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2023-11-23	R23-11	AUTOSAR Release Management	• Migration of document from standard RS Update And Configuration Management

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1 Scope of Document

This document specifies the requirements of the AUTOSAR Adaptive Platform on the Vehicle Update and Configuration Management (V-UCM). The motivation of V-UCM is to provide a standardized way to coordinate within a vehicle the installation, update and removal of software safely and securely.

2 Conventions to be used

2.1 Document Conventions

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].

2.2 Requirements Guidelines

No content.

2.2.1 Requirements quality

No content.

2.2.2 Requirements identification

No content.

2.2.3 Requirements status

No content.

3 Acronyms and abbreviations

The glossary below includes acronyms and abbreviations relevant to the V-UCM module that are not included in the AUTOSAR TR Glossary.

Abbreviation / Acronym:	Description:
UCM	Update and Configuration Management
V-UCM	V-UCM is distributing packages and coordinating an update campaign in a vehicle
Backend	Backend is a server hosting Software Packages

Table 3.1: Acronyms and abbreviations used in the scope of this Document

Below acronyms and abbreviations relevant for this document are included in the AUTOSAR TR Glossary. This is to avoid duplicate definition of the technical term. And to refer to the correct document.

Term	Description:
Adaptive Application	see AUTOSAR TR Glossary
AUTOSAR Adaptive Platform	see AUTOSAR TR Glossary
Functional Cluster	see AUTOSAR TR Glossary
Service	see AUTOSAR TR Glossary
Electronic Control Unit	see AUTOSAR TR Glossary
Machine	see AUTOSAR TR Glossary
Manifest	see AUTOSAR TR Glossary
Software Package	see AUTOSAR TR Glossary
Software Cluster	see AUTOSAR TR Glossary
Vehicle Package	see AUTOSAR TR Glossary
Vehicle State Manager	see [2] AUTOSAR Glossary

Table 3.2: Reference to Technical Terms

4 Requirements Specification

This chapter describes all requirements driving the work to define the AUTOSAR_AP_RS_VehicleUpdateAndConfigurationManagement.

4.1 Functional Overview

One of the declared goals of the AUTOSAR Adaptive Platform is the ability to flexibly update the software and its configuration through local ("tester-based") or remote ("over-the-air") updates. V-UCM provides services for updating the software and its configuration in a vehicle. V-UCM is coordinating an update campaign within the vehicle. Therefore this document includes requirements on the following functionalities:

- Interact with Backend to:
  - Identify Software Clusters that could be updated, installed or removed
  - Authenticate Vehicle Package
  - Confirm dependencies between Software Clusters within vehicle before starting campaign
  - Inform Backend of needed Software Packages, receives them and dispatch them to targeted ECUs
- Interact with Vehicle State Manager:
  - Inform which safety conditions that have to be applied according to Vehicle Package
  - Share the computed vehicle state to other Applications or Functional Clusters involved in the update campaign
- Interact with Human Driver about update campaign:
  - Provides campaign state to trigger interaction with Human during update campaign
  - Get vehicle modification approval or consent from Human when configured in Vehicle Package
- Provide information of installed software in vehicle
- Provide information of update campaigns history
- Recovery in case of failure

4.2 Functional Requirements

4.2.1 Functional Cluster initialization

[RS_VUCM_00046] V-UCM Initialization ⌈

Description:	V-UCM shall be initialized before starting to provide any services.
Rationale:	Calling APIs from uninitialized Functional Clusters that depend on prior initialization cannot be performed properly and may lead to undefined behavior. Therefore the API is only offered after internal initialization is completed.
Dependencies:	–
Use Case:	Startup of functional cluster
Supporting Material:	–

⌋

4.2.2 V-UCM

[RS_VUCM_00038] V-UCM Driver Interaction ⌈

Description:	V-UCM shall notify the driver about the intended actions of the campaign and act according to the driver's feedback.
Rationale:	In order to make sure a vehicle update is performed in a state where the vehicle can safely perform the update if required, driver interaction, acknowledgment and action are needed.
Dependencies:	–
Use Case:	Update of safety critical application in a vehicle
Supporting Material:	–

⌋

[RS_VUCM_00036] V-UCM Interaction with UCMs ⌈

Description:	V-UCM shall interact with all UCMs in the vehicle using platform communication services.
Rationale:	In order for V-UCM to distribute received Software Packages, it needs to discover the other UCMs that could perform any modifications within the vehicle.
Dependencies:	–
Use Case:	Complete vehicle Electronic Control Units update
Supporting Material:	–

⌋

4.2.3 Update coordination and safety

[RS_VUCM_00043] V-UCM Software Update Campaign Orchestration ⌈

Description:	The V-UCM shall orchestrate an update campaign according to the Vehicle Package manifest. Additional Information: • Vehicle package manifest: received as an input from the Backend. • Orchestrate an update campaign: coordinate the sequence and conditions of the update campaign.
Rationale:	–
Dependencies:	–
Use Case:	Vehicle update
Supporting Material:	–

⌋

[RS_VUCM_00035] V-UCM Cross-ECU Updates

Upstream requirements: RS_SAF_10027

⌈

Description:	V-UCM shall coordinate the distribution and processing of Software Packages in several ECUs.
Rationale:	There could be dependencies between Machines or ECUs that shall be resolved by a central entity in the vehicle and that require specific processing or activation ordering
Dependencies:	–
Use Case:	Complete vehicle Electronic Control Units update
Supporting Material:	–

⌋

[RS_VUCM_00037] V-UCM Safe Software Modification

Upstream requirements: RS_SAF_10038

⌈

Description:	V-UCM shall ensure that it is only modifying safety-relevant Software Packages when the vehicle is in a safe state. Additional Information: • Modify Software Packages: updating, removing or installing.
Rationale:	Performing an update of autonomous driving features will require for instance to have vehicle standing still, closed doors, etc. but a simple service might not have to consider vehicle safety.
Dependencies:	–

▽

△

Use Case:	–
Supporting Material:	–

⌋

4.2.4 Versions reporting

[RS_VUCM_00033] V-UCM Version Information ⌈

Description:	The V-UCM shall provide functionality to retrieve version information describing the software installed in a complete vehicle.
Rationale:	AUTOSAR Adaptive Platform shall support keeping software up-to-date through vehicle's lifecycle.
Dependencies:	–
Use Case:	Retrieve version information of the installed software to determine which software needs to be installed, updated or removed.
Supporting Material:	–

⌋

4.2.5 History, progress and status

[RS_VUCM_00034] V-UCM Action History ⌈

Description:	V-UCM shall record action history of campaigns and aggregate all UCMs' histories.
Rationale:	Keeping history can be needed for Legal reasons or to help troubleshoot failing updates.
Dependencies:	–
Use Case:	–
Supporting Material:	–

⌋

[RS_VUCM_00042] V-UCM Update Status Reporting ⌈

Description:	When V-UCM is performing an update campaign, then V-UCM shall report the update campaign status to the Backend. Additional Information: • Performing an update campaign: includes OTA update.

▽

△

Rationale:	If a vehicle update is failing, it is important to know which UCM and at what state any failure occurred.
Dependencies:	–
Use Case:	Vehicle update
Supporting Material:	–

⌋

4.2.6 Validation

[RS_VUCM_00039] V-UCM Vehicle Packages Validation ⌈

Description:	V-UCM shall prevent processing of compromised Vehicle Packages by verifying integrity and authenticity using strong and state of the art cryptographic techniques.
Rationale:	A Vehicle Package may be subject to attacks during an OTA transmission. Authentication and consistency check of Vehicle Package prevents any changes to the Adaptive Platform from a malicious package.
Dependencies:	–
Use Case:	–
Supporting Material:	–

⌋

4.2.7 Standardization of Log and Trace Messages

[RS_VUCM_00047] V-UCM Trace Points ⌈

Description:	V-UCM shall support standardized trace points during the update campaign process.
Rationale:	Providing standardized trace points during update campaign provides information of the ongoing events during different phases of campaign like vehicle package transfer, software package transfer, package processing and campaign result.
Dependencies:	ara::log
Use Case:	–
Supporting Material:	–

⌋

4.3 Non-Functional Requirements

No content.

5 References

[1] Standardization Template
AUTOSAR_FO_TPS_StandardizationTemplate

[2] Glossary
AUTOSAR_FO_TR_Glossary

A Appendix

No content.

B 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.

B.1 Traceable item history of this document according to AUTOSAR Release R23-11

B.1.1 Added Requirements in R23-11

Number	Heading
[RS_VUCM_00033]	V-UCM shall support reporting version information of a complete vehicle
[RS_VUCM_00034]	V-UCM shall record all V-UCM's action history
[RS_VUCM_00035]	V-UCM shall coordinate software update in a vehicle across multiple Electronic Control Units
[RS_VUCM_00036]	V-UCM shall use platform communication services for interacting with UCMs
[RS_VUCM_00037]	V-UCM shall ensure it is safe to perform any modification to the vehicle
[RS_VUCM_00038]	V-UCM shall interact with driver
[RS_VUCM_00039]	V-UCM shall prevent processing of compromised Vehicle Packages
[RS_VUCM_00042]	V-UCM shall provide an interface to read the state of an update campaign
[RS_VUCM_00043]	V-UCM shall orchestrate a software update campaign according to the Vehicle Package's Manifest
[RS_VUCM_00046]	V-UCM initialization

Table B.1: Added Requirements in R23-11

B.1.2 Changed Requirements in R23-11

none

B.1.3 Deleted Requirements in R23-11

none

B.2 Traceable item history of this document according to AUTOSAR Release R24-11

B.2.1 Added Requirements in R24-11

Number	Heading
[RS_VUCM_00047]	UCM shall support standardized trace points

Table B.2: Added Requirements in R24-11

B.2.2 Changed Requirements in R24-11

none

B.2.3 Deleted Requirements in R24-11

none

B.3 Traceable item history of this document according to AUTOSAR Release R25-11

B.3.1 Added Requirements in R25-11

none

B.3.2 Changed Requirements in R25-11

none

B.3.3 Deleted Requirements in R25-11

none

B.4 Traceable item history of this document according to AUTOSAR Release R26-11

B.4.1 Added Requirements in R26-11

none

B.4.2 Changed Requirements in R26-11

none

B.4.3 Deleted Requirements in R26-11

none