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1 Scope of Document

This document specifies requirements on State Management. State Management implements interfaces of State Manager on the AUTOSAR Adaptive Platform, because State Management is highly project specific and therefor to be implemented by the project itself.

2 Conventions to be used

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

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

3 Acronyms and abbreviations

The glossary below includes acronyms and abbreviations relevant to this Document.

Abbreviation / Acronym:	Description:
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.

Table 3.1: Technical Terms

The following technical terms used in this document are defined in the corresponding document mentioned in the table below.

Abbreviation / Acronym:	Description:
Platform Health Management	see [2] Specification of Platform Health Management
Execution Management	see [3] Requirements on Execution Management
Function Group	see [3] Requirements on Execution Management
Function Group State	see [3] Requirements on Execution Management
Machine State	see [3] Requirements on Execution Management
Network Management	see [4] Specification of Network Management
Process	see [5] AUTOSAR Glossary
Adaptive Application	see [5] AUTOSAR Glossary
AUTOSAR Adaptive Platform	see [5] AUTOSAR Glossary
Executable	see [5] AUTOSAR Glossary
Functional Cluster	see [5] AUTOSAR Glossary
Machine	see [5] AUTOSAR Glossary
Manifest	see [5] AUTOSAR Glossary
Adaptive Platform Foundation	see [5] AUTOSAR Glossary
Adaptive Platform Services	see [5] AUTOSAR Glossary
Operating System	see [6] Requirements Specification of Operating System Interface

Table 3.2: Reference to Technical Terms

4 Requirements Specification

This chapter describes all requirements driving the work to define the State Management.

4.1 Functional Overview

This document specifies the requirements regarding the realization of the State Management on Adaptive Platform. Only the interfaces and abstract functionality will be defined, because State Management is highly project specific.

Execution Management, Platform Health Management and State Management are the main safety relevant functional clusters of the AUTOSAR Adaptive Platform. Consequently, their development may require certain processes to be followed - as recommended in ISO26262. A safety argumentation for the AUTOSAR Adaptive Platform, describing functional safety measures and use-cases is provided through Explanation of Safety Overview [7].

4.2 Functional Requirements

4.2.1 State Management

[RS_SM_00001] State Management shall coordinate and control multiple sets of Applications. ⌈

Description:	State Management shall allow to change the availability of Adaptive Applications based on internal decision and/or external requests.
Rationale:	State Management shall coordinate and control one or multiple sets of Adaptive Applications (Function Group State) and the platform (Machine State) itself so that the machine behaves as to fulfill the intended system design of a particular project.
Dependencies:	–
Use Case:	Provide interface to influence State Managements internal states.
Supporting Material:	–

⌋

[RS_SM_00004] State Management shall provide standardized interfaces. ⌈

Description:	State Management implementation shall be portable between different AUTOSAR Adaptive Platform compliant stacks. State Management shall only depend on the standardized interfaces when it interacts with other Functional Cluster. Therefor State Management shall provide interfaces over at least `ara::com`.

▽

△

Rationale:	
Dependencies:	
Use Case:	Support error reaction of "Platform Health Management", configure `Adaptive Applications` availability based on "Diagnostic" and "Update and Configuration Management"
Supporting Material:	

⌋

[RS_SM_00005] State Management internal states. ⌈

Description:	`State Management` shall support to change `State Managements` its internal states based on external inputs
Rationale:	`State Management` shall support to implement one or more state machines. `State Management` shall change its internal states in a project-specific manner based on requests from external inputs via its provided interfaces. `State Management` may reflect the changes of its internal states based on project-specific requirements via its provided interfaces.
Dependencies:	–
Use Case:	–
Supporting Material:	–

⌋

4.2.2 Virtualization support / Hierarchical State Management

[RS_SM_00200] State Management shall provide an interface between State Management instances. ⌈

Description:	`State Management` shall provide an interface between `State Management` instances used in a hierarchically manner.
Rationale:	In a virtualized/hierarchical environment several instances of `State Management` will be active. Instances with lower priority have to be controlled by instances with a higher priority
Dependencies:	
Use Case:	The components are possibly provided by different vendors, working on different microcontrollers or virtual machines. On each controller or (virtual) machine a separate instance of `State Management` might be used and it should be possible to operate these instances in a hierarchically manner.
Supporting Material:	

⌋

4.2.3 Calibration and variant support

[RS_SM_00300] State Management shall support variant handling based on calibration data. ⌈

Description:	State Management shall evaluate calibration data. State Management should (or not) set Function Groups to specified Function Group State depending on read configuration data.
Rationale:	
Dependencies:	
Use Case:	For different car lines, countries or regions different Function Groups will be allowed to be started. State Management evaluates this information from calibration data to enable only the wanted Function Groups.
Supporting Material:	

⌋

4.2.4 Dynamic communication paths

[RS_SM_00400] State Management shall establish communication paths dynamically. ⌈

Description:	State Management shall be able to evaluate which communication channels are needed by Adaptive Applications and therefor by their corresponding Function Group. Opening and closing of these channels shall be done by requesting them from Network Management.
Rationale:	
Dependencies:	
Use Case:	Adaptive Applications as part of aFunction Group will have a need to use communication with other ones. Therefore State Management evaluates this information from configuration and requests Network Management to establish or shutdown the corresponding communication channel.
Supporting Material:	

⌋

[RS_SM_00401] State Management shall control Applications depending on dynamic communication paths . ⌈

Description:	State Management shall be able to evaluate which Adaptive Applications and therefor their corresponding Function Group are needed by establishing communication channels. starting and stopping of Adaptive Applications shall be done on request from Network Management.
Rationale:	
Dependencies:	

▽

△

Use Case:	Adaptive Applications as part of a Function Group will have a need to use communication with other ones. Therefore State Management evaluates this information from configuration and requests Execution Management to set a Function Group (and therefor the related Adaptive Applications) to a dedicated state.
Supporting Material:	

⌋

[RS_SM_00402] Coordination of System Sleep States ⌈

Description:	The State Management shall coordinate the system sleep states between the Operating System, the Adaptive Applications, and between the Functional Clusters.
Rationale:	To set a system into a low power mode, the integrator/architect may require read and write access to control the sleep state of a system. S2R-Aware Adaptive Applications can register notifications to prepare (and optionally deny) the suspend and to do actions after resume.
Use Case:	Suspend to RAM
Dependencies:	–
Supporting Material:	–

⌋

4.2.5 Recovery actions

[RS_SM_00601] State Management shall coordinate recovery actions.

Upstream requirements: RS_SAF_10005, RS_SAF_10006

⌈

Description:	State Management shall coordinate recovery actions.
Rationale:	State Management is a central functional cluster to which Platform Health Management reports supervision failures and State Management decides which recovery action (e.g. functional group state change, notification to a safe application or even ECU reset) should be triggered.
Use Case:	PHM supervises a safety critical Adaptive Application. This application fails. PHM detects the issue and reports to State Management. State Management coordinates the error recovery actions.
Dependencies:	PHM
Supporting Material:	–

⌋

4.3 Non-Functional Requirements

[RS_SM_00600] State Management shall be implemented at least according to the highest safety integrity level from any process that is managed by State Management.

Upstream requirements: RS_SAF_10001

⌈

Description:	`State Management` shall be implemented at least according to the highest safety integrity level from any process that is managed by `State Management`.
Rationale:	`State Management` manages state changes and recovery actions of all the processes and therefore needs to be developed and executed according to the same safety standards as the highest rated safety application managed by `State Management` in the system.
Use Case:	An ASIL C, B and QM Application is running on the adaptive Platform. `State Management` shall manage the ASIL C, B and the QM application, therefore `State Management` shall be implemented with an ASIL C.
Dependencies:	–
Supporting Material:	–

⌋

5 References

[1] Standardization Template
AUTOSAR_FO_TPS_StandardizationTemplate

[2] Specification of Platform Health Management
AUTOSAR_AP_SWS_PlatformHealthManagement

[3] Requirements on Execution Management
AUTOSAR_AP_RS_ExecutionManagement

[4] Specification of Network Management
AUTOSAR_AP_SWS_NetworkManagement

[5] Glossary
AUTOSAR_FO_TR_Glossary

[6] Requirements on Operating System Interface
AUTOSAR_AP_RS_OperatingSystemInterface

[7] Explanation of Safety Overview
AUTOSAR_FO_EXP_SafetyOverview

A Change history of AUTOSAR traceable items

Please note that the lists in this chapter also include traceable items that have been removed from the specification in a later version. These items do not appear as hyperlinks in the document.

A.1 Traceable item history of this document according to AUTOSAR Release R26-11

A.1.1 Added Requirements in R26-11

none

A.1.2 Changed Requirements in R26-11

Number	Heading
[RS_SM_00001]	State Management shall coordinate and control multiple sets of Applications.
[RS_SM_00004]	State Management shall provide standardized interfaces.
[RS_SM_00005]	State Management internal states.
[RS_SM_00200]	State Management shall provide an interface between State Management instances.
[RS_SM_00300]	State Management shall support variant handling based on calibration data.
[RS_SM_00400]	State Management shall establish communication paths dynamically.
[RS_SM_00401]	State Management shall control Applications depending on dynamic communication paths .
[RS_SM_00402]	Coordination of System Sleep States
[RS_SM_00600]	State Management shall be implemented at least according to the highest safety integrity level from any process that is managed by State Management.
[RS_SM_00601]	State Management shall coordinate recovery actions.

Table A.1: Changed Requirements in R26-11

A.1.3 Deleted Requirements in R26-11

none

A.2 Traceable item history of this document according to AUTOSAR Release R25-11

A.2.1 Added Requirements in R25-11

Number	Heading
[RS_SM_00402]	Coordination of System Sleep States

Table A.2: Added Requirements in R25-11

A.2.2 Changed Requirements in R25-11

Number	Heading
[RS_SM_00001]	State Management shall coordinate and control multiple sets of Applications.
[RS_SM_00004]	State Management shall provide standardized interfaces.
[RS_SM_00005]	State Management internal states.
[RS_SM_00200]	State Management shall provide an interface between State Management instances.
[RS_SM_00300]	State Management shall support variant handling based on calibration data.
[RS_SM_00400]	State Management shall establish communication paths dynamically.
[RS_SM_00401]	State Management shall control Applications depending on dynamic communication paths .
[RS_SM_00600]	State Management shall be implemented at least according to the highest safety integrity level from any process that is managed by State Management.
[RS_SM_00601]	State Management shall coordinate recovery actions.

Table A.3: Changed Requirements in R25-11

A.2.3 Deleted Requirements in R25-11

none

A.3 Traceable item history of this document according to AUTOSAR Release R24-11

A.3.1 Added Requirements in R24-11

none

A.3.2 Changed Requirements in R24-11

Number	Heading
[RS_SM_00001]	State Management shall coordinate and control multiple sets of Applications.
[RS_SM_00004]	State Management shall provide standardized interfaces.
[RS_SM_00200]	State Management shall provide an interface between State Management instances.
[RS_SM_00400]	State Management shall establish communication paths dynamically.
[RS_SM_00401]	State Management shall control Applications depending on dynamic communication paths .
[RS_SM_00600]	State Management shall be implemented at least according to the highest safety integrity level from any process that is managed by State Management.
[RS_SM_00601]	State Management shall coordinate recovery actions.

Table A.4: Changed Requirements in R24-11

A.3.3 Deleted Requirements in R24-11

Number	Heading
[RS_SM_00100]	`State Management` shall support ECU reset

Table A.5: Deleted Requirements in R24-11

A.4 Traceable item history of this document according to AUTOSAR Release R23-11

A.4.1 Added Requirements in R23-11

none

A.4.2 Changed Requirements in R23-11

none

A.4.3 Deleted Requirements in R23-11

none

A.4.4 Added Constraints in R23-11

none

A.4.5 Changed Constraints in R23-11

none

A.4.6 Deleted Constraints in R23-11

none

A.5 Traceable item history of this document according to AUTOSAR Release R22-11

A.5.1 Added Requirements in R22-11

Number	Heading
[RS_SM_00600]	State Management shall be implemented at least according to the highest safety integrity level from any process that is managed by State Management.
[RS_SM_00601]	State Management shall coordinate recovery actions.

Table A.6: Added Requirements in R22-11

A.5.2 Changed Requirements in R22-11

Number	Heading
[RS_SM_00400]	`State Management` shall establish communication paths dynamically.
[RS_SM_00401]	`State Management` shall control `Adaptive Applications` depending on dynamic communication paths .

Table A.7: Changed Requirements in R22-11

A.5.3 Deleted Requirements in R22-11

Number	Heading
[RS_SM_00101]	`State Management` shall support diagnostic reset cause

Table A.8: Deleted Requirements in R22-11

A.5.4 Added Constraints in R22-11

none

A.5.5 Changed Constraints in R22-11

none

A.5.6 Deleted Constraints in R22-11

none

A.6 Traceable item history of this document according to AUTOSAR Release R21-11

A.6.1 Added Requirements "in R21-11"

Number	Heading
[RS_SM_00001]	`State Management` shall coordinate and control multiple sets of `Adaptive Applications`.
[RS_SM_00004]	`State Management` shall provide standardized interfaces.
[RS_SM_00005]	`State Management` internal states.
[RS_SM_00100]	`State Management` shall support ECU reset
[RS_SM_00101]	`State Management` shall support diagnostic reset cause
[RS_SM_00200]	`State Management` shall provide an interface between `State Management` instances.
[RS_SM_00300]	`State Management` shall support variant handling based on calibration data.
[RS_SM_00400]	`State Management` shall establish communication paths dynamically.
[RS_SM_00401]	`State Management` shall control `Adaptive Applications` depending on dynamic communication paths .

Table A.9: Added Requirements "in R21-11"

A.6.2 Changed Requirements "in R21-11"

none

A.6.3 Deleted Requirements "in R21-11"

none

A.6.4 Added Constraints "in R21-11"

none

A.6.5 Changed Constraints "in R21-11"

none

A.6.6 Deleted Constraints "in R21-11"

none

A.7 Traceable item history of this document according to AUTOSAR Release R20-11

A.7.1 Added Requirements in R20-11

Number	Heading
[RS_SM_00001]	State Management shall coordinate and control multiple sets of Adaptive Applications.
[RS_SM_00004]	State Management shall provide standardized interfaces.
[RS_SM_00005]	State Management internal states.
[RS_SM_00100]	State Management shall support ECU reset
[RS_SM_00101]	State Management shall support diagnostic reset cause
[RS_SM_00200]	State Management shall provide an interface between State Management instances.
[RS_SM_00300]	State Management shall support variant handling based on calibration data.
[RS_SM_00400]	State Management shall establish communication paths dynamically.
[RS_SM_00401]	State Management shall control Adaptive Applications depending on dynamic communication paths .

Table A.10: Added Requirements in R20-11

A.7.2 Changed Requirements in R20-11

none

A.7.3 Deleted Requirements in R20-11

none

A.7.4 Added Constraints in R20-11

none

A.7.5 Changed Constraints in R20-11

none

A.7.6 Deleted Constraints in R20-11

none

A.8 Traceable item history of this document according to AUTOSAR Release R19-11

A.8.1 Added Requirements in 19-11

none

A.8.2 Changed Requirements in 19-11

Number	Heading
[RS_SM_00004]	`State Management` shall provide standardized interfaces.
[RS_SM_00300]	`State Management` shall support variant handling based on calibration data.
[RS_SM_00400]	`State Management` shall establish communication paths dynamically.

Table A.11: Changed Requirements in 19-11

A.8.3 Deleted Requirements in 19-11

Number	Heading
[RS_SM_00500]	`State Management` shall support efficient resource usage.

Table A.12: Deleted Requirements in 19-11

A.8.4 Added Constraints in 19-11

none

A.8.5 Changed Constraints in 19-11

none

A.8.6 Deleted Constraints in 19-11

none

A.9 Traceable item history of this document according to AUTOSAR Release R19-03

A.9.1 Added Requirements in 19-03

Number	Heading
[RS_SM_00004]	`State Management` shall provide standardized interfaces.
[RS_SM_00005]	`State Management` internal states.
[RS_SM_00401]	`State Management` shall control `Adaptive Applications` depending on dynamic communication paths .

Table A.13: Added Requirements in 19-03

A.9.2 Changed Requirements in 19-03

Number	Heading
[RS_SM_00001]	`State Management` shall coordinate and control multiple sets of `Adaptive Applications`.
[RS_SM_00200]	`State Management` shall provide an interface between `State Management` instances.
[RS_SM_00400]	`State Management` shall establish communication paths dynamically.

Table A.14: Changed Requirements in 19-03

A.9.3 Deleted Requirements in 19-03

Number	Heading
[RS_SM_00002]	`State Management` shall support `Component State` change requests.
[RS_SM_00201]	`State Management` shall provide the interface over `ara::com`.

Table A.15: Deleted Requirements in 19-03

A.9.4 Added Constraints in 19-03

none

A.9.5 Changed Constraints in 19-03

none

A.9.6 Deleted Constraints in 19-03

none