data, calibration)</p>
Rationale:	The more information that is stored in the car (e.g. personal data, credit card information) the more important it is to protect this information against misuse.

Use Case:	Driver temporarily/partially passes responsibility for driving task to vehicle (ADAS/HAD) OEM provides safety or security related software for installation onto vehicle Authorized party accesses configuration vehicle parameters and data Developer performs agile development of vehicle functions Customer acquires license to use feature or data in his vehicle Vehicle data provision
Applies to:	CP, AP
Dependencies:	--
Supporting Material:	--

](RS_PO_00005)

4.1.21 [RS_Main_00170] AUTOSAR shall provide secure access to ECU

Type:	Valid
Description:	AUTOSAR shall provide secured access to ECU, (e.g. by user authentication), including standardized up- and download of data and software. For this mechanisms and methods shall be defined.
Rationale:	The update and upgrade feasibility provided by AUTOSAR includes technical challenges (e.g. standardized up-/download protocol, partly update of the software) and mechanisms (e.g. how to authorize the user).
Use Case:	Download of dedicated Software Components in ECU.
Applies to:	AP, CP
Dependencies:	To fulfill this requirement it is also necessary that the environment that is not standardized by AUTOSAR (e.g. bootloader) needs to match the same security requirements.
Supporting Material:	--

](RS_PO_00004, RS_PO_00005, RS_PO_00009)

4.1.22 [RS_Main_00510] AUTOSAR shall support secure onboard communication

Type:	Valid
Description:	AUTOSAR shall provide means to check data authenticity, data integrity and data freshness in inter ECU communication.
Rationale:	Dependable systems rely on authentic and trustworthy exchange of information between ECUs. Protecting and assuring data authenticity, data integrity and data freshness in inter ECU communication allows for the development of secure and safe systems by using the AUTOSAR platform.
Use Case:	Protection of on-board communication against manipulation.

Applies to:	AP, CP
Dependencies:	--
Supporting Material:	--

](RS_PO_00004, RS_PO_00005, RS_PO_00008)

4.1.23 [RS_Main_00260] AUTOSAR shall provide diagnostics means during runtime, for production and services purposes

Type:	Valid
Description:	AUTOSAR shall support diagnostics standards like ISO14229 or OBD. Specifications of error handling must be developed.
Rationale:	Standardized diagnostics is necessary for field service and admission.
Use Case:	Diagnosis of a SW component or a ECU.
Applies to:	AP, CP
Dependencies:	--
Supporting Material:	--

](RS_PO_00004, RS_PO_00005, RS_PO_00009)

4.1.24 [RS_Main_00261] AUTOSAR shall provide means for calibration

Type:	Valid
Description:	AUTOSAR shall provide a unified way for off- and onboard data calibration. The calibration data shall be accessible by Applications.
Rationale:	Standardized means for calibration are for production and field service.
Use Case:	Calibration of Application Software during production or in the field.
Applies to:	AP, CP
Dependencies:	--
Supporting Material:	--

](RS_PO_00004, RS_PO_00005, RS_PO_00009)

4.1.25 [RS_Main_00280] AUTOSAR shall provide standardized communication interfaces for the onboard data exchange between ECUs with different software platforms

Type:	Valid
Description:	AUTOSAR shall support the interaction between platforms defined by AUTOSAR or other parties (e.g. running other operating systems). These interacting software platforms may be deployed on: one MCU with different cores (virtualization) one ECU with different MCUs different ECUs
Rationale:	Automotive networks consist of ECUs running different software platforms beside the software platforms defined by AUTOSAR. Examples, which can also be found in automotive networks are Genivi, WinCE, VxWorks, Linux, Android, or QNX. For a seamless integration, it is essential to provide standardized communication mechanisms.
Use Case:	Driver temporarily/partially passes responsibility for driving task to vehicle (ADAS/HAD) Software as a product Smartphone integration App interaction Heterogeneous Architecture Highly Automated Driving Car-2-X communication, vehicle data storage Communication with traffic light
Applies to:	AP, CP
Dependencies:	--
Supporting Material:	--

](RS_PO_00003)

4.1.26 [RS_Main_00285] AUTOSAR shall support protocols for Intelligent Transportation Systems

Type:	Valid
Description:	AUTOSAR communication shall support geo-networking, transport protocols and facility protocols for Vehicle-2-X applications as defined by ETSI
Rationale:	Geo-networking (GN) and the basic transport protocol (BTP) are essential components of a V2X stack. The facilities (FAC) implement the functionality for reception and transmission of standardized V2X messages. V2X facilities also build the interface for vehicle specific applications. For the European market they especially

	support decoding, encoding and management of cooperative awareness messages. All protocols are accompanied by standardized mechanisms to secure privacy and maintain availability of the service in highly congested areas
Use Case:	Examples e.g. enhance traffic flow by provision of infrastructure messages (traffic lights ahead, ...) to software components, implementation of standardized sending applications
Applies to:	CP, AP
Dependencies:	--
Supporting Material:	EN 302 636, EN 302 636, ETSI TS 102 636-3

](RS_PO_00003,RS_PO_00004,RS_PO_00005,RS_PO_00006,RS_PO_00009)

4.1.27 [RS_Main_00026] AUTOSAR shall support high speed and high bandwidth communication between executed SW

Type:	Valid
Description:	The middleware shall support high speed and high bandwidth communication between executed SW.
Rationale:	Requirements for communication speed and bandwidth have grown at a rapid pace in the past and continue to grow at an unbroken rate.
Use Case:	High-bandwidth data like image or sensor data is exchanged between components within automotive networks.
Applies to:	CP, AP
Dependencies:	--
Supporting Material:	--

](RS_PO_00006)

4.1.28 [RS_Main_01001] AUTOSAR shall support intra ECU communication

Type:	Valid
Description:	AUTOSAR communication shall support intra ECU communication.
Rationale:	An SWC should be able to communicate with each another SWC within the same ECU.
Use Case:	Several SWCs send signals to each other to exchange algorithm data.
Applies to:	CP, AP
Dependencies:	--
Supporting Material:	--

](RS_PO_00002, RS_PO_00001)

4.1.29 [RS_Main_01002] AUTOSAR shall support service-oriented communication

Type:	Valid
Description:	AUTOSAR shall support service-oriented communication between applications independently of the location of the applications.
Rationale:	Reuseability of services and dynamic configuration of communication paths.
Use Case:	A parking assistant application wants to use camera and radar services.
Applies to:	AP
Dependencies:	RS_Main_00150, RS_Main_00140
Supporting Material:	--

](RS_PO_00001)

4.1.30 [RS_Main_01003] AUTOSAR shall support data-oriented communication

Type:	Valid
Description:	AUTOSAR shall support data-oriented communication between applications. This means that applications are able to send data to all applications configured to receive the respective data.
Rationale:	Transfer data to applications on other ECUs or on the same ECU.
Use Case:	Send current vehicle speed over CAN bus to various applications.
Applies to:	CP, AP
Dependencies:	RS_Main_00150, RS_Main_00140
Supporting Material:	--

](RS_PO_00001)

4.2 Adaptive Platform

4.2.1 [RS_Main_00513] AUTOSAR shall support language bindings for different programming languages

Type:	Valid
Description:	The AUTOSAR Adaptive Platform shall support the implementation of Application Software in different programming languages.
Rationale:	Depending on the context and domain of a development project different programming languages might be appropriate. AUTOSAR shall support a variety of programming languages.
Use Case:	Implementation of complex algorithms in C++ Implementation of safety relevant functionality in C
Applies to:	AP
Dependencies:	--
Supporting Material:	--

|(RS_PO_00001, RS_PO_00004)

4.2.2 [RS_Main_00505] AUTOSAR support the interaction of onboard application software with offboard systems.

Type:	Valid
Description:	The AUTOSAR Adaptive Platform shall support the communication between AUTOSAR Application Software and offboard services provided by devices, which are not permanently integrated into the vehicle network. These includes but is not limited to <ul style="list-style-type: none"> • infrastructure such as traffic lights • mobile devices • backend systems
Rationale:	Automotive applications require more and more information from different offboard systems such as infrastructure elements (e.g. traffic lights) and different back end systems (e.g. OEM-specific back end).
Use Case:	Driver temporarily/partially passes responsibility for driving task to vehicle (ADAS/HAD). Authorized party accesses configuration vehicle parameters and data. Developer performs agile development of vehicle functions. Customer acquires license to use feature or data in his vehicle.

	High quality map data Car-2-X communication, vehicle data storage
Applies to:	AP, CP
Dependencies:	--
Supporting Material:	--

](RS_PO_00004, RS_PO_00009)

4.2.3 [RS_Main_00503] AUTOSAR shall provide a Software Platform that supports adaptation of communication topology after production

Type:	Valid
Description:	Advanced systems require dynamic allocation of AUTOSAR Applications and adaptations of the communication topology after development and production, but at life-time of the system. AUTOSAR shall provide a platform, which provides these features.
Rationale:	Advanced driving assistance functions have to be updated over the air. This might include changes to the scheduling and the communication behavior of the function and has to be supported by the platform.
Use Case:	OEM provides safety or security related software for installation onto vehicle OEM provides additional QM software for installation onto vehicle Developer performs agile development of vehicle functions Software as a product Developer performs agile development of vehicle functions Reallocation of yaw rate control from one ECU to another at development-time Optimization of overall system architecture. Update of (single) SWCs or update of specific configurations over the air
Applies to:	AP
Dependencies:	[RS_Main_00400] AUTOSAR shall provide a layered software architecture
Supporting Material:	--

](RS_PO_00005)

4.2.4 [RS_Main_01004] AUTOSAR shall support standards for wireless off-board communication

Type:	Valid
Description:	AUTOSAR communication shall support standards for wireless off-board communication.
Rationale:	To be compatible with off-board service providers, the AUTOSAR communication needs to support off-board

	communication standards.
Use Case:	Services for automotive applications can be provided in cloud instances or vehicle backend
Applies to:	AP
Dependencies:	--
Supporting Material:	--

] (RS_PO_00004)

4.2.5 [RS_Main_01008] AUTOSAR shall provide secure communication with off-board entities

Type:	Valid
Description:	AUTOSAR communication shall provide secure communication with off-board entities.
Rationale:	Data should be securely transferred between the vehicle and off-board entities to protect data integrity, privacy and prevent misuse.
Use Case:	Purchasing applications or unlocking functionality through the headunit HMI should be safe and secure.
Applies to:	AP, CP
Dependencies:	--
Supporting Material:	--

] (RS_PO_00004)

4.2.6 [RS_Main_01005] AUTOSAR shall establish communication paths dynamically

Type:	Valid
Description:	AUTOSAR communication shall establish communication paths dynamically.
Rationale:	The deployment of services can depend on many factors, changing several times during the development process or after release in the field.
Use Case:	A service is selected based on availability of sensor data.
Applies to:	AP
Dependencies:	--
Supporting Material:	--

] (RS_PO_00006, RS_PO_00002)

4.2.7 [RS_Main_01007] AUTOSAR communication shall assure quality of service on communication

Type:	Valid
Description:	AUTOSAR communication shall assure quality of service on communication

Rationale:	Some applications are sensitive to delays in signal reception. Other applications may need guaranteed reception of certain signals for proper operation.
Use Case:	An algorithm in the ESP needs data from the wheel sensors with low-latency and guaranteed reception.
Applies to:	AP
Dependencies:	--
Supporting Material:	--

](RS_PO_00005)

4.2.8 [RS_Main_00049] AUTOSAR shall provide an Execution Management for running multiple applications

Type:	Valid
Description:	The middleware shall provide an execution framework for adaptive SWCs.
Rationale:	SWCs can be started and stopped based on application logic. To support this, the execution management should be able to facilitate lifecycle operations for numerous SWCs.
Use Case:	The execution management starts all required SWCs at system initialization.
Applies to:	AP
Dependencies:	--
Supporting Material:	--

](RS_PO_00006, RS_PO_00004)

4.2.9 [RS_Main_00050] AUTOSAR shall provide an Execution Framework towards applications to implement concurrent application internal control flows.

Type:	Valid
Description:	AUTOSAR shall provide an Execution Framework towards applications to implement concurrent application internal control flows.
Rationale:	The execution framework must manage numerous running SWCs and handle their independent control flows.
Use Case:	The execution framework starts several SWCs in an ordered manner.
Applies to:	AP
Dependencies:	--
Supporting Material:	--

](RS_PO_00006, RS_PO_00004)

4.2.10 [RS_Main_00106] AUTOSAR shall provide the possibility to extend the software with new SWCs without recompiling the platform foundation

Type:	Valid
Description:	It shall be possible to extend AUTOSAR with new SWCs without recompiling the platform foundation
Rationale:	To prevent unnecessary build time, individual SWCs should be able to be compiled independently without the need to recompile all other system software.
Use Case:	A new SWC is introduced to an ECU implementation at a later point in time during the SW project.
Applies to:	AP
Dependencies:	--
Supporting Material:	--

](RS_PO_00004, RS_PO_00007)

4.3 Classic Platform

4.3.1 [RS_Main_00130] AUTOSAR shall provide an abstraction from hardware

Type:	Valid
Description:	AUTOSAR shall provide an abstraction layer from hardware characteristics. This abstraction layer shall only be accessible to the software modules directly interacting with the HW. Other parts of the System Software shall be independent from hardware.
Rationale:	Reuse of the Application Software independent of the underlying hardware. Software sharing between multiple HW platforms.
Use Case:	Relocate application from one ECU with hardware A to a ECU with hardware B without changing the Application Software.
Applies to:	CP, FO
Dependencies:	--
Supporting Material:	--

](RS_PO_00001, RS_PO_00002)

4.3.2 [RS_Main_00100] AUTOSAR shall provide standardized Basic Software

Type:	Valid
Description:	AUTOSAR shall provide a complete functional specification of the Basic Software including interfaces and behavioral description.
Rationale:	The Basic Software provides the infrastructural functionalities of an ECU and is per definition not visible to the customer. To support reallocation of Software Components it is necessary that the Software Components can rely on identical services provided by the Basic Software. This basic software functionality shall be defined, implemented, and tested once but integrated in many ECUs of an E/E-architecture. Achieving this for many OEMs the suppliers and OEMs have stable foundations for implementing their application without bothering about details of the basic software. This leads to a higher quality and lower costs for automotive software.
Use Case:	Compatibility of the Basic Software with defined quality and

	<p>maintenance is achieved. Application Software shall be useable on multiple implementations of the Basic Software.</p>
Applies to:	CP
Dependencies:	--
Supporting Material:	--

](RS_PO_00001, RS_PO_00007)

4.3.3 [RS_Main_00430] AUTOSAR shall support established automotive communication standards

Type:	Valid
Description:	<p>AUTOSAR ECUs shall support common established communication systems. This includes at least but is not restricted to:</p> <p>CAN, LIN, FlexRay, Ethernet</p>
Rationale:	<p>Automotive ECUs communicate over different standardized communication systems. These shall be supported by AUTOSAR.</p>
Use Case:	<p>Implementation of distributed functionality e. g. driving assistance systems</p>
Applies to:	CP
Dependencies:	--
Supporting Material:	--

](RS_PO_00004,RS_PO_00009)

4.3.4 [RS_Main_00435] AUTOSAR shall support automotive microcontrollers

Type:	Valid
Description:	<p>AUTOSAR shall support hardware features of commonly used automotive microcontrollers.</p>
Rationale:	<p>Automotive ECUs use dedicated, highly integrated microcontrollers, which have to pass automotive qualification procedures. The AUTOSAR shall support the integrated features of these microcontrollers. These include, but are not limited to:</p> <p>Digital I/O Analog/Digital converter Pulse-width modulation Bus controllers for CAN, LIN, FlexRay, Ethernet Multiprocessor architectures Many core architectures Memory protection units</p>

	Flash Microprocessors
Use Case:	Development of typical automotive control units [UC_AD1.4] Highly Automated Driving
Applies to:	CP,AP
Dependencies:	--
Supporting Material:	--

](RS_PO_00005,RS_PO_00008, RS_PO_00009)

4.3.5 [RS_Main_00450] AUTOSAR shall standardize access to general purpose I/O

Type:	Valid
Description:	The AUTOSAR Basic Software shall support access to general purpose I/O.
Rationale:	Software Components need to access application specific hardware (sensor and actuators)
Use Case:	Temperature sensor for engine control.
Applies to:	CP
Dependencies:	--
Supporting Material:	--

](RS_PO_00001, RS_PO_00004)

4.3.6 [RS_Main_00220] The functional interfaces of AUTOSAR shall be specified in standard C

Type:	Valid
Description:	The specification of functional interfaces of AUTOSAR shall be specified in standard C90. This implies that languages, which can interface to standard C90 can be used for application programming.
Rationale:	A useful reduction of programming languages to current programming languages reduces the impacts on AUTOSAR definitions and specifications due to logical and/or technical differences of different programming languages.
Use Case:	AUTOSAR implementation in C, C++.
Applies to:	CP, FO
Dependencies:	--
Supporting Material:	--

](RS_PO_00001, RS_PO_00004)

4.4 Methodology

4.4.1 [RS_Main_00160] AUTOSAR shall provide means to describe interfaces of the entire system.

Type:	Valid
Description:	Well-defined interfaces are the key for exchangeability, reusability and the basis for the freedom of interference. Decomposition on interface level is essential for an appropriate clustering and partitioning in the AUTOSAR Application Software.
Rationale:	Principle: “divide and conquer” which is a key success factor in the development of large systems.
Use Case:	Development of large interconnected software systems with a high degree of reuse, such as driving assistance systems.
Applies to:	AP, CP
Dependencies:	--
Supporting Material:	--

](RS_PO_00007)

4.4.2 [RS_Main_00161] AUTOSAR shall provide a unified way to describe software systems deployed to Adaptive and / or Classic platforms.

Type:	Valid
Description:	A comprehensive software model shall capture all elements of a distributed software system. The definition of functionality shall be independent from the final assignment to platforms and ECUs.
Rationale:	The allocation of software to platforms shall be a subsequent step after the overall definition of functionality.
Use Case:	Development of large software systems being deployed on mixed platforms.
Applies to:	CP, AP, FO
Dependencies:	--
Supporting Material:	--

](RS_PO_00007)

4.4.3 [RS_Main_00180] AUTOSAR shall provide mechanisms to protect intellectual property in a shared development process

Type:	Valid
Description:	Integration of software of different suppliers requires exchange of software (especially source code) between the different parties involved. Thus, AUTOSAR shall provide mechanisms to safeguard software. AUTOSAR shall ensure a smooth integration process that at the same time protects intellectual property of the companies involved.
Rationale:	Integration of third party solutions requires dealing with intellectual property issues.
Use Case:	1) SW sale of split-screen software for navigation. 2) Integration of BSW modules of different suppliers.
Applies to:	AP, CP
Dependencies:	--
Supporting Material:	--

](RS_PO_00007)

4.4.4 [RS_Main_00300] AUTOSAR shall provide data exchange formats to support work-share in large inter and intra company development groups

Type:	Valid
Description:	AUTOSAR shall support the work-share in large development projects via well-defined exchange formats.
Rationale:	A typical AUTOSAR system is expected to carry a huge number of signals per vehicle. To develop vehicle descriptions a good organization of work-share is needed. To support such organizations, well defined concepts for information exchange are required.
Use Case:	Data sharing between OEM and 1 st Tier supplier.
Applies to:	AP, CP, FO
Dependencies:	--
Supporting Material:	--

](RS_PO_00007)

4.4.5 [RS_Main_00301] AUTOSAR shall specify profiles for data exchange to support work-share in large inter- and intra-company development groups

Type:	Valid
Description:	AUTOSAR shall support the work-share in large development projects via the definition of common data exchange points and profiles which provide guidance with respect to completeness and correctness of data at these data exchange points.
Rationale:	Smooth exchange of data between different stakeholders by improved tool interoperability. Avoid iterations due to incomplete data. Clear definition of a data exchange point for all stakeholders. Early identification of possible data exchange problems.
Use Case:	Data sharing between OEM and 1 st Tier supplier.
Applies to:	AP, CP, FO
Dependencies:	RS_Main_00300, RS_Main_00250, RS_Main_00251
Supporting Material:	--

](RS_PO_00007)

4.4.6 [RS_Main_00080] AUTOSAR shall provide means to describe a component model for Application Software

Type:	Valid
Description:	AUTOSAR shall provide a formal description Application Software for the Adaptive as well as the Classic Platform. This description together with source code and/or object code forms an AUTOSAR Application Software.
Rationale:	Software reuse is one of the major aims of AUTOSAR.
Use Case:	Momentum control in different ECUs.
Applies to:	AP, CP, FO
Dependencies:	--
Supporting Material:	--

](RS_PO_00004, RS_PO_00007)

4.4.7 [RS_Main_00310] AUTOSAR shall support hierarchical Application Software design methods

Type:	Valid
Description:	AUTOSAR shall provide means to structure Application Software in a hierarchical way, so that only links to outside Software need to be treated / adapted / changed in the next hierarchical level.

Rationale:	Objective is to allow each actor in the development chain to focus on the required level and tasks.
Use Case:	Software development of an engine management system can only be achieved by using hierarchical strategies.
Applies to:	AP, CP, FO
Dependencies:	--
Supporting Material:	--

](RS_PO_00001, RS_PO_00002, RS_PO_00007)

4.4.8 [RS_Main_00320] AUTOSAR shall provide formats to specify all aspects necessary to integrate Application Software on an ECU

Type:	Valid
Description:	In AUTOSAR it shall be possible to describe all requirements of Application Software to their platform environment. This enables the integrator to provide the Application Software such an environment on an ECU.
Rationale:	Application Software need a well defined environment to ensure correct and reliable functionality.
Use Case:	OEM designs Application Software and a 1 st Tier Supplier shall integrate these AUTOSAR Applications into an ECU.
Applies to:	AP, CP, FO
Dependencies:	--
Supporting Material:	--

](RS_PO_00004, RS_PO_00007)

4.4.9 [RS_Main_00340] AUTOSAR shall support the observance of timing requirements

Type:	Valid
Description:	AUTOSAR shall support the description and correct implementation of timing requirements. This includes dataflow and control flow related requirements.
Rationale:	Application Software has specific timing requirements, which are not to be overwritten by architectural changes.
Use Case:	Real time control of today's gasoline injection systems.
Applies to:	AP, CP
Dependencies:	--
Supporting Material:	--

](RS_PO_00005)

4.4.10 [RS_Main_00360] AUTOSAR shall support management of vehicle diversity

Type:	Valid
Description:	Diversity management is introduced on vehicle level. This enables formal check of compatibility of Application Software, management of availability of partner Application Software in vehicle versions their release state etc. Also the number of required software versions per ECU integration can be evaluated and tracked with reasonable effort.
Rationale:	Diversity of e.g. a wiring harness is reaching the amount of 10 000 to 1.000.000 different versions for the same vehicle platform. Same diversity requirements multiplied with the version management per AUTOSAR Application Software apply for the entity of the software on the vehicle level. Unmanaged this effect can lead to deadlock situations in the logistic of vehicle software. Potential implementations are e.g. "existence" property matrix per class, group and instance of AUTOSAR Application Software and connections.
Use Case:	Integration of Application Software on different ECUs and/or E/E-architectures.
Applies to:	AP, CP
Dependencies:	--
Supporting Material:	--

](RS_PO_00002)

4.4.11 [RS_Main_00250] AUTOSAR methodology shall provide a predefinition of typical roles and activities in work-share model

Type:	Valid
Description:	Work-share requires visibility and common understanding of specific roles and activities in the design methodology. Roles could be e.g. vehicle architect, domain architect, ECU integrator, function designer. Roles could also be found related to different disciplines like static architecture, dynamic architecture, communication architecture, etc. Typical activities could be e.g. SW/SW partitioning, mapping of SW to ECU, configuration of AUTOSAR Platform.
Rationale:	This definition serves the understanding of workflow for the design of the tools. Individual roles and activities might be combined to one person in the later application, or distributed differently. This also does not assign tasks to OEM or Tier1 suppliers. Application of later work-share- distribution is

	matter of individual contracts between the parties.
Use Case:	System architect or SW component developer are such roles which shall be predefined.
Applies to:	AP, CP, FO
Dependencies:	--
Supporting Material:	--

](RS_PO_00007)

4.4.12 [RS_Main_00251] AUTOSAR methodology shall support roles and rights in a work-share model

Type:	Valid
Description:	Distributed Development needs definable responsibilities. AUTOSAR shall support a general approach to express roles and their rights to create/access/modify AUTOSAR descriptions.
Rationale:	The definition of roles and the corresponding rights guide the user while editing AUTOSAR descriptions and reduce the risk to introduce errors.
Use Case:	It is forbidden e.g. for software developers to change the configuration of basic software modules.
Applies to:	AP, CP
Dependencies:	--
Supporting Material:	--

](RS_PO_00007)

4.4.13 [RS_Main_00507] AUTOSAR shall reflect the stages of a software system development in a formal model description

Type:	Valid
Description:	AUTOSAR shall reflect the stages of a software development process and define templates how information at these stages can be exchanged between the different parties. As blueprint for such development processes AUTOSAR shall consider existing standards like ISO26262 and Automotive SPICE.
Rationale:	During the development of a vehicle, software system at different process steps information is exchanged between the various partners. AUTOSAR shall refine the formats and state criteria for completeness of the exchanged information to capture general requirements on the progress of development.
Use Case:	OEM provides safety or security related software for installation onto vehicle OEM provides additional QM software for installation onto vehicle Developer performs agile development of vehicle functions

	Methodology and exchange formats
Applies to:	AP, CP, FO
Dependencies:	--
Supporting Material:	--

](RS_PO_00001,RS_PO_00009)

4.5 Non-functional Requirements

4.5.1 [RS_Main_00200] AUTOSAR specifications shall allow resource efficient implementations

Type:	Valid
Description:	AUTOSAR specifications shall allow efficient implementations with respect to <ul style="list-style-type: none"> • RAM • ROM, Flash • Computing Power • Bus bandwidth
Rationale:	Limited resources like flash, RAM, computing power characterize automotive microcontrollers.
Use Case:	Integration of the AUTOSAR platform and a single application in a typical 16-bit automotive microcontroller.
Applies to:	AP, CP
Dependencies:	--
Supporting Material:	--

](RS_PO_00006)

4.5.2 [RS_Main_00270] AUTOSAR shall provide mitigation strategies towards new releases

Type:	Valid
Description:	Migration from AUTOSAR release n to release n+1 shall be supported. AUTOSAR shall provide migration strategies, how Software Components and ECUs of different release have to be adapted to interoperate.
Rationale:	Compatibility ensures a long time usage of the AUTOSAR standard.
Use Case:	Integration of ECU's using infrastructure software of the latest AUTOSAR release in a network built from ECU's using a former release.
Applies to:	AP, CP
Dependencies:	--
Supporting Material:	--

](RS_PO_00001)

4.5.3 [RS_Main_00500] AUTOSAR shall provide naming conventions

Type:	Valid
Description:	AUTOSAR shall define naming conventions for internal and external symbols created and used by the standard.
Rationale:	Naming conventions shall be defined in specification documents to achieve a standardized and consistent documentation. This is good documentary practice, helps for better understanding, reduces ambiguities and improves cooperation
Use Case:	Work-share models between OEM and supplier. Development of AUTOSAR specifications.
Applies to:	AP, CP
Dependencies:	--
Supporting Material:	--

](RS_PO_00007)

4.6 Acceptance Testing

4.6.1 [RS_Main_00120] AUTOSAR shall provide means to assure interoperability of AUTOSAR implementations (ICC1 level) on application level (RTE) and bus level.

Type:	Valid
Description:	AUTOSAR shall provide specified test cases and the essential test methodology to ensure interoperability on application (RTE side) and bus level for BSW on ICC1 level (Black Box Test). These specified test cases and its related methodology shall be developed to test implementations of AUTOSAR basic software.
Rationale:	Acceptance tests are strongly needed to provide evidence that a product complies with the AUTOSAR specification i.e. to ensure a certain behavior of the regarded elements at the interfaces to application and communication busses.
Use Case:	Integration of the infrastructure SW into a specific ECU, bring it into the E/E-architecture without backlashes on the system. Example from real world: Integration of BSW stack (ICC1 level) to applications and the ECU infrastructure without difficulties. Support test of any ICC implementations (from ICC1 to ICC3). Reuse of the same test specification even when the ICC3 specification details change
Applies to:	TC
Dependencies:	--
Supporting Material:	--
Tested Items:	--

] (RS_PO_00008)

4.6.2 [RS_Main_00121] Acceptance tests shall minimize test effort and test costs

Type:	Valid
Description:	In order to avoid redundant test cycles and ease the reuse of test results for users of AUTOSAR standard, acceptance tests shall focus on reduction of test effort and test costs. Test concept shall address explicitly efficiency.
Rationale:	Users of acceptance tests will typically use these tests for checking that a BSW implementation is mature enough to enter the user's ECU software development process. Within this development process, there are usually more in-depth release tests in place. The acceptance tests are thus not required to test the BSW in full depth and with full coverage and can therefore not replace release tests at OEMs or Tier1s. Standard test ease the reuse of test results because they are commonly understood by different market partners (who use the test results / who implement the tests and who execute the tests).
Use Case:	BSW handover into Development process Selection of the standard tests needed for an application (where test results are required) / documentation of the standard test supported by a BSW implementation (where test results will be provided)
Applies to:	TC
Dependencies:	--
Supporting Material:	--
Tested Items:	--

](RS_PO_00007, RS_PO_00002)

4.6.3 [RS_Main_00122] Acceptance tests shall test interoperability of BSW implementations of one AUTOSAR release in one vehicle network

Type:	Valid
Description:	Acceptance tests shall ensure interoperability of BSW implementations of one AUTOSAR release in one vehicle network
Rationale:	Sourcing and differences in lifecycles of ECUs require flexibility in the choice of BSW implementations
Use Case:	Heterogenic vehicle networks of ECUs with different BSW implementations of the same AUTOSAR release
Applies to:	TC
Dependencies:	--
Supporting Material:	--
Tested Items:	RS_Main_00230, RS_Main_00430, RS_Main_00260, RS_Main_00160, RS_Main_00360

](RS_PO_00001, RS_PO_00002, RS_PO_00007, RS_PO_00008)

4.6.4 [RS_Main_00123] Acceptance tests shall test interoperability of BSW implementations in vehicle networks

Type:	Valid
Description:	Acceptance tests shall test interoperability of BSW implementations in vehicle networks.
Rationale:	BSW is supplied from various sources and suppliers
Use Case:	heterogenic vehicle networks of ECUs from different suppliers and gateways
Applies to:	TC
Dependencies:	--
Supporting Material:	--
Tested Items:	RS_Main_00210, RS_Main_00230, RS_Main_00430, RS_Main_00260, RS_Main_00160, RS_Main_00360, RS_Main_00270

](RS_PO_00001, RS_PO_00002, RS_PO_00007, RS_PO_00008)

4.6.5 [RS_Main_00124] Acceptance tests shall test interoperability of BSW implementations to applications

Type:	Valid
Description:	Acceptance tests shall test interoperability of BSW implementations to applications.
Rationale:	Application development must be independent from the different BSW implementations. The application interfaces are the RTE with its interfaces and the BSW services.
Use Case:	Strategic, abstract and generic application development Support for different development cycles for applications and BSW implementations
Applies to:	TC
Dependencies:	--
Supporting Material:	--
Tested Items:	RS_Main_00400, RS_Main_00150, RS_Main_00060, RS_Main_00410, RS_Main_00440, RS_Main_00460, RS_Main_00260, RS_Main_00160, RS_Main_00080, RS_Main_00320

[(RS_PO_00001, RS_PO_00002, RS_PO_00007, RS_PO_00008)]

4.6.6 [RS_Main_00125] Acceptance tests shall provide means to measure quality of BSW implementation

Type:	Valid
Description:	Acceptance tests shall provide a reference to measure quality.
Rationale:	Generic test goal, it is the purpose of testing
Use Case:	Usage of standard tests during the qualification process of BSW implementation
Applies to:	TC
Dependencies:	--
Supporting Material:	--
Tested Items:	--

[(RS_PO_00007, RS_PO_00008)]

4.6.7 [RS_Main_00126] Acceptance tests shall support mainstream releases

Type:	Valid
Description:	Acceptance tests shall support mainstream releases starting from release 3.2.
Rationale:	Provide tests for the most used releases
Use Case:	Support users of multiple releases and reduce development and maintenance effort by supporting multiple release in the same test specification.
Applies to:	TC
Dependencies:	--
Tested Items:	--
Supporting Material:	--

](RS_PO_00007)

4.6.8 [RS_Main_00127] Execution of acceptance tests shall be feasible by any market partner

Type:	Valid
Description:	Execution of acceptance tests shall be feasible by any market partner.
Rationale:	AUTOSAR does not enforce a specific business model (OEM, Tier 1, Tier 2, independent laboratory, ...)
Use Case:	AUTOSAR is an open architecture
Applies to:	TC
Dependencies:	--
Supporting Material:	--
Tested Items:	--

](RS_PO_00007)

4.6.9 [RS_Main_00128] Acceptance tests shall cover a commonly agreed subset of AUTOSAR requirements

Type:	Valid
Description:	Acceptance tests shall cover a commonly agreed subset of AUTOSAR requirements.
Rationale:	By definition acceptance tests are designed from user perspective, the user decides to accept the BSW for further usage in projects. The configurability of AUTOSAR requires focusing on the most used features.
Use Case:	Specification and implementation effort focussed on the features or test cases with the highest market needs
Applies to:	TC
Dependencies:	--
Supporting Material:	--
Tested Items:	--

](RS_PO_00007)

4.6.10 [RS_Main_00129] Acceptance tests shall provide a commonly agreed test methodology

Type:	Valid
Description:	Acceptance test shall provide a commonly agreed test methodology.
Rationale:	Consistencies within test suites and between users of test suites
Use Case:	Extension of the standard test suite with OEM specific tests is possible by using the same methodology Cooperation between companies using the acceptance tests methodology
Applies to:	TC
Dependencies:	--
Tested Items:	--
Supporting Material:	--

](RS_PO_00007)

4.7 Processes

4.7.1 [RS_Main_00030] AUTOSAR shall support development processes for safety related systems

Type:	Valid
Description:	To develop safety related automotive systems all processes applied need to follow the corresponding requirements given in ISO26262. AUTOSAR shall support development processes for safety related systems by providing according exchange formats (e.g. for requirements tracing) and concepts.
Rationale:	Automotive software is in many cases safety related. Therefore dedicated development processes have to be followed. AUTOSAR shall support the users to apply these standards
Use Case:	Development of brake assist, highly automated driving
Applies to:	AP, CP, FO
Dependencies:	--
Supporting Material:	ISO26262

](RS_PO_00005, RS_PO_00009)

4.7.2 [RS_Main_00490] AUTOSAR processes shall be compliant to ISO26262

Type:	Valid
Description:	To develop safety related automotive systems all processes applied need to follow the corresponding requirements given in ISO26262. Accordingly the applicable process related requirements of ISO26262 have to be fulfilled by AUTOSAR processes.
Rationale:	AUTOSAR shall support the development of systems according to the highest ASIL.
Use Case:	Development of safety related automotive systems, e.g. to achieve high availability and fail-operational systems for highly automated driving
Applies to:	AP, CP
Dependencies:	--
Supporting Material:	ISO26262

](RS_PO_00005, RS_PO_00009)

4.7.3 [RS_Main_00290] AUTOSAR shall support the verification of its specifications

Type:	Valid
Description:	To develop safety related automotive systems all development artifacts need to be verified. Accordingly the development artifacts of AUTOSAR shall be verified.
Rationale:	AUTOSAR shall support the development of systems according to the highest ASIL.
Use Case:	Development of safety related automotive systems, e.g. to achieve high availability and fail-operational systems for highly automated driving.
Applies to:	AP, CP
Dependencies:	--
Supporting Material:	ISO26262

](RS_PO_00009)

4.7.4 [RS_Main_00350] AUTOSAR specifications shall be analyzable and support according methods to demonstrate the achievement of safety related properties.

Type:	Valid
Description:	To achieve safety-related properties an adequate software architectural design and implementation matching the safety requirements is required and has to be demonstrated. Such demonstration can be done by safety analyses, therefore. AUTOSAR specifications shall be analyzable accordingly. Corresponding analysis methods shall be applicable to the development artifacts specified by AUTOSAR.
Rationale:	In the context of the safety-related developments a confirmation that design and implementation are adequately safe is required.
Use Case:	--
Applies to:	AP, CP, FO
Dependencies:	--
Supporting Material:	ISO26262

](RS_PO_00005, RS_PO_00009)

4.7.5 [RS_Main_00480] AUTOSAR shall support the test of implementations

Type:	Valid
Description:	AUTOSAR shall support the testability of compliant implementations and tools.
Rationale:	Testing of implementations is required by software development, software maturity and software safety standards.

Use Case:	Tool interoperability tests and/or test of of AUTOSAR Basic Software implementations.
Applies to:	AP, CP, TC
Dependencies:	--
Supporting Material:	ISO26262

](RS_PO_00001, RS_PO_00005, RS_PO_00007)

5 References

[Glossary] Glossary,
AUTOSAR_TR_Glossary.pdf

[ISO 26262] Road vehicles — Functional safety — Part 1 to 9

[TPS_STDT] Standardization Template,
AUTOSAR_TPS_StandardizationTemplate.pdf

[RS_ProjectObjectives] Project Objectives
AUTOSAR_RS_ProjectObjectives.pdf