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1 Scope of Document

This document collects the requirements on the Basic Software Module Description template (BSWMD-T).
The main goal of the BSWMD-T is to provide the scheme for the BSWMD. The BSWMD holds information about an implementation of a BSW module or cluster to support the integration on an ECU. Another use-case is the support of the conformance tests of BSW modules.
Three stages of a BSW module can be distinguished in the methodology:

- 'BSW module specification' is provided as the standard by AUTOSAR.
  The API may be a specified for all use-cases. The configuration parameter may have a wide range of configuration possibilities. Certain crucial configuration parameters may be missing because of hardware dependencies which can not be described in the specification.
- 'BSW module implementation' is one possible implementation of the BSW module specification.
  Only a subset of the specified API may be implemented. Several configuration decisions may have been taken however other configuration parameters are still open for the integrator to choose.
  Vendor-specific configuration parameters may be added in order to allow the configuration of the module's behavior (applicable for all BSW modules), and/or to support the configuration of specific hardware elements, like special register settings (applicable to hardware dependent modules only).
- 'Configured BSW module' takes the still open configuration parameters from a concrete BSW module implementation and assigns values to them. The fully configured BSW module can be actually integrated on an ECU.

Each BSW module implementation does come with an own BSW Module Description. It is important to always use the right pair of BSW module implementation and the according BSWMD.
In Figure 1-1 the inputs to the activity 'Configure ECU' are shown:

- 'Collection of Available Software Components' contains references to all the descriptions of Software Components mapped to this specific ECU
- 'ECU Extract of System Configuration' contains the subset of the System Configuration which is relevant for this specific ECU. This includes the communication matrix and the data to signal mapping.
- 'BSW Module Description' (requirements are collected in this document).

The output is the 'ECU Configuration Description'.

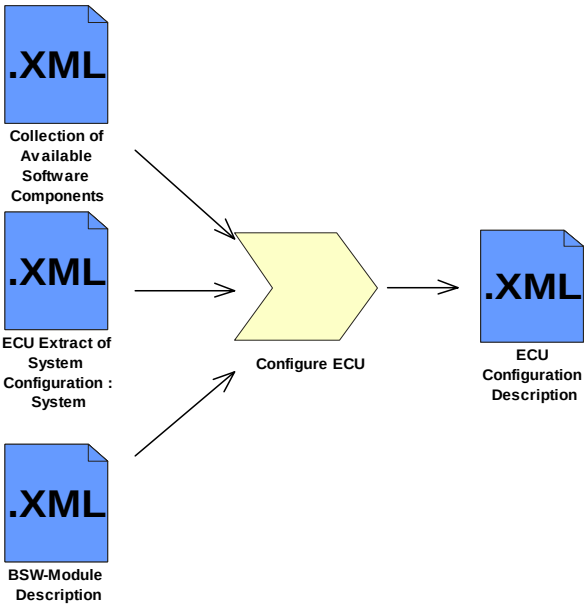

Figure 1-1: Overview ECU Configuration

The BSWMD-template specifies which content the actual Basic Software Module Description (BSWMD) is able to provide. From a technical point of view the template is provided as a document [13] and a XML schema [14] (see also [4] and [5]).
The actual Basic Software Module Descriptions are XML files which conform to the XML schema.

The requirements are structured in the following sections:

- General Requirements: overall goal of the BSWMD and requirements how to develop the BSWMD-T schema
- Published Information: these are the requirements which information needs to be provided on a BSW Module implementation
- Resources: To allow a resource estimation the needed resources have to be described for the BSW Module.

2 Conventions to be used

- In requirements, the following specific semantics shall be used (based on 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:

  - SHALL: This word 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.
  - MUST: This word means that the definition is an absolute requirement of the specification due to legal issues.
  - MUST NOT: This phrase means that the definition is an absolute prohibition of the specification due to legal constraints.
  - 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.)

3 Related Documentation

3.1 Input Documents

The following input documents have been used in the development of these requirements:

- General Requirements on Basic Software Modules [2]
- AUTOSAR RTE Software Requirement Specification [3]
- AUTOSAR Methodology [7]
- AUTOSAR Glossary [1]
- Technical Overview [8]
- AUTOSAR Template UML Profile and Modeling Guide [4]
- AUTOSAR Model Persistence Rules for XML [5]

3.2 Specification Documents

The requirements collected in this document will be satisfied by two specification documents:

- Specification of the BSW Module Description Template
  This document implements most of the requirements stated here.
- ECU Configuration Specification [10]
  This document provides specification and guidelines for the creation of ECU Configuration Parameter Definitions.

3.3 Abbreviations

Abbreviation	***Meaning***
BSW	Basic Software
BSWMD	Basic Software Module Description
BSWMD-T	Basic Software Module Description Template
ECUC	ECU Configuration Values
ECUC Parameter Definition	ECU Configuration Parameter Definition
ECUC-T	ECU Configuration Template
ICS	Implementation Conformance Statement
SWC	Software Component Description
SWC-T	Software Component Template

4 Requirements on BSW Module Description Template

4.1 Functional Requirements

4.1.1 Published Information

4.1.1.1 [BSWMD0043] Support description of common published information

Initiator:	TemplateTeam
Date:	23.01.2007
Short Description:	Support description of common published information
Type:	New
Importance:	High
Description:	The BSWMD template SHALL provide means to describe the common published information provided by BSW module implementations according to the respective BSW SWS.
Rationale:	Configuration tools SHALL be able to read the common published information of a BSW implementation, as ECU Configuration Parameters may depend on common published information.
Use Case:	Providing common published information like: Module VERSION, REVISION number or AUTOSAR specification number.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	None identified.

4.1.1.2 [BSWMD0024] Support description of module specific published information

Initiator:	WP4.1.1.2
Date:	23.03.2005
Short Description:	Support description of module specific published information
Type:	New
Importance:	High
Description:	The BSWMD template SHALL provide means to describe the module specific published information provided by BSW module implementations according to the respective BSW SWS.
Rationale:	Configuration tools SHALL be able to read the published information of a BSW implementation as ECU Configuration Parameters may depend on published information.
Use Case:	Make the value of MEMIF_BROADCAST_ID available to other modules (e.g. to NvM). Make the values of hardware dependent information like: EEPROM-ERASE-TIME or the width of API parameters like EEP-IF-ADDRESSTYPE (uint8, 16, 32) available to other modules (e.g. to MemIf).
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	None identified.

4.1.1.3 [BSWMD0039] Identification of implemented API and functions

Initiator:	WP4.2.2.3
Date:	04.12.2006

Short Description:	Identification of implemented API and functions
Type:	New
Importance:	High
Description:	Describes which API and functions are actually implemented by the BSW module/cluster.
Rationale:	The specifications of the BSW modules allow implementing only a subset of the specified APIs and functions. Which subset is actually implemented SHALL be described.
Use Case:	Conformance of a module (cluster) can only be attested for the functionality that a module/cluster actually provides.
Dependencies:	[BSWMD0040] [BSWMD0041]
Conflicts:	None identified.
Supporting Material:	None identified.

4.1.1.4 [BSWMD0040] Identification of required API and functions

Initiator:	WP4.2.2.3
Date:	04.12.2006
Short Description:	Identification of required API and functions
Type:	New
Importance:	High
Description:	Describes which API and functions of other modules this implementation requires.
Rationale:	The required API and functions are described on module level. For the call-chain dependencies refer to [BSWMD0047].
Use Case:	Check whether the provided API and functions of other modules match the requirements of the BSW module implementation.
Dependencies:	[BSWMD0039] [BSWMD0041] [BSWMD0047]
Conflicts:	None identified.
Supporting Material:	None identified.

4.1.1.5 [BSWMD0041] Declaration of the provided API argument data types

Initiator:	WP4.2.2.3
Date:	04.12.2006
Short Description:	Declaration of the provided API argument data types
Type:	New
Importance:	High
Description:	Description of the actual data types used by the implementation for API function arguments and ECU Configuration Parameters which have been left open in the specification documents.
Rationale:	The specifications of the BSW modules in some cases do not fix the data type to be used for the implementation. To allow the integration these actual data types need to be described.
Use Case:	If the BSW SWS does specify an API argument to be either UInt8 or UInt16 the BSWMD template SHALL provide means to describe which type has been used in the actual implementation.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	None identified.

4.1.1.6 [BSWMD0042] Description of the required API argument data types

Initiator:	WP4.2.2.3
Date:	04.12.2006
Short Description:	Description of the required API argument data types
Type:	New
Importance:	High
Description:	Description of the actual data types required by the implementation for API function arguments which have been left open in the specification documents.
Rationale:	The specifications of the BSW modules in some cases do not fix the data type to be used for the implementation. To allow the integration these actual data types need to be described.
Use Case:	If the BSW SWS does specify an API argument to be either UInt8 or UInt16 the BSWMD template SHALL provide means to describe which type is expected in the actual implementation.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	None identified.

4.1.1.7 [BSWMD0011] Guaranteed execution context of API calls

Initiator:	WP4.1.1.2
Date:	18.03.2005
Short Description:	Guaranteed execution context of API calls
Type:	New
Importance:	High
Description:	For API calls to other modules it SHALL be possible to describe whether the call will be executed in interrupt context by the caller.
Rationale:	If both, the caller and the callee specify the context of the call it is possible to detect invalid call chains during ECU configuration activity. If a call is happening in interrupt context it has some restrictions on execution time and available instructions. The RTE Generator needs to know the context of calls from the BSW services to be able to decouple interrupt context from the application SW-Components.
Use Case:	The Com module expects the notifications from PduR happening in task context, but the PduR just handles the interrupt context which is coming from the CanIf. This is an invalid configuration and shall be detected.
Dependencies:	[BSWMD0038] [BSWMD0040] [BSW00326]
Conflicts:	None identified.
Supporting Material:	None identified.

4.1.1.8 [BSWMD0038] Required execution context of API calls

Initiator:	WP4.1.1.2
Date:	11.10.2006
Short Description:	Required execution context of API calls
Type:	New
Importance:	High
Description:	A BSWMD template SHALL provide means to define the context for each provided API function in which it shall be invoked.
Rationale:	If both, the caller and the callee specify the context of the call it is possible to detect invalid call chains during ECU configuration activity.

Use Case:	The Com module expects the notifications from PduR happening in task context, but the PduR just handles the interrupt context which is coming from the CanIf. This is an invalid configuration and shall be detected.
Dependencies:	[BSWMD0011] [BSWMD0039] [BSW00326]
Conflicts:	None identified.
Supporting Material:	None identified.

4.1.1.9 [BSWMD0010] Compiler version and settings

Initiator:	WP4.1.1.2
Date:	18.04.2005
Short Description:	Compiler version and settings
Type:	New
Importance:	High
Description:	It SHALL be possible to describe the actual compiler (vendor, version), and its settings, which has been used for object code delivery or which needs to be used for source code delivery.
Rationale:	When BSW is delivered as object code the integrator needs to know how the object code has been compiled. If it is delivered as source code, the code is often provided for specific compilers and versions.
Use Case:	Object code compiled with different compilers may have issues in the stack structure. Therefore the used compiler has to be described in order to detect such inconsistencies.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	None identified.

4.1.1.10 [BSWMD0037] Needed libraries

Initiator:	WP4.1.1.2
Date:	11.10.2006
Short Description:	Needed libraries
Type:	New
Importance:	High
Description:	It SHALL be possible to describe which libraries (vendor and version) have been used for object code deliveries or which need to be included for source code deliveries.
Rationale:	When a BSW module is delivered as object code the integrator needs to know how the object code has to be integrated. If it is delivered as source code, the code may need a specific version of expected libraries only.
Use Case:	If several BSW modules use the same library it only needs to be present on the ECU once. Describe the used libraries and version in order to be able to detect whether the libraries used by several BSW module implementations are not compatible.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	None identified.

4.1.1.11 [BSWMD0034] ECU Configuration Editor and Generation supported tool version information

Initiator:	TemplateTeam
Date:	19.09.2006
Short Description:	ECU Configuration Editor and Generation supported tool version information
Type:	New
Importance:	Medium
Description:	It SHALL be possible to describe the supported ECU Configuration editor and generator tool (vendor, version) and its settings.
Rationale:	When a BSW module is delivered the integrator needs to know which editing and generation tools can be used to configure the BSW.
Use Case:	Since the BSW module implementation may need some vendor specific ECU Configuration Parameters it SHALL be possible to state which generator can cope with these extensions.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	This requirement does not exclude tools not explicitly listed from working with the specific XML file.

4.1.1.12 [BSWMD0013] Describe configuration class of ECU Configuration Parameters

Initiator:	WP4.1.1.2
Date:	21.04.2005
Short Description:	Describe configuration class of ECU Configuration Parameters
Type:	New
Importance:	High
Description:	When the actual implementation of a BSW module has the freedom to choose the configuration class (pre-compile, link-time, post-build) it SHALL be possible to describe which alternative has been chosen.
Rationale:	An ECU Configuration Parameter needs to be handled differently depending on its configuration class.
Use Case:	The ECU Configuration editor SHALL be able to only allow changes on the post-build time ECU Configuration Parameters.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	None identified.

4.1.1.13 [BSWMD0025] Support for shipment information

Initiator:	WP4.1.1.2
Date:	26.07.2005
Short Description:	Support for shipment information
Type:	new
Importance:	medium
Description:	The BSWMD template SHALL support the description which files (source, object, documentation) are included in the delivery of the BSW module.
Rationale:	Describe which artifacts are shipped in the delivery of the BSW module.
Use Case:	Check for completeness of the delivered artifacts.
Dependencies:	[BSWMD0044]
Conflicts:	None identified.
Supporting Material:	None identified.

4.1.1.14 [BSWMD0014] Support of BSW Module clusters

Initiator:	WP4.1.1.2
Date:	30.05.2007
Short Description:	Support of BSW Module clusters
Type:	New
Importance:	High
Description:	Support the description of BSW module clusters (ICC2/ICC1 [11]) which implement several BSW modules.
Rationale:	AUTOSAR allows integrating several BSW modules (or even the whole BSW including the AUTOSAR Services) in a single cluster, treating this BSW cluster as one entity. It must be known how the cluster interacts with other modules / clusters in order to integrate it. Tests for clusters must know what parts (operation signatures and configurable functionality) are actually supported by the object under test.
Use Case:	Delivery of complete COM stack in a single implementation. Delivery of the whole AUTOSAR BSW in a single implementation.
Dependencies:	Definition of ICC2 / ICC1 in [11].
Conflicts:	None identified.
Supporting Material:	None identified.

4.1.1.15 [BSWMD0033] Pre-configured ECU Configuration Values

Initiator:	WP4.1.1.2
Date:	07.02.2006
Short Description:	Pre-configured ECU Configuration Values
Type:	New
Importance:	High
Description:	The BSWMD template SHALL allow defining a (partial) ECU Configuration Values that may hold values for those ECU Configuration Parameters that are fixed by the implementation.
Rationale:	This pre-configured ECU Configuration Values must be copied into the ECU Configuration Values of the actual BSW module as part of the base module configuration, once the module implementation has been chosen. It contains values which cannot be altered by the BSW module integrator, since they are fixed by the implementation.
Use Case:	A value may be fixed for different reasons. E.g. all pre-compile parameters are fixed in object code deliveries.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	None identified.

4.1.1.16 [BSWMD0032] Recommended ECU Configuration Values

Initiator:	WP4.1.1.2
Date:	07.02.2006
Short Description:	Recommended ECU Configuration Values
Type:	New
Importance:	Low
Description:	The BSWMD template SHALL allow to describe a (partial) ECU

	Configuration Values that may hold recommended values for ECU Configuration Parameters.
Rationale:	This Recommended ECU Configuration Values may hold the ECU Configuration Values recommended by the implementer and may be copied into the ECU Configuration Values of the BSW module as base, once the BSW module implementation has been chosen. The Recommended ECU Configuration Values is more flexible than default values, since it allows to define several container instances with different ECU Configuration Parameter values in each container.
Use Case:	Allow BSW vendors to deliver a partial or complete ECU configuration of the BSW module together with the implementation. This eases the work of the integrator who only needs to fill in the missing ECU Configuration Parameter values.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	None identified.

4.1.1.17 [BSWMD0035] Provide standardized ECU Configuration Parameter Definition

Initiator:	TemplateTeam
Date:	19.09.2006
Short Description:	Provide standardized ECU Configuration Parameter Definition
Type:	new
Importance:	high
Description:	The BSWMD template SHALL allow the specification of the definition for the module's standardized ECU Configuration Parameters. The parameters SHALL be defined in the format used for the ECU Configuration Parameter Definition.
Rationale:	The standardized ECU Configuration Parameters are the base for the configuration of the BSW modules. Each BSW module need to provide information which standardized ECU Configuration Parameter Definition SHALL be used for configuration.
Use Case:	Provide information which standardized ECU Configuration Parameter Definition is used with a certain BSW module implementation.
Dependencies:	[BSWMD0048]
Conflicts:	None identified.
Supporting Material:	None identified.

4.1.1.18 [BSWMD0050] Allow vendor-specific modification of standardized ECU Configuration Parameter Definition

Initiator:	WPII-1.2
Date:	29.10.2007
Short Description:	Allow vendor-specific modification of standardized ECU Configuration Parameter Definition
Type:	New
Importance:	High
Description:	The BSWMD template SHALL allow the specification of modifications to the standardized ECU Configuration Parameter Definition in order to support implementation specific adaptations.
Rationale:	The ECU Configuration Parameter Definition does specify the superset of possible values per configuration parameter. A certain implementation may restrict the actual available value ranges.

Use Case:	The BlockId of the NvRam manager may either be 8 or 16 bit. The standardized parameter has a min value of 1 and a max value of 65535. An implementation may choose to support only the 8 bit values, so the max value has to be adopted to be 255.
Dependencies:	[BSWMD0035]
Conflicts:	None identified.
Supporting Material:	None identified.

4.1.1.19 [BSWMD0027] Provide vendor-specific ECU Configuration Parameter Definition

Initiator:	WP4.1.1.2
Date:	26.07.2005
Short Description:	Provide vendor-specific ECU Configuration Parameter Definition
Type:	New
Importance:	High
Description:	The BSWMD template SHALL allow the definition of the module's vendor-specific ECU Configuration Parameters.
Rationale:	Additional configuration parameters are necessary because the standardized ECU Configuration Parameter Definition does not contain all relevant configuration parameters for certain modules due to the fact that the configuration parameters are hardware dependent the specific implementation does require additional configuration. The "vendor-specific ECU Configuration Parameter Definition" specifies which configuration parameters and ranges are actually supported by a concrete implementation of the BSW module (this is required for the ICS).
Use Case:	Vendor-specific configuration parameters may be added in order to allow the configuration of the module's behavior (applicable for all BSW modules), and/or to support the configuration of specific hardware elements, like special register settings (applicable to hardware dependent modules only).
Dependencies:	For the definition of vendor-specific parameters the ECU Configuration Parameter Definition template SHALL be used. [BSWMD0048]
Conflicts:	None identified.
Supporting Material:	None identified.

4.1.1.20 [BSWMD0007] Provide vendor-specific published information

Initiator:	WP4.1.1.2
Date:	04.04.2005
Short Description:	Provide vendor-specific published information
Type:	New
Importance:	Low
Description:	BSWMD template SHALL support the definition of vendor-specific published information.
Rationale:	Vendors may want to publish proprietary information for usage in their tool chain.
Use Case:	Describe vendor-specific published information on the actual implementation of the module based on the implemented target. Avoid proprietary means to provide such extensions by specifying a standardized way of description.
Dependencies:	[BSWMD0048]
Conflicts:	This is diluting the standard; however there is a need for such extensions.
Supporting Material:	ECUC0002 [9]

4.1.1.21 [BSWMD0048] Tagging of vendor-specific ECU Configuration Parameter Definition

Initiator:	WPII-2.2
Date:	30.05.2007
Short Description:	Tagging of vendor-specific ECU Configuration Parameter Definition
Type:	New
Importance:	High
Description:	It SHALL be possible to distinguish between standardized and vendor-specific ECU Configuration Parameter Definitions.
Rationale:	Since it is possible for vendors to add vendor specific ECU Configuration Parameters to the ECU Configuration Parameter Definition those additions need to be distinguished from the standardized ECU Configuration Parameters.
Use Case:	In order to check the ECU Configuration Parameter Definition for conformance it needs to be described which ECU Configuration Parameters are standardized and which are vendor-specific.
Dependencies:	[BSWMD0035] [BSWMD0027] [BSWMD0007]
Conflicts:	None identified.
Supporting Material:	None identified.

4.1.1.22 [BSWMD0047] Modeling of call-chain dependencies between BSW Modules

Initiator:	TemplateTeam
Date:	23.01.2007
Short Description:	Modeling of call-chain dependencies between BSW Modules
Type:	New
Importance:	Medium
Description:	It SHALL be possible to describe which other API functions are invoked by a function.
Rationale:	Needed for the development and ECU Configuration activity of BSW modules. Needed when the OS is configured since OS resources must be mapped to the tasks that utilize them.
Use Case:	Derive which OS resources are used when a main function is invoked and this main function is invoking another API function, and so on.
Dependencies:	[BSWMD0019] [BSWMD0046]
Conflicts:	None identified.
Supporting Material:	None identified.

4.1.2 Resources

4.1.2.1 [BSWMD0005] Description of the memory needs of the BSW Module implementation

Initiator:	WP4.1.1.2
Date:	23.03.2005
Short Description:	Description of the memory needs of the BSW Module implementation
Type:	New

Importance:	Low
Description:	The BSWMD template SHALL support the description of the memory needs of an implementation of a BSW module. Also specification of the quality (e.g. estimate, measurement, analysis) of these values SHALL be supported. The memory requirements of the defined memory sections SHALL be described individually.
Rationale:	Resource estimations/measurements are needed to design & configure the ECU.
Use Case:	The ROM utilization of BSW modules delivered as object code is typically fixed and can be stated in the BSWMD. In most cases the memory needs are dependent on the actual ECU Configuration Parameter Values and can only be estimated.
Dependencies:	[BSWMD0031]
Conflicts:	None identified.
Supporting Material:	None identified.

4.1.2.2 [BSWMD0031] Description of used memory section names

Initiator:	WP4.1.1.2
Date:	25.02.2005
Short Description:	Description of used memory section names
Type:	new
Importance:	high
Description:	Support the description of memory section names which have been used while developing/compiling the BSW module.
Rationale:	With the usage of memory section names it is possible to partition the software into several sections which will be placed into memory sections on the ECU in the ECU Configuration activity.
Use Case:	The ECU State Manager implementation uses the memory section NOINIT to indicate which declared variables SHALL not be initialized during ECU startup. It is up to the ECU Configuration activity to actually map this section in an appropriate memory section on the ECU which satisfies this requirement.
Dependencies:	ECUC0068 [9], [BSWMD0005]
Conflicts:	None identified.
Supporting Material:	Specification of Memory Mapping [6]

4.1.2.3 [BSWMD0009] Description of peripheral register usage

Initiator:	WP4.1.1.2
Date:	04.04.2005
Short Description:	Description of peripheral register usage
Type:	new
Importance:	medium
Description:	The BSWMD template SHALL support ECU Configuration tools in determining conflicts between different BSW modules accessing the same peripheral register. In some cases these needs are dependent on the actual ECU Configuration Parameter Values (no formula SHOULD be provided in that case!).
Rationale:	BSW module implementations from different vendors may use conflicting configuration of peripheral registers. When these BSW modules are integrated in the same ECU then the ECU Configuration tool SHOULD detect these conflicts and alert the user.
Use Case:	Two BSW module implementations both writing to the same microcontroller

	register but using a different setting. Conflict must be identified.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	None identified.

4.1.2.4 [BSWMD0016] Timing guarantees

Initiator:	WP4.1.1.2
Date:	23.03.2005
Short Description:	Timing guarantees
Type:	New
Importance:	Low
Description:	The BSWMD template SHALL allow specifying the guaranteed or estimated reaction time of the BSW module functions (main functions and API calls incl. callbacks & ISR).
Rationale:	To be able to do timing analysis of Application SW-Components, the BSW needs to define timing guarantees.
Use Case:	With the knowledge of the guaranteed execution time the design of exclusive area access can be optimized, depending on the duration an interrupt block might be possible.
Dependencies:	SW-Component template requirement CONTENT080
Conflicts:	None identified.
Supporting Material:	None identified.

4.1.2.5 [BSWMD0030] Publish resource needs for the BSW Scheduler

Initiator:	WP4.1.1.2
Date:	30.05.2007
Short Description:	Publish resource needs for the BSW Scheduler
Type:	New
Importance:	High
Description:	BSWMD template SHALL provide means to describe the resources used by the implementation which need to be provided and integrated by the BSW Scheduler [12].
Rationale:	The BSW Scheduler is used to abstract the usage of concrete OS mechanism from the abstract concepts. The abstract concepts are describe in the BSW Scheduler specification [12]. The BSWMD template SHALL provide means to describe the needs on the BSW Scheduler from the BSW module implementation. But which actual mechanism is used to fulfill these needs is up to the implementation of the BSW Scheduler.
Use Case:	A BSW module is using an exclusive area access in its implementation and need to describe this usage, but it is up to the BSW Scheduler how this exclusive area access is actually implemented (using global interrupt blocking or an OS resource).
Dependencies:	[BSWMD0046] [12]
Conflicts:	None identified.
Supporting Material:	None identified.

4.1.2.6 [BSWMD0046] Publish OS resource usage

Initiator:	TemplateTeam

Date:	23.01.2007
Short Description:	Publish OS resource usage
Type:	new
Importance:	medium
Description:	For every function (main, API, ISR) it SHALL be possible to describe the OS resources used within the function.
Rationale:	To configure the OS correctly the access to OS resources has to be specified for every function. The BSW Scheduler must be able to resolve the task context in which any OS resource may be used.
Use Case:	Configure the OS with the right OS resource accesses.
Dependencies:	[BSWMD0030] [BSWMD0047]
Conflicts:	None identified.
Supporting Material:	None identified.

4.1.2.7 [BSWMD0045] Publish resources needed from AUTOSAR Services

Initiator:	TemplateTeam
Date:	23.01.2007
Short Description:	Publish resources needed from AUTOSAR Services
Type:	new
Importance:	medium
Description:	If a BSW module needs resources from AUTOSAR Services, the needs have to be described.
Rationale:	To allow the ECU Configuration activity of the AUTOSAR Services, the needs from BSW and Application SW Components have to be captured.
Use Case:	When a BSW module requires some NVRAM space it has to provide a description of the attributes this NVRAM has to have.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	None identified.

4.1.2.8 [BSWMD0026] Description of supported hardware

Initiator:	WP4.1.1.2
Date:	26.07.2005
Short Description:	Description of supported hardware
Type:	new
Importance:	medium
Description:	For BSW modules that are hardware dependent (like the drivers) the supported hardware SHALL be described.
Rationale:	Certain software modules can only be integrated on specific hardware.
Use Case:	When the supported hardware is specified a selection of drivers for a certain hardware can be provided.
Dependencies:	The characterization SHOULD be done by referencing the ECU Resource Description.
Conflicts:	None identified.
Supporting Material:	None identified.

4.2 Non-functional Requirements

4.2.1 Requirements on the Template

4.2.1.1 [BSWMD0001] Main source of information on BSW Module ECU Configuration activity and integration

Initiator:	WP4.1.1.2
Date:	23.03.2005
Short Description:	Main source of information on BSW Module ECU Configuration activity and integration
Type:	new
Importance:	medium
Description:	The BSWMD template SHALL provide means to describe - or reference to - the information needed for ECU Configuration activity and integration of a BSW module or cluster of BSW modules. This description formats SHALL be used for the ECU Configuration activity and integration along with the relevant BSW SWS documents.
Rationale:	By selecting the BSWMD of a BSW module's implementation, the necessary information for the ECU Configuration activity and integration of that module SHALL be available. When delivering several BSW modules in a cluster the BSWMD template SHALL support the integration of this cluster. However this description format might not formalize all aspects needed for taking integration decisions (e.g. scheduling).
Use Case:	To be able to exchange BSW modules from different vendors only the specified information can be used during the integration.
Dependencies:	[BSWMD0014]
Conflicts:	None identified.
Supporting Material:	None identified.

4.2.1.2 [BSWMD0008] BSW Module Description SHALL be tool processable

Initiator:	WP4.1.1.2
Date:	30.05.2007
Short Description:	BSW Module Description SHALL be tool processable
Type:	New
Importance:	High
Description:	Work products based on the BSWMD template SHALL be readable and processable by tools.
Rationale:	The ECU Configuration activity of an ECU SHALL be supported by tools with the BSWMD as one input.
Use Case:	ECU Configuration activity will have to have tool support. The ICS SHALL be extractable from the BSWMD.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	BSW159 [2]

4.2.1.3 [BSWMD0028] Development according to the AUTOSAR Metamodeling Guide

Initiator:	WP4.1.1.2
Date:	29.07.2005
Short Description:	Development according to the AUTOSAR Metamodeling Guide

Type:	New
Importance:	High
Description:	The UML representation of the BSWMD template SHALL be developed according to the AUTOSAR Metamodeling Guide.
Rationale:	The experience and tools already available for the AUTOSAR Metamodeling SHALL be reused.
Use Case:	The template for the BSWMD is similar to other templates already done with the AUTOSAR Metamodeling Guide.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	Template UML Profile and Modeling Guide [4]

4.2.1.4 [BSWMD0029] Transformation of BSWMD modeling according to the AUTOSAR Model Persistence Rules for XML

Initiator:	WP4.1.1.2
Date:	26.07.2005
Short Description:	Transformation of BSWMD template modeling according to the AUTOSAR Model Persistence Rules for XML
Type:	New
Importance:	High
Description:	The XML representation for the BSWMD template SHALL be derived from its UML representation according to the AUTOSAR Model Persistence Rules for XML.
Rationale:	The experience and tools already available for the AUTOSAR Modeling SHALL be reused.
Use Case:	The template for the BSWMD is similar to other templates already done with the AUTOSAR Metamodeling Guide.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	Model Persistence Rules for XML [5]

5 References

[1] Glossary,
https://svn2.autosar.org/repos2/22_Releases/
AUTOSAR_Glossary.pdf

[2] General Requirements on Basic Software Modules,
https://svn2.autosar.org/repos2/22_Releases/
AUTOSAR_SRS_General.pdf

[3] Requirements on RTE Software,
https://svn2.autosar.org/repos2/22_Releases/
AUTOSAR_SRS_RTE.pdf

[4] Template UML Profile and Modeling Guide,
https://svn2.autosar.org/repos2/22_Releases/
AUTOSAR_TemplateModelingGuide.pdf

[5] Model Persistence Rules for XML,
https://svn2.autosar.org/repos2/22_Releases/
AUTOSAR_ModelPersistenceRulesXML.pdf

[6] Specification of Memory Mapping,
https://svn2.autosar.org/repos2/22_Releases/
AUTOSAR_SWS_MemoryMapping.pdf

[7] Methodology,
https://svn2.autosar.org/repos2/22_Releases/
AUTOSAR_Methodology.pdf

[8] Technical Overview,
https://svn2.autosar.org/repos2/22_Releases/
AUTOSAR_TechnicalOverview.pdf

[9] Requirements on ECU Configuration,
https://svn2.autosar.org/repos2/22_Releases/
AUTOSAR_RS_ECU_Configuration.pdf

[10] Specification of ECU Configuration,
https://svn2.autosar.org/repos2/22_Releases/
AUTOSAR_ECU_Configuration.pdf

[11] Layered Software Architecture
https://svn2.autosar.org/repos2/22_Releases/
AUTOSAR_LayeredSoftwareArchitecture.pdf

[12] Specification of BSW Scheduler
https://svn2.autosar.org/repos2/22_Releases/
AUTOSAR_SWS_BSW_Scheduler.pdf

[13] Specification of BSW Module Description Template
https://svn2.autosar.org/repos2/22_Releases/
AUTOSAR_BSWMDTemplate.pdf

[14] XML Schema
https://svn2.autosar.org/repos2/22_Releases/
autosar.xsd