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31.01.2007	2.0.0	AUTOSAR Administration	Release as a separate Document. The Specification of System Template V1.0.0 has been split into independent documents for Release 2.1 • Legal disclaimer revised • Release Notes added • “Advice for users” revised • “Revision Information” added

Document Change History			
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09.05.2005	1.0.0	AUTOSAR Administration	Initial release as part of the Specification of System Template V1.0.0

Disclaimer

Advice for users

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1 Scope of Document

This document collects the requirements on the System Template (SYS-T).
The main goal of the System Template is the definition of a relationship between the pure Software View on the System and a Physical System Architecture with networked ECUs.

The System Template covers the following areas:

- System topology: In the system topology the logical layout of the system is described. This means it is documented which ECU is connected to which cluster or channel.
- Communication properties: The central purpose of a communication system is the exchange of frames with certain properties.
- Mapping: The mapping covers the distribution of software components to ECUs as well as the mapping of data elements that are to be exchanged between software components onto signals and frames.

The requirements collected in this document will be satisfied by the System Template specification [5]. This document implements most of the requirements stated here.

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 Requirements

This chapter describes all requirements driving the work of the System Template group. Most of them originate from the Main Requirements document from the PL Team (“MainX” requirements defined in [4]). Also, some of them have strong links to the timing model requirements defined in (“RSTMX” requirements defined in [7]) and to the software component template requirements defined in (“SWCTX” requirements defined in [6]). These links are given in the “supporting material” field.

3.1 Functional Requirements

3.1.1 [SYSCT0001] Mixed Systems (AUTOSAR/NON-AUTOSAR)

Initiator:	WP Methodology&Templates
Date:	30.03.2004
Short Description:	Mixed Systems (AUTOSAR/NON-AUTOSAR)
Type:	new
Importance:	high
Description:	System constraints, which arise through usage of mixed systems, must be treated by System Template.
Rationale:	The transition between non-AUTOSAR systems to full-AUTOSAR systems can only be achieved gradually. Furthermore, interoperability with legacy solutions must be ensured. Thus, it must be possible to have AUTOSAR and non-AUTOSAR ECUs together on the same system (“mixed” systems).
Use Case:	Gradual AUTOSAR introduction into an existing architecture e.g. it shall be possible to handle signals not originating from AUTOSAR software components.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	[**Main190**] AUTOSAR shall provide interoperability with legacy software. [**Main210**] AUTOSAR shall provide means to integrate AUTOSAR ECUs in non-AUTOSAR networks.

3.1.2 [SYSCT0002] Basic Software Resources and RTE Resources

Initiator:	WP Methodology&Templates
Date:	30.03.2004
Short Description:	Basic Software Resources and RTE Resources
Type:	new
Importance:	high
Description:	The System Template has to cover resource requests of the basic SW and the RTE.
Rationale:	Resources of an ECU are, by their own definition, limited (RAM, ROM, CPU time, etc.). Such limitations act as constraints during the mapping process.
Use Case:	Taking into account memory limitations when allocating AUTOSAR services and features on a small ECU.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	

3.1.3 [SYSCT0003] Iterative Development

Initiator:	WP Methodology&Templates
Date:	30.03.2004
Short Description:	Iterative Development
Type:	new
Importance:	high
Description:	The System Template has to support an iterative system development.
Rationale:	During the development of an AUTOSAR system, solutions found in former steps of the system design process are themselves system constraints for the next system generation steps.
Use Case:	If new functionalities are added to a vehicle project in a late development phase, the current mapping become itself a constraint for the mapping of the new SW components associated with such new functionalities.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	[**Main90**] Tool-chains, which are developed for or adopted to AUTOSAR, must be compatible with the AUTOSAR-process. [**Main300**] AUTOSAR supports work-share in large inter-company development groups.

3.1.4 [SYSCT0006] Compatibility between the AUTOSAR Templates

Initiator:	WP Methodology&Templates
Date:	29.07.2007
Short Description:	Compatibility between the AUTOSAR Templates
Type:	change
Importance:	high
Description:	The compatibility between the AUTOSAR Templates must be guaranteed. In this context, compatibility means that each AUTOSAR template can have references to elements of another AUTOSAR template.
Rationale:	Ensuring coherence and interoperability between AUTOSAR templates.
Use Case:	Development of an in-vehicle electronic architecture (software modelling, hardware modelling and mapping constraint modelling) using the same tool chain.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	[**Main90**] Tool-chains, which are developed for or adopted to AUTOSAR, must be compatible with the AUTOSAR-process. [**Main300**] AUTOSAR supports work-share in large inter-company development groups.

3.1.5 [SYSCT0007] Mapping of Software Components to ECUs

Initiator:	WP Methodology&Templates
Date:	10.06.2008
Short Description:	Mapping of Software Components to ECUs
Type:	changed
Importance:	high
Description:	The System Template has to describe the mapping of software components to ECUs. An optional mapping of software components to individual processing units residing in one ECU shall also be possible.
Rationale:	
Use Case:	For safety reasons (or simply due to the experience) some specific Software Components can run only on some specific ECUs. Such “pre-mapping” is a

	constraint for the real mapping process.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	[**Main40**] AUTOSAR must be compatible with concepts, mechanisms, tools, and processes to handle safety-related systems. [**Main50**] AUTOSAR shall support inter- and intra-ECU-communication mechanisms with high reliability [**Main200**] AUTOSAR shall imply only small memory and performance impacts when used in today's micro controllers

3.1.6 [SYSCT0008] SWC Cluster

Initiator:	WP Methodology&Templates
Date:	30.03.2004
Short Description:	SWC Cluster
Type:	new
Importance:	high
Description:	The System Constraint Description has to cover the clustering of SW Components. SW Component Clustering means that two SW Components cannot be divided and must be mapped to the same ECU.
Rationale:	Due to performance requirements, to safe communication requirements or simply to experience, some communication paths must be prevented to be mapped onto an external bus. Involved SW Components shall then be mapped together onto the same ECU.
Use Case:	Safe communication, which may not be carried out over a communication bus, or very strict timing requirements.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	[**Main40**] AUTOSAR must be compatible with concepts, mechanisms, tools, and processes to handle safety-related systems. [**Main200**] AUTOSAR shall imply only small memory and performance impacts when used in today's micro controllers.

3.1.7 [SYSCT0009] SWC Separation

Initiator:	WP Methodology&Templates
Date:	30.03.2004
Short Description:	SWC Separation
Type:	new
Importance:	high
Description:	The System Constraint Description has to cover the separation of SW Components. SW Component Separation means that two SW Components cannot be on the same ECU.
Rationale:	To enhance the independence of redundant SW-C.
Use Case:	Two redundant Software Components, implementing safety critical functions, will not be mapped together on the same ECU because of safety requirements (of course, redundancy does not always imply SWC separation).
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	[**Main40**] AUTOSAR must be compatible with concepts, mechanisms, tools, and processes to handle safety-related systems.

3.1.8 [SYSCT0010] Exclusive Mapping of SW-C

Initiator:	WP Safety
Date:	22.10.2004
Short Description:	Exclusive Mapping of SW-C
Type:	new
Importance:	high
Description:	The System Constraint Description has to cover the exclusion of SW-Cs from one or more ECUs. “Exclusion” means that the SW-C cannot be mapped to the ECUs it is excluded from.
Rationale:	During the mapping process it can be useful to express that a specific SW-C cannot be mapped to one or more ECUs, based on ECU properties.
Use Case:	Exclusion of safety critical functions from crash exposed areas.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	[**Main40**] AUTOSAR must be compatible with concepts, mechanisms, tools, and processes to handle safety-related systems.

3.1.9 [SYSCT0011] Dedicated Mapping of SW-C

Initiator:	WP Safety
Date:	22.10.2004
Short Description:	Dedicated Mapping of SW-C
Type:	new
Importance:	high
Description:	The System Constraint Description has to describe dedicated mapping of SW-Cs to one or more ECUs. “Dedicated mapping” means that the SW-C can only be mapped to the ECUs it is dedicated to.
Rationale:	During the mapping process it can be useful to express that a specific SW-C can be only mapped to some ECUs, based on ECU properties.
Use Case:	SW-Cs requiring an ECU that can guarantee full functionality for a specified time period after power down.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	[**Main40**] AUTOSAR must be compatible with concepts, mechanisms, tools, and processes to handle safety-related systems.

3.1.10 [SYSCT0013] Topology

Initiator:	WP Methodology&Templates
Date:	30.03.2004
Short Description:	Topology
Type:	new
Importance:	high
Description:	The System Template has to describe the topology of an EE System.
Rationale:	The available communication paths limit the possible distributions of SW Components to some ECUs.
Use Case:	Mapping of SW Components being tightly linked from a functional point of view: the topology must then be known in order to avoid too long data paths.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	[**Main230**] AUTOSAR shall support networks of networks including sub networks.

3.1.11 [SYSCT0014] Data Segmenting

Initiator:	WP Methodology&Templates

Date:	30.03.2004
Short Description:	Data Segmenting
Type:	new
Importance:	medium
Description:	The System Template must provide information, which can be used for the segmenting of (application) data to more than 1 frame.
Rationale:	Data length limitations of the underlying bus technology.
Use Case:	Transmission of diagnostic data, often longer than 8 bytes, by means of 8 byte CAN frames.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	[**Main140**] AUTOSAR shall provide an independency of application software from in-vehicle communication technologies.

3.1.12 [SYSCT0015] Bus bandwidth

Initiator:	WP Methodology&Templates
Date:	22.10.2004
Short Description:	Bus bandwidth
Type:	new
Importance:	high
Description:	The System Template shall support bandwidth calculation as a constraint for the definition of the Communication Matrix.
Rationale:	Bandwidth is a limited resource, acting as a constraint during the definition of the Communication Matrix.
Use Case:	When defining the Communication Matrix for mixed systems (AUTOSAR and non-AUTOSAR ECUs), only one part of the Communication Matrix is freely configurable using the AUTOSAR process. That means that the available bandwidth for the AUTOSAR system generator is limited by the non-AUTOSAR part of the Communication Matrix.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	[**Main90**] Tool-chains, which are developed for or adapted to AUTOSAR, must be compatible with the AUTOSAR-process. [**Main210**] AUTOSAR shall provide means to integrate AUTOSAR ECU's in non-AUTOSAR networks.

3.1.13 [SYSCT0016] Dedicated physical connections

Initiator:	WP Methodology&Templates
Date:	29.10.2004
Short Description:	Dedicated physical connections
Type:	new
Importance:	medium
Description:	The System Constraint Description shall be able to describe that a signal has to be sent over a dedicated wire, which is only used by two SW-Components (sender and receiver).
Rationale:	This technique is commonly used in current safety concepts.
Use Case:	Communication with the airbag module.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	[**Main20**] AUTOSAR shall provide mechanisms to support redundancy paths. [**Main40**] AUTOSAR must be compatible with concepts, mechanisms, tools, and processes to handle safety-related systems.

3.1.14 [SYSCT0017] Mapping of signals to the same physical line

Initiator:	WP Methodology&Templates
Date:	29.10.2004
Short Description:	Mapping of signals to the same physical line
Type:	new
Importance:	medium
Description:	The System Constraint Description shall be able to describe that a group of signals has to be sent via the same physical line.
Rationale:	--
Use Case:	--
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	[**Main20**] AUTOSAR shall provide mechanisms to support redundancy paths.

3.1.15 [SYSCT0018] Mapping of signals to different physical lines

Initiator:	WP Safety
Date:	22.10.2004
Short Description:	Mapping of signals to different physical lines
Type:	new
Importance:	medium
Description:	The System Constraint Description shall be able to describe, if needed, that signals between ECUs are sent via different physical lines.
Rationale:	To support hardware and information redundancy (as a mean to support fault detection and fault handling).
Use Case:	A mean to guarantee the transmission of very safety critical data, is to force the sending of redundant copies onto different physical lines.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	[**Main20**] AUTOSAR shall provide mechanisms to support redundancy paths. [**Main40**] AUTOSAR must be compatible with concepts, mechanisms, tools, and processes to handle safety-related systems. [**Main50**] AUTOSAR shall support inter- and intra-ECU-communication mechanisms with high reliability.

3.1.16 [SYSCT0019] Mapping of signals to a specific physical line

Initiator:	WP Safety
Date:	29.10.2004
Short Description:	Mapping of signals to a specific physical line
Type:	new
Importance:	medium
Description:	The System Constraint Description shall be able to describe that signals have to be mapped to a specific physical line.
Rationale:	Some signals have to be mapped to specific physical lines due to e.g. special performance and/or safety needs.
Use Case:	Powertrain signals have to be mapped to a high-speed bus, due to their timing requirements.
Dependencies:	None identified.
Conflicts:	None identified.

Supporting Material:	[**Main20**] AUTOSAR shall provide mechanisms to support redundancy paths.

3.1.17 [SYSCT0020] Exclusion of signals from a specific physical line

Initiator:	WP Methodology&Templates
Date:	29.10.2004
Short Description:	Exclusion of signals from a specific physical line
Type:	new
Importance:	medium
Description:	The System Constraint Description shall be able to describe that signals have not to be mapped to a specific physical line.
Rationale:	Some physical lines can result unsuitable (too slow, unsafe communication protocol, etc.) for the transmission of some specific signals.
Use Case:	Most of power train signals cannot be mapped to a low speed CAN bus, due to their timing requirements.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	[**Main20**] AUTOSAR shall provide mechanisms to support redundancy paths.

3.1.18 [SYSCT0021] ECU Communication via CAN (Controller Area Network)

Initiator:	WP Methodology&Templates
Date:	23.02.2005
Short Description:	ECU Communication via CAN
Type:	Change (SYSCT0012)
Importance:	high
Description:	The System Template has to cover the system communication via CAN Bus.
Rationale:	CAN is widely used in the automotive systems.
Use Case:	Development of a complete, multi-networked, in-vehicle electronic architecture.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	[**Main60**] AUTOSAR shall provide open and standardized software interfaces for intra-ECU and inter-ECU communication. [**Main140**] AUTOSAR shall provide an independency of application software from in-vehicle communication technologies.

3.1.19 [SYSCT0022] ECU Communication via LIN (Local Interconnect Network)

Initiator:	WP Methodology&Templates
Date:	30.03.2004
Short Description:	ECU Communication via LIN
Type:	Change (SYSCT0012)
Importance:	high
Description:	The System Template has to cover the system communication via LIN.
Rationale:	LIN is widely used in the automotive systems.
Use Case:	Development of a complete, multi-networked, in-vehicle electronic architecture.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	[**Main60**] AUTOSAR shall provide open and standardized software interfaces for intra-ECU and inter-ECU communication. [**Main140**] AUTOSAR shall provide an independency of application software from

	in-vehicle communication technologies.

3.1.20 [SYSCT0023] ECU Communication via MOST (Media Oriented Systems Transport)

Initiator:	WP Methodology&Templates
Date:	30.03.2004
Short Description:	ECU Communication via MOST
Type:	postponed
Importance:	high
Description:	The System Template has to cover the system communication via MOST.
Rationale:	MOST is going to become a standard communication protocol in the automotive industry.
Use Case:	Development of a complete, multi-networked, in-vehicle electronic architecture.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	[**Main60**] AUTOSAR shall provide open and standardized software interfaces for intra-ECU and inter-ECU communication. [**Main140**] AUTOSAR shall provide an independency of application software from in-vehicle communication technologies.

3.1.21 [SYSCT0024] ECU Communication via FlexRay

Initiator:	WP Methodology&Templates
Date:	30.03.2004
Short Description:	ECU Communication via FlexRay
Type:	Change (SYSCT0012)
Importance:	High
Description:	The System Template has to cover the system communication via FlexRay.
Rationale:	FlexRay is going to become a standard communication protocol in the automotive industry.
Use Case:	Development of a complete, multi-networked, in-vehicle electronic architecture.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	[**Main60**] AUTOSAR shall provide open and standardized software interfaces for intra-ECU and inter-ECU communication. [**Main140**] AUTOSAR shall provide an independency of application software from in-vehicle communication technologies.

3.1.22 [SYSCT0025] Derivation of COM Stack Configuration Parameters from the System Template

Initiator:	WP Methodology&Templates
Date:	29.06.2007
Short Description:	Derivation of COM Stack Configuration Parameters from the System Template
Type:	New
Importance:	High
Description:	The System Template shall enable the configuration of the Com Stack of the ECU. It handles those parameters that are necessary to describe the inter-ECU communication. Configuration parameters local to an ECU are not in the scope of the System Template.

Rationale:	All ECUs connected in one communication cluster needs to be configured consistently.
Use Case:	Generate Base ECU Configuration from ECU Extract
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	

3.1.23 [SYSCT0026] Fibex compatibility

Initiator:	WP Methodology&Templates
Date:	29.06.2007
Short Description:	Fibex compatibility
Type:	New
Importance:	High
Description:	Whenever there is a considerable overlap between the System Template and the ASAM FIBEX Standard, the System Template shall adopt the structures of the ASAM FIBEX Standard.
Rationale:	The System Template will benefit from Fibex as an established proven standard.
Use Case:	Facilitate the adoption of the System Template into existing tools which deal with the Fibex Standard.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	

3.1.24 [SYSCT0027] ECU Extract

Initiator:	WP Methodology&Templates
Date:	10.06.2008
Short Description:	ECU Extract generation rules
Type:	New
Importance:	High
Description:	The ECU Extract is derived from a System Description. The specification for generating the ECU Extract shall be detailed enough to enable semantically unambiguous generation of this artifact.
Rationale:	Tool interoperability requires unambiguous description of the ECU Extract.
Use Case:	Generate Base ECU Configuration from ECU Extract
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	

3.1.25 [SYSCT0028] IPdu End-to-End Communication Protection support

Initiator:	WP Safety
Date:	10.06.2008
Short Description:	IPdu End-to-End Communication Protection support
Type:	New
Importance:	High
Description:	The System Template shall enable to select E2E protection settings for IPdus.
Rationale:	Protect communication between COM modules.
Use Case:	Transmission of safety-related data on a single channel without redundancy.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	

3.1.26 [SYSCT0029] Dynamic length signals

Initiator:	WP COM
Date:	10.06.2008
Short Description:	Dynamic length signals
Type:	New
Importance:	High
Description:	The System Template shall support a definition of dynamic length signals. A Signal shall have either a static length or its length should vary up to some statically defined maximum. Signals with a maximum length are called dynamic length signals.
Rationale:	Dynamic length signals can change size during run time.
Use Case:	--
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	OSEK COM

3.1.27 [SYSCT0030] Dynamic length IPdus

Initiator:	WP COM
Date:	10.06.2008
Short Description:	Dynamic length IPdus
Type:	New
Importance:	High
Description:	The System Template shall support a definition of IPdus that contain dynamic length signals.
Rationale:	Dynamic length IPdus can change size during run time.
Use Case:	The Network Layer and the Data Link Layer are capable of transmitting and receiving both fixed and dynamic-length I-Pdus as determined by the Interaction Layer.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	OSEK COM

3.1.28 [SYSCT0031] Distribution of Application and Vehicle Mode Requests

Initiator:	WP VMM/AMM
Date:	10.06.2008
Short Description:	Distribution of Application and Vehicle Mode Requests
Type:	New
Importance:	High
Description:	The System Template shall support the distribution of application and vehicle mode requests to all affected ECUs.
Rationale:	A Mode Requester is an entity that requests modes from a Mode Manager by sending some data via a port with a Mode Request interface. The Mode Manager receives the incoming information, arbitrates the requests and decides upon a resulting mode.
Use Case:	Depending on Vehicle and Application Modes, the BSW modes may change, e.g.

	the communication needs of an Application may cause a change in the BSW Mode of a communication network.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	

3.1.29 [SYSCT0032] Topology variants

Initiator:	WP Methodology&Templates
Date:	12.06.2008
Short Description:	Topology variants
Type:	New
Importance:	High
Description:	The System Template shall provide the means to describe topology variants with optional/alternative ECUs and communication clusters.
Rationale:	In a product line approach different product variants can be realized by a common core topology with only a few varying topology nodes.
Use Case:	In a product line two different product variants HIGH and LOW use the same common core topology with the difference, that the product variant HIGH requires an additional ECU.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	[**Main360**]: Management of vehicle diversity is supported by AUTOSAR.

3.1.30 [SYSCT0033] Software-to-ECU mapping variants

Initiator:	WP Methodology&Templates
Date:	12.06.2008
Short Description:	Software-to-ECU mapping variants
Type:	New
Importance:	High
Description:	The System Template shall provide the means to describe alternative mappings of software components to ECUs.
Rationale:	In order to reach different specific characteristics of the overall system for products within a product line a different mapping of software components is used.
Use Case:	In a product line two different product variants HIGH and LOW use the same common software architecture but define a different mapping to the network topology.
Dependencies:	[SWCT0030]
Conflicts:	None identified.
Supporting Material:	[**Main360**]: Management of vehicle diversity is supported by AUTOSAR.

3.1.31 [SYSCT0034] Timing Variants

Initiator:	WP Methodology&Templates
Date:	12.06.2008
Short Description:	Timing Variants
Type:	New
Importance:	High
Description:	The System Template shall provide the means to describe alternative timing

	properties (e.g. trigger type, period, priority) and timing constraints (e.g. latency, age).
Rationale:	Due to a different software-to-ECU mapping the timing properties and constraints for the transmission of signals can vary.
Use Case:	A PDU is transmitted cyclically for two different product variants HIGH and LOW with a period of 10ms for the variant HIGH and 20ms for the variant LOW.
Dependencies:	
Conflicts:	None identified.
Supporting Material:	[**Main360**]: Management of vehicle diversity is supported by AUTOSAR.

3.1.32 [SYSCT0035] Data mapping variants

Initiator:	WP Methodology&Templates
Date:	12.06.2008
Short Description:	Data mapping variants
Type:	New
Importance:	High
Description:	The System Template shall provide the means to describe data mapping Variants.
Rationale:	Variants in the Software Component Description have an impact on the data mapping which is described in the System Template.
Use Case:	A DataElement exists only in one product variant HIGH.
Dependencies:	[**SWCT0010**], [**SWCT0020**], [**SWCT0150**]
Conflicts:	None identified.
Supporting Material:	[**Main360**]: Management of vehicle diversity is supported by AUTOSAR.

3.1.33 [SYSCT0036] Communication variants

Initiator:	WP Methodology&Templates
Date:	12.06.2008
Short Description:	Communication variants
Type:	New
Importance:	High
Description:	The System Template shall provide the means to describe communication variants, such as alternative signal-to-PDU mappings, alternative communication paths, and alternative signal and PDU properties (e.g. data type, data length).
Rationale:	To optimize the communication matrix for different product variants which use the same network topology the description of communication variants in the System Template is an essential prerequisite.
Use Case:	A signal is transmitted for two different product variants HIGH and LOW with the byte order LittleEndian for the variant HIGH and the byte order BidEndian for the variant LOW.
Dependencies:	[**SWCT0040**], [**SYST0035**]
Conflicts:	None identified.
Supporting Material:	[**Main360**]: Management of vehicle diversity is supported by AUTOSAR.

3.1.34 [SYSCT0037] Timing properties

Initiator:	WP Methodology&Templates
Date:	12.06.2008

Short Description:	Timing properties
Type:	New
Importance:	High
Description:	The System Template shall provide the means to describe the timing properties of a system's dynamics, which are determined by the consumption of computation, communication, and other hardware resources.
Rationale:	The description of timing properties in the System Template is an essential prerequisite for the analysis and validation of a system's timing behavior or its prediction early in the process.
Use Case:	Analysis and validation of timing behavior, early prediction of modification impacts, support for hardware dimensioning, system configuration optimization
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	[**RSTM001**]

3.1.35 [SYSCT0038] Support of SAE J1939 Protocol Features

Initiator:	WP Methodology&Templates
Date:	12.06.2008
Short Description:	Support of SAE J1939 Protocol Features
Type:	New
Importance:	High
Description:	The System Template has to cover the system communication via SAE J1939.
Rationale:	SAE J1939 protocol is an industry standard that is used in automotive systems.
Use Case:	Development of a complete, multi-networked, in-vehicle electronic architecture.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	

3.1.36 [SYSCT0039] ECU Communication via Ethernet

Initiator:	WP Methodology&Templates
Date:	12.06.2008
Short Description:	ECU Communication via Ethernet
Type:	New
Importance:	High
Description:	The System Template has to cover the system communication via Ethernet.
Rationale:	Ethernet is going to become a standard communication protocol in the automotive industry.
Use Case:	Development of a complete, multi-networked, in-vehicle electronic architecture.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	[**Main60**] AUTOSAR shall provide open and standardized software interfaces for intra-ECU and inter-ECU communication. [**Main140**] AUTOSAR shall provide an independency of application software from in-vehicle communication technologies.

3.1.37 [SYSCT0040] Timing constraints

Initiator:	WP Methodology&Templates
Date:	12.06.2008
Short Description:	Timing constraints
Type:	New
Importance:	High
Description:	The System Template shall provide the means to describe the timing constraints of a system's dynamics, which are determined by the consumption of computation, communication, and other hardware resources.
Rationale:	The description of timing constraints in the System Template is an essential prerequisite for the analysis and validation of a system's timing behavior or its prediction early in the process.
Use Case:	Analysis and validation of timing behavior, early prediction of modification impacts, support for hardware dimensioning, system configuration optimization
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	[**RSTM002**]

3.1.38 [SYSCT0041] Variants in ECU Extract

Initiator:	WP Methodology&Templates
Date:	29.08.2008
Short Description:	Variants in ECU Extract
Type:	New
Importance:	High
Description:	The ECU Extract shall support variability of elements taken over or derived during the transformation from the System Description.
Rationale:	Data mapping and communication variants (see SYSCT0035, SYST0036) may have to be preserved in artifacts, which are generated out of a System Description (e.g. ECU-Extract), if the binding time is at a later point in the process.
Use Case:	Pdu Layout is postbuild configurable during the ECU Configuration, variability needs to be visible at build time.

Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	

3.1.39 [SYSCT0042] Support for Partial Networking

Initiator:	WP Methodology&Templates
Date:	07.06.2011
Short Description:	Support for Partial Networking
Type:	new
Importance:	high
Description:	System Template shall support the definition of partial network clusters, the mapping of virtual function clusters to partial network clusters and the wakeup information of individual ECUs.
Rationale:	System Template shall contain all system relevant parameters required for the configuration of a partial network.
Use Case:	Describe the size and location of the system wide partial network cluster vector.
Dependencies:	None identified.
Conflicts:	None identified.
Supporting Material:	

4 References

[1] AUTOSAR Glossary
AUTOSAR_TR_Glossary.pdf

[2] Methodology
AUTOSAR_MOD_Methodology.pdf

[3] Technical Overview
AUTOSAR_TechnicalOverview.pdf

[4] AUTOSAR Main Requirements
AUTOSAR_RS_inRequirements.pdf

[5] AUTOSAR System Template
AUTOSAR_TPS_SystemTemplate.pdf

[6] AUTOSAR RS Software Component Template
AUTOSAR_RS_SoftwareComponentTemplate.pdf

[7] AUTOSAR Requirements on Timing Extensions
AUTOSAR_RS_TimingExtensions.pdf

5 Change History

5.1 Change History for AUTOSAR R4.0.1 against R3.1.5

5.1.1 Removed SRS Items

SYSCT0004	Variant Handling
SYSCT0005	Timing Requirements

5.1.2 Changed SRS Items

SYSCT0001	Mixed Systems (AUTOSAR/NON-AUTOSAR)
SYSCT0007	Mapping of Software Components to ECUs

5.1.3 Added SRS Items

SYSCT0027	ECU Extract
SYSCT0028	IPdu End-to-End Communication Protection support
SYSCT0029	Dynamic length signals
SYSCT0030	Dynamic length IPdus
SYSCT0031	Distribution of Application and Vehicle Mode Requests
SYSCT0032	Topology variants
SYSCT0033	Software-to-ECU mapping variants
SYSCT0034	Timing Variants
SYSCT0035	Data mapping variants
SYSCT0036	Communication variants
SYSCT0037	Timing properties
SYSCT0038	Support of SAE J1939 Protocol Features
SYSCT0039	ECU Communication via Ethernet
SYSCT0040	Timing constraints
SYSCT0041	Variants in ECU Extract

5.2 Change History for AUTOSAR R4.0.2 against R4.0.1

5.2.1 Removed SRS Items

N/A

5.2.2 Changed SRS Items

N/A

5.2.3 Added SRS Items

N/A

5.3 Change History for AUTOSAR R4.0.3 against R4.0.2

5.3.1 Removed SRS Items

N/A

5.3.2 Changed SRS Items

N/A

5.3.3 Added SRS Items

SYSCT0042	Support for Partial Networking