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2018-03-29	18-03	AUTOSAR Release Management	• Removed: RS_EM_00006, RS_EM_00007 and RS_EM_00012 • Minor changes and document clean up
2017-10-27	17-10	AUTOSAR Release Management	• Minor changes, document clean up
2017-03-31	17-03	AUTOSAR Release Management	• Initial release

Disclaimer

Table of Contents

1 Scope of this document

This document specifies requirements of the AUTOSAR Adaptive Platform on the Execution Management. The motivation is to provide a standardized way to start, stop and police applications platform wide.

2 Conventions to be used

The representation of requirements in AUTOSAR documents follows the table specified in [TPS_STDT_00078], see Standardization Template [1], chapter Support for Traceability.

The verbal forms for the expression of obligation specified in [TPS_STDT_00053] shall be used to indicate requirements, see Standardization Template [1], chapter Support for Traceability.

2.1 Requirements Guidelines

2.1.1 Requirements quality

2.1.2 Requirements identification

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 follows, based on [2].

Note that the requirement level of the document in which they are used modifies the force of these words.

- MUST: This word, or the adjective "LEGALLY REQUIRED", means that the definition is an absolute requirement of the specification due to legal issues.
- MUST NOT: This phrase, or the phrase "MUST NOT", means that the definition is an absolute prohibition of the specification due to legal issues.
- SHALL: This phrase, or the adjective "REQUIRED", means that the definition is an absolute requirement of the specification.
- SHALL NOT: This phrase means that the definition is an absolute prohibition of the specification.
- SHOULD: This word, or the adjective "RECOMMENDED", means 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", means 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, SHALL 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, SHALL be prepared to interoperate with another implementation, which does not include the option (except, of course, for the feature the option provides.)

2.1.3 Requirements status

The following requirements are described within this document but not otherwise considered in this release:

- [RS_EM_00050] – System-wide coordination
- [RS_EM_00051] – External trigger conditions
- [RS_EM_00111] – Identification of Processes
- [RS_EM_00014] – Trusted Platform.

The functionality described above is subject to modification and will be considered for inclusion in a future release of this document.

3 Acronyms and abbreviations

All technical terms used throughout this document – except the ones listed here – can be found in the official [3] AUTOSAR Glossary or [4] TPS Manifest Specification.

Term	Description
process	A `process` refers to the OS concept of a running process. **Attention:** `process` is **not equal** to `Modelled Process` (see below). Hence each `Modelled Process` has at some time a related (OS) process but a process may not always have a related `Modelled Process`.
Modelled Process	A Modelled Process is an instance of an `Executable` to be executed on a `Machine`.

Execution Dependency	Dependencies between Executable instances can be configured to define a sequence for starting and terminating them.
Execution Management	The element of the AUTOSAR Adaptive Platform responsible for the ordered startup and shutdown of the AUTOSAR Adaptive Platform and Adaptive Applications.
State Management	The element defining modes of operation for AUTOSAR Adaptive Platform. It allows flexible definition of functions which are active on the platform at any given time.
Identity and Access Management (IAM)	A Adaptive Platform Service within the AUTOSAR Adaptive Platform
Function Group	A Function Group is a set of coherent Modelled Processes, which need to be controlled consistently. Depending on the state of the Function Group, processes (related to the Modelled Processes) are started or terminated. processes can belong to more than one Function Group State (but at exactly one Function Group). "MachineFG" is a Function Group with a predefined name, which is mainly used to control Machine lifecycle and processes of platform level Applications. Other Function Groups are sort of general purpose tools used (for example) to control processes of user level Applications.
Function Group State	The element of State Management that characterizes the current status of a set of (functionally coherent) user-level Applications. The set of Function Groups and their Function Group States is machine specific and are configured in Machine Manifest.
Machine State	A state of Function Group "MachineFG" with some predefined states (Startup/Shutdown/Restart). This can term can refer to the current state ("The Machine State is ..."), to a specific state ("In Machine State Startup ..."), or to a set of states ("In Machine States Startup or Shutdown ...").
Time Determinism	The results of a calculation are guaranteed to be available before a given deadline.
Data Determinism	The results of a calculation only depend on the input data and are reproducible, assuming a given initial internal state.
Full Determinism	Combination of Time and Data Determinism.
Communication Management	A Functional Cluster within the Adaptive Platform Foundation
Execution Manifest	Manifest file to configure execution of an Adaptive Application. An Execution Manifest is created at integration time and deployed onto a Machine together with the Executable to which it is attached. It supports the integration of the Executable code and describes the configuration properties (startup parameters, resource group assignment etc.) of each process, i.e. started instance of that Executable.
Machine Manifest	Manifest file to configure a Machine. The Machine Manifest holds all configuration information which cannot be assigned to a specific Executable or process.
Operating System	Software responsible for managing processes on a Machine and for providing an interface to hardware resources.
ResourceGroup	Configuration element to enable restrictions on resources uses by Adaptive Applications running in the group.

ExecutionClient	Adaptive Application interface to Execution Management.
DeterministicClient	Adaptive Application interface to Execution Management to support control of the process-internal cycle, a deterministic worker pool, activation time stamps and random numbers.
Platform Health Management	A Functional Cluster within the Adaptive Platform Foundation
Recovery Action	Actions defined by the integrator to control Adaptive Application error recovery.
Process State	Lifecycle state of a Modelled Process
Service Instance Manifest	Manifest file to configure Service usage of an Adaptive Application.
Trusted Platform	An execution platform supporting a continuous chain of trust from boot through to application supporting authentication (that all code executed is from the claimed source) and integrity validation (that prevents tampered code/data from being executed).

Table 3.1: Technical Terms

The following technical terms used throughout this document are defined in the official [3] AUTOSAR Glossary or [4] TPS Manifest Specification – they are repeated here for tracing purposes.

Term	Description
Adaptive Application	see [3] AUTOSAR Glossary
Application	see [3] AUTOSAR Glossary
AUTOSAR Adaptive Platform	see [3] AUTOSAR Glossary
Adaptive Platform Foundation	see [3] AUTOSAR Glossary
Manifest	see [3] AUTOSAR Glossary
Executable	see [3] AUTOSAR Glossary
Functional Cluster	see [3] AUTOSAR Glossary
Adaptive Platform Service	see [3] AUTOSAR Glossary
Machine	see [3] AUTOSAR Glossary
Service	see [3] AUTOSAR Glossary
Service Interface	see [3] AUTOSAR Glossary
Service Discovery	see [3] AUTOSAR Glossary

Table 3.2: Glossary-defined Technical Terms

4 Requirements Specification

4.1 Functional Overview

The AUTOSAR Adaptive Platform provides services to influence the lifecycle of Applications based on configuration. This document therefore includes requirements that determine the facilities provided by Execution Management to affect the machine-wide startup, shutdown and restart of an Application based on configuration.

Execution Management is responsible for all aspects of platform lifecycle management and application lifecycle management, including:

- Machine startup and shutdown.
  - Execution Management is the initial (“boot”) process of the operating system.
- Required process hierarchy of started services, e.g., init and its child process.
  - after booting. The boot process in this case corresponds to machine init process.
- Provision of process isolation with each instance of an Executable managed as a single process.
- Startup and shutdown of Applications.
  - Loading Executable based on a defined Execution Dependency.
  - Specific requirements until starting an Executable main function (i.e. entry point)
- Privileges and use of access control
  - description and semantics of access control in manifest files
- State management
  - Conditions for the execution of Applications

4.2 Functional Requirements

This section describes all requirements driving the work to define Execution Management functionality.

4.2.1 Startup and Shutdown of Applications

[RS_EM_00002]{DRAFT} **Execution Management shall set-up one process for the execution of each Modelled Process.** ⌈

Type:	draft
Description:	For each instance of an Executable, Execution Management shall allocate one POSIX process. Furthermore process specific properties (like priority, scheduling policy and access rights) shall be assigned based on the Execution Manifest.

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Rationale:	Isolation of `Executable` instances from each other.
Dependencies:	–
Use Case:	Safety and security related `Applications` require isolation.
Supporting Material:	–

⌋(*RS_Main_00010*, *RS_Main_00049*, *RS_Main_00080*, *RS_Main_00320*, *RS_Main_00150*, *RS_Main_00420*, *RS_SAF_21201*)

[RS_EM_00014]{DRAFT} **`Execution Management` shall support a Trusted Platform.** ⌈

Type:	draft
Description:	`Execution Management` shall ensure that integrity and authenticity are checked for all `Executables` and their corresponding `Execution Management` meta-data (i.e. processed Machine and Execution Manifests), and shall only allow starting `Executables` that passed validation check.
Rationale:	`Execution Management` takes over the responsibility from `Operating System` and/or boot loader for `AUTOSAR Adaptive Platform` startup and hence for keeping the platform trusted. After the boot process has finished, `Execution Management` is the only `AUTOSAR Adaptive Platform` entity allowed to start `Executables` and therefore responsible for the continuation of platform trust.
Dependencies:	–
Use Case:	Verify the integrity and authenticity of software deployed on `AUTOSAR Adaptive Platform`.
Supporting Material:	–

⌋(*RS_Main_00170*, *RS_Main_00514*, *RS_Main_00180*)

[RS_EM_00005]{DRAFT} **`Execution Management` shall support the configuration of OS resource budgets for `process` and groups of `processes`.** ⌈

Type:	draft
Description:	Based on the `Execution Manifest`, `Execution Management` shall allocate OS resources to the `process`. The allocation shall be possible for single `process` and groups of `processs`.
Rationale:	Real-time guarantees shall be defined
Dependencies:	–
Use Case:	Like `cgroups` (based on containers which contain one or more processes) and `ulimit`.
Supporting Material:	–

⌋(*RS_Main_00002*, *RS_Main_00010*, *RS_Main_00106*, *RS_Main_00340*, *RS_Main_00150*)

[RS_EM_00008]{DRAFT} **Execution Management shall support the binding of all threads of a given process to a specified set of processor cores.** ⌈

Type:	draft
Description:	Execution Management shall allow the binding of threads to specific set of processor cores based on configuration in the Execution Manifest. The binding granularity shall be at process level.
Rationale:	Mechanism to influence load balancing, reaction times, and latencies.
Dependencies:	–
Use Case:	Assign two parallel threads to two processor cores to achieve true parallelism.
Supporting Material:	–

⌋*(RS_Main_00010, RS_Main_00050, RS_Main_00106, RS_Main_00320, RS_Main_00501, RS_Main_00150)*

[RS_EM_00009]{DRAFT} **Execution Management shall ensure it is the sole entity starting processes.** ⌈

Type:	draft
Description:	Execution Management is responsible for starting child processes and shall prevent such child processes from directly starting other processes.
Rationale:	Execution Management needs full control of starting applications to ensure required isolation of temporal and spatial properties. Only Execution Management shall start processes.
Dependencies:	–
Use Case:	Segregation between applications with different safety and/or security properties.
Supporting Material:	–

⌋*(RS_Main_00010, RS_Main_00011, RS_Main_00049, RS_Main_00150, RS_SAF_21201)*

[RS_EM_00010] Execution Management shall support multiple instances of Executables. ⌈

Type:	valid
Description:	It shall be possible to start more than one Modelled Process from a single Executable. Instance specific information is described in Modelled Process startup configuration.
Rationale:	Avoid code duplication.
Dependencies:	–

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Use Case:	Redundancy of an `Executable` by parallel execution of two instances.
Supporting Material:	–

⌋(*RS_Main_00002*, *RS_Main_00049*, *RS_Main_00106*, *RS_Main_00501*)

[RS_EM_00011] `Execution Management` shall support self-initiated graceful shutdown of `processes`. ⌈

Type:	valid
Description:	`Execution Management` shall support self-initiated graceful shutdown of `processes`.
Rationale:	Self-initiated graceful shutdown enables a `process` to free allocated dedicated resources and inform other interacting entities about its shutdown (e.g. de-registering a service) to create a consistent state within the `Machine`/vehicle. Self-initiated `process` shutdown is, by definition, only be initiated by the `process` itself.
Dependencies:	–
Use Case:	The process of an `Executable` instance is finished and shuts down itself.
Supporting Material:	–

⌋(*RS_Main_00002*, *RS_Main_00049*)

[RS_EM_00100] `Execution Management` shall support the ordered startup and shutdown of `processes`. ⌈

Type:	valid
Description:	`Execution Management` shall support the ordered startup and shutdown of `Executable` instances.
Rationale:	Ensure that startup and shutdown dependencies between `Executable` instances are respected, if an execution dependency is specified in the `Execution Manifest` of an `Executable` instance. If no execution dependency is specified between `Executable` instances, they can be started and stopped in an arbitrary order.
Dependencies:	–
Use Case:	An `Executable` needs a specific functional cluster to be up and running before it can be started.
Supporting Material:	–

⌋(*RS_Main_00002*, *RS_Main_00049*, *RS_Main_00340*, *RS_Main_00460*)

4.2.2 Execution

[RS_EM_00050]{DRAFT} **Execution Management shall perform Machine-wide coordination of processes.** ⌈

Type:	draft
Description:	Execution Management shall provide an API for a process to register its activities for being able to coordinate their execution.
Rationale:	Coordinated scheduling of activities across Executables.
Dependencies:	–
Use Case:	Usage of computation resources within the running processes shall be managed in the Machine to ensure that activities can be coordinated across processes. Registration enables Execution Management to form the necessary Machine-wide view for the coordination.
Supporting Material:	–

⌋*(RS_Main_00460, RS_SAF_21202)*

[RS_EM_00051]{DRAFT} **Execution Management shall provide APIs to the process for configuring external trigger conditions for its activities.** ⌈

Type:	draft
Description:	Execution Management shall provide an API for configuring the trigger conditions of registered activities.
Rationale:	Execution Management shall have the information when to schedule the activities.
Dependencies:	–
Use Case:	Execution on data receipt, sequencing of activity execution.
Supporting Material:	–

⌋*(RS_Main_00050, RS_Main_00060)*

[RS_EM_00052]{DRAFT} **Execution Management shall provide APIs to the process for configuring cyclic triggering of its activities.** ⌈

Type:	draft
Description:	Execution Management shall provide an API for configuring the cyclic triggering of registered activities.
Rationale:	Execution Management shall have the information when to schedule the activities.
Dependencies:	–
Use Case:	Cyclic execution of activities

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Supporting Material:	–

⌋(*RS_Main_00050*, *RS_Main_00340*)

[RS_EM_00053]{DRAFT} **Execution Management shall provide APIs to the process to support deterministic redundant execution of processes.** ⌈

Type:	draft
Description:	Execution Management shall provide APIs to support deterministic redundant execution of processes.
Rationale:	High ASIL systems require safety mechanism like software lockstep to be implemented on non-automotive grade microprocessors. The redundant execution shall guarantee deterministic, i.e. reproducible results.
Dependencies:	–
Use Case:	Redundant execution of activities to implement software lockstep
Supporting Material:	–

⌋(*RS_Main_00010*, *RS_Main_00501*, *RS_SAF_21202*)

[RS_EM_00113]{DRAFT} **Execution Management shall support time-triggered execution.** ⌈

Type:	draft
Description:	Execution Management shall facilitate time-triggered periodic execution.
Rationale:	Algorithms in processes can be time-triggered. The OS needs to provide mechanisms to allow the time-triggered execution of applications. The triggers need to contain at least external timers, but are not limited to.
Dependencies:	–
Use Case:	Redundant execution of activities to implement software lockstep
Supporting Material:	–

⌋(*RS_Main_00010*, *RS_Main_00501*)

[RS_EM_00111]{DRAFT} **Execution Management shall assist identification of processes during Machine runtime.** ⌈

Type:	draft

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Description:	Adaptive Applications shall be identifiable, for example by Identity and Access Management, during runtime so that access restrictions can be enforced. Execution Management spawns runtime processes based on Execution Manifest. Execution Management is qualified to assist AUTOSAR Adaptive Platform software, such as Identity and Access Management, by providing information about the link between runtime representation and Modelled Process.
Rationale:	Adaptive Applications shall be identifiable by Identity and Access Management on the basis of their runtime representation as spawned by Execution Management.
Dependencies:	–
Use Case:	App A requests access on Service Interface. Identity and Access Management is able to retrieve runtime information of App A, e.g. POSIX pid or cryptographic token. Execution Management assists Identity and Access Management by resolving this runtime information to the Adaptive Application.
Supporting Material:	–

⌋(*RS_Main_00170*, *RS_Main_00514*, *RS_Main_00420*)

4.2.3 State Management

[RS_EM_00101]{DRAFT} **Execution Management shall support State Management functionality.** ⌈

Type:	draft
Description:	Execution Management shall provide an interface to State Management to request a change in Function Group State.
Rationale:	To support the starting and stopping of processes based on declared Function Group State dependencies, Execution Management provides an interface to request Function Group State (including Machine State) changes by the State Management fuctional cluster. In response to state change requests, Execution Management ensures that only the required set of Application processes are running in any given operation conditions and therefore platform resources are saved for relevant processes.
Dependencies:	–
Use Case:	Provide a mechanism to define modes of operation of the Machine.
Supporting Material:	–

⌋(*RS_Main_00460*)

[RS_EM_00103] Execution Management shall support process lifecycle management. ⌈

Type:	valid
Description:	The lifecycle of a `process` consists of its initialization, running and terminating (shutdown) phases. As well as supporting transitions between these phases of the `process` lifecycle, `Execution Management` should ensure that phases, e.g. the startup and shutdown, of `processes` can be coordinated between groups of `processes` which shall run in the same `Machine State` or `Function Group State`. Coordination and tracking of lifecycle phases enables `Execution Management` to ensure that `Executable`'s `processes` are fully established and running before other `processes` which depend on their functionality can be started.
Rationale:	Coordination and tracking of lifecycle phases enables `Execution Management` to ensure that Executable `processes` are fully established and running before other executable `processes` which depend on their functionality can be started.
Dependencies:	–
Use Case:	
Supporting Material:	–

⌋(*RS_Main_00049, RS_Main_00050, RS_Main_00106, RS_Main_00460, RS_SAF_-21201*)

4.2.4 Error Handling

[RS_EM_00150]{DRAFT} **Error Handling.** ⌈

Type:	draft
Description:	`Execution Management` shall support error handling including unrecoverable errors.
Rationale:	`Execution Management` may face conditions where it has no mechanism to recover the system. These situations are typically expected to result from a misconfigured system and therefore a suitable response might be to halt startup so that the misconfiguration can be resolved.
Dependencies:	–
Use Case:	`Execution Management` can not start PHM or `State Management` and hence the platform as a whole cannot be started, it is not possible to recover from this situation hence `Execution Management` must halt startup.
Supporting Material:	–

⌋(*RS_Main_00011*)

4.2.5 Support for Diagnostics

Support for Diagnostics is handled by `State Management` and therefore the requirements are replaced by the ones from [5].

4.3 Non-Functional Requirements

None.

5 Requirements Tracing

The following tables reference the requirements specified in [6] and links to the fulfillment of these.

Please note that if column “Satisfied by” is empty for a specific requirement this means that this requirement is not fulfilled by this document. Likewise, an entry of [RS_EM_NA] indicates that the source requirement has been evaluated as “not applicable” to `Execution Management`.

Requirement	Description	Satisfied by
[RS_Main_00002]	AUTOSAR shall provide a software platform for high performance computing platforms	[RS_EM_00005] [RS_EM_00010] [RS_EM_00011] [RS_EM_00100]
[RS_Main_00010]	AUTOSAR shall support the development of safety related systems	[RS_EM_00002] [RS_EM_00005] [RS_EM_00008] [RS_EM_00009] [RS_EM_00053] [RS_EM_00113]
[RS_Main_00011]	AUTOSAR shall support the development of reliable systems	[RS_EM_00009] [RS_EM_00150]
[RS_Main_00026]	AUTOSAR shall support high speed and high bandwidth communication between executed SW	[RS_EM_NA]
[RS_Main_00030]	AUTOSAR shall support development processes for safety related systems	[RS_EM_NA]
[RS_Main_00049]	AUTOSAR shall provide an Execution Management for running multiple applications	[RS_EM_00002] [RS_EM_00009] [RS_EM_00010] [RS_EM_00011] [RS_EM_00100] [RS_EM_00103]
[RS_Main_00050]	AUTOSAR shall provide an Execution Framework towards applications to implement concurrent application internal control flows	[RS_EM_00008] [RS_EM_00051] [RS_EM_00052] [RS_EM_00103]
[RS_Main_00060]	AUTOSAR shall provide a standardized software interface for communication between Applications	[RS_EM_00051]

Requirement	Description	Satisfied by
[RS_Main_00080]	AUTOSAR shall provide means to describe a component model for Application Software	[RS_EM_00002]
[RS_Main_00106]	AUTOSAR shall provide the possibility to extend the software with new SWCs without recompiling the platform foundation	[RS_EM_00005] [RS_EM_00008] [RS_EM_00010] [RS_EM_00103]
[RS_Main_00140]	AUTOSAR shall provide network independent communication mechanisms for applications	[RS_EM_NA]
[RS_Main_00150]	AUTOSAR shall support the deployment and reallocation of AUTOSAR Application Software	[RS_EM_00002] [RS_EM_00005] [RS_EM_00008] [RS_EM_00009]
[RS_Main_00160]	AUTOSAR shall provide means to describe interfaces of the entire system	[RS_EM_NA]
[RS_Main_00161]	AUTOSAR shall provide a unified way to describe software systems deployed to Adaptive and / or Classic platforms	[RS_EM_NA]
[RS_Main_00170]	AUTOSAR shall provide secure access to ECU data and services	[RS_EM_00014] [RS_EM_00111]
[RS_Main_00180]	AUTOSAR shall provide mechanisms to protect intellectual property in a shared development process	[RS_EM_00014]
[RS_Main_00190]	AUTOSAR shall support standardized interoperability with non-AUTOSAR software	[RS_EM_NA]
[RS_Main_00230]	AUTOSAR shall support network topologies including gateways	[RS_EM_NA]
[RS_Main_00250]	AUTOSAR methodology shall provide a predefinition of typical roles and activities	[RS_EM_NA]
[RS_Main_00260]	AUTOSAR shall provide diagnostics means during runtime, for production and services purposes	[RS_EM_NA]
[RS_Main_00261]	AUTOSAR shall provide means for calibration	[RS_EM_NA]
[RS_Main_00270]	AUTOSAR shall provide mitigation strategies towards new releases	[RS_EM_NA]
[RS_Main_00280]	AUTOSAR shall support standardized automotive communication protocols	[RS_EM_NA]
[RS_Main_00285]	AUTOSAR shall support protocols for Intelligent Transportation Systems	[RS_EM_NA]

Requirement	Description	Satisfied by
[RS_Main_00300]	AUTOSAR shall provide data exchange formats to support work-share in large inter and intra company development groups	[RS_EM_NA]
[RS_Main_00301]	AUTOSAR shall specify profiles for data exchange to support work-share in large inter- and intra-company development groups	[RS_EM_NA]
[RS_Main_00310]	AUTOSAR shall support hierarchical Application Software design methods	[RS_EM_NA]
[RS_Main_00320]	AUTOSAR shall provide formats to specify system development	[RS_EM_00002] [RS_EM_00008]
[RS_Main_00340]	AUTOSAR shall support the continuous timing requirement analysis	[RS_EM_00005] [RS_EM_00052] [RS_EM_00100]
[RS_Main_00350]	AUTOSAR specifications shall be analyzable and support according methods to demonstrate the achievement of safety related properties	[RS_EM_NA]
[RS_Main_00360]	AUTOSAR shall support variant management	[RS_EM_NA]
[RS_Main_00410]	AUTOSAR shall provide specifications for routines commonly used by Application Software to support sharing and optimization	[RS_EM_NA]
[RS_Main_00420]	AUTOSAR shall use established software standards and consolidate de-facto standards for basic software functionality	[RS_EM_00002] [RS_EM_00111]
[RS_Main_00440]	AUTOSAR shall standardize access to non-volatile memory	[RS_EM_NA]
[RS_Main_00445]	AUTOSAR shall standardize access to crypto-specific HW and SW	[RS_EM_NA]
[RS_Main_00460]	AUTOSAR shall standardize methods to organize mode management on Application, ECU and System level	[RS_EM_00050] [RS_EM_00100] [RS_EM_00101] [RS_EM_00103]
[RS_Main_00480]	AUTOSAR shall support the test of implementations	[RS_EM_NA]
[RS_Main_00490]	AUTOSAR processes shall be compliant to ISO26262	[RS_EM_NA]
[RS_Main_00491]	AUTOSAR shall provide means for logging	[RS_EM_NA]
[RS_Main_00500]	AUTOSAR shall provide naming conventions	[RS_EM_NA]
[RS_Main_00501]	AUTOSAR shall support redundancy concepts	[RS_EM_00008] [RS_EM_00010] [RS_EM_00053] [RS_EM_00113]

Requirement	Description	Satisfied by
[RS_Main_00503]	AUTOSAR shall support change of communication and application software at runtime.	[RS_EM_NA]
[RS_Main_00507]	AUTOSAR shall reflect the stages of a software system development in a formal model description	[RS_EM_NA]
[RS_Main_00510]	AUTOSAR shall support secure onboard communication	[RS_EM_NA]
[RS_Main_00511]	AUTOSAR shall support virtualization	[RS_EM_NA]
[RS_Main_00512]	AUTOSAR shall support time synchronization	[RS_EM_NA]
[RS_Main_00513]	AUTOSAR shall support language bindings for different programming languages	[RS_EM_NA]
[RS_Main_00514]	AUTOSAR shall support the development of secure systems	[RS_EM_00014] [RS_EM_00111]
[RS_Main_00650]	AUTOSAR shall support up - and download of data and software	[RS_EM_NA]
[RS_Main_00652]	AUTOSAR shall support the translation between signal-based and service-oriented communication	[RS_EM_NA]
[RS_Main_00653]	AUTOSAR shall provide an abstract description of the vehicle VFB communications independent of platform	[RS_EM_NA]
[RS_Main_01001]	AUTOSAR shall support intra ECU communication	[RS_EM_NA]
[RS_Main_01002]	AUTOSAR shall support service-oriented communication	[RS_EM_NA]
[RS_Main_01003]	AUTOSAR shall support data-oriented communication	[RS_EM_NA]
[RS_Main_01004]	AUTOSAR shall support standards for wireless off-board communication	[RS_EM_NA]
[RS_Main_01005]	AUTOSAR shall establish communication paths dynamically	[RS_EM_NA]
[RS_Main_01007]	AUTOSAR communication shall assure quality of service on communication	[RS_EM_NA]
[RS_Main_01008]	AUTOSAR shall provide secure communication with off-board entities	[RS_EM_NA]
[RS_Main_01025]	AUTOSAR shall support debugging of software on the target and onboard	[RS_EM_NA]
[RS_Main_01026]	AUTOSAR shall support tracing and profiling on the target and onboard	[RS_EM_NA]

Requirement	Description	Satisfied by
[RS_SAF_21201]	Execution Management shall inherit at least the highest safety integrity level from any process that is running on the platform.	[RS_EM_00002] [RS_EM_00009] [RS_EM_00103]
[RS_SAF_21202]	Execution Management shall support fully deterministic execution (time determinism and data determinism) so that higher ASIL levels can be achieved even when using parallel processing.	[RS_EM_00050] [RS_EM_00053]

5.1 Not applicable requirements

[RS_EM_NA]{DRAFT} ⌈These requirements are not applicable as they are not within the scope of this release.⌋ *(RS_Main_01026, RS_Main_01025, RS_Main_00650, RS_Main_00026, RS_Main_00030, RS_Main_00140, RS_Main_00160, RS_Main_00161, RS_Main_00190, RS_Main_00230, RS_Main_00250, RS_Main_00260, RS_Main_00261, RS_Main_00270, RS_Main_00280, RS_Main_00285, RS_Main_00300, RS_Main_00301, RS_Main_00310, RS_Main_00350, RS_Main_00360, RS_Main_00410, RS_Main_00440, RS_Main_00445, RS_Main_00480, RS_Main_00490, RS_Main_00491, RS_Main_00500, RS_Main_00503, RS_Main_00507, RS_Main_00510, RS_Main_00511, RS_Main_00512, RS_Main_00513, RS_Main_00652, RS_Main_00653, RS_Main_01001, RS_Main_01002, RS_Main_01003, RS_Main_01004, RS_Main_01005, RS_Main_01007, RS_Main_01008)*

6 References

[1] Standardization Template
AUTOSAR_TPS_StandardizationTemplate

[2] Key words for use in RFCs to Indicate Requirement Levels
http://www.ietf.org/rfc/rfc2119.txt

[3] Glossary
AUTOSAR_TR_Glossary

[4] Specification of Manifest
AUTOSAR_TPS_ManifestSpecification

[5] Requirements of State Management
AUTOSAR_RS_StateManagement

[6] Main Requirements
AUTOSAR_RS_Main