

AUTOSAR – BMW's strategy to introduce AUTOSAR.

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AUTOSAR



BMW Group
AUTOSAR

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AUTOSAR – BMW's strategy to introduce AUTOSAR.

- Motivation
- Roll-out
- Experiences
- Summary

AUTOSAR – BMW's path to introduce an industry standard. Motivation for automotive standards.

Cost saving
for non-competitive
infrastructure
components

Quality / maturity
due to OEM-wide carry-
over use of components

Handling the degree
of complexity



Get the freedom to promote innovations.

AUTOSAR – BMW's strategy to introduce AUTOSAR. Motivation for AUTOSAR.

AUTOSAR

Application Software *„customer functionality“*

- Development of comprehensive OEM interface compatible building sets of function software at ECU suppliers
- Re-use of OEM specific software functions at different ECU suppliers

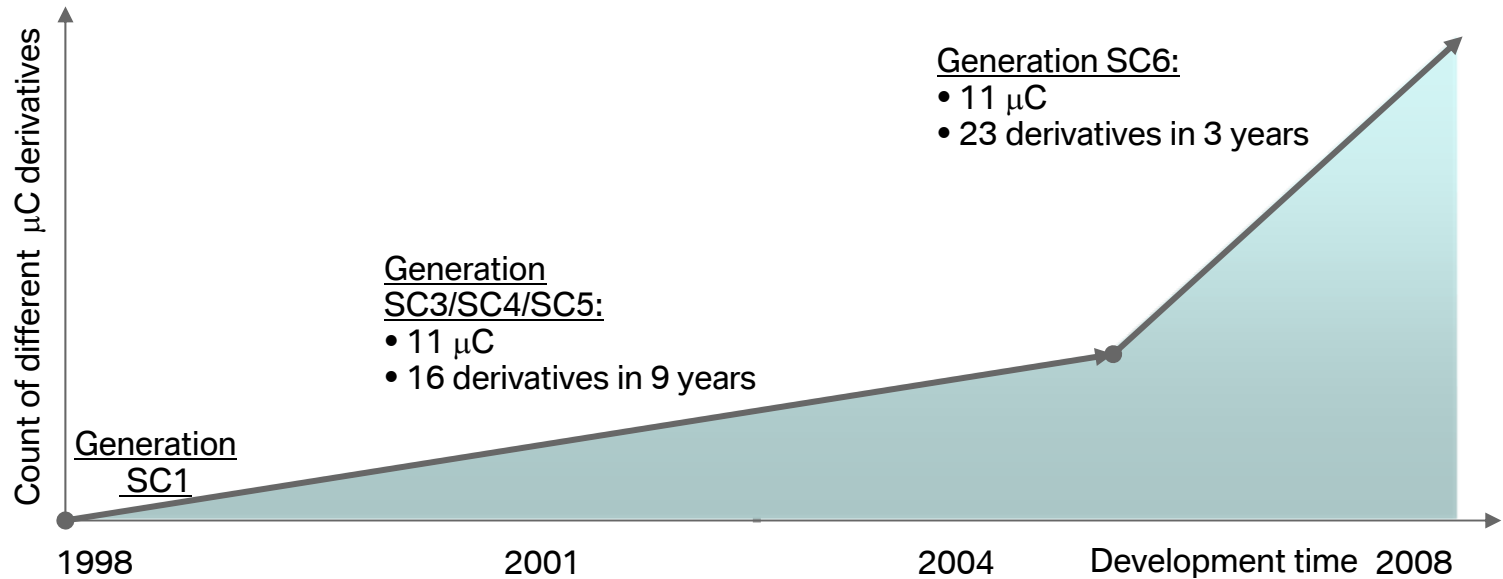
Basic Software *„Operating system & services“*

- OEM and supplier using comprehensive basic software modules
- Enhancement of robustness and maturity.
- Reduction of development and maintenance resources create space for customer related innovation

AUTOSAR Methodology

- Seamless Interaction and data exchange between all partners by a consistent and holistic view of E/E systems
- Tool based system design: tool chain from virtual integration to ECU mapping

AUTOSAR – BMW's strategy to introduce AUTOSAR. 10 years of Standard Core (SC) Development.



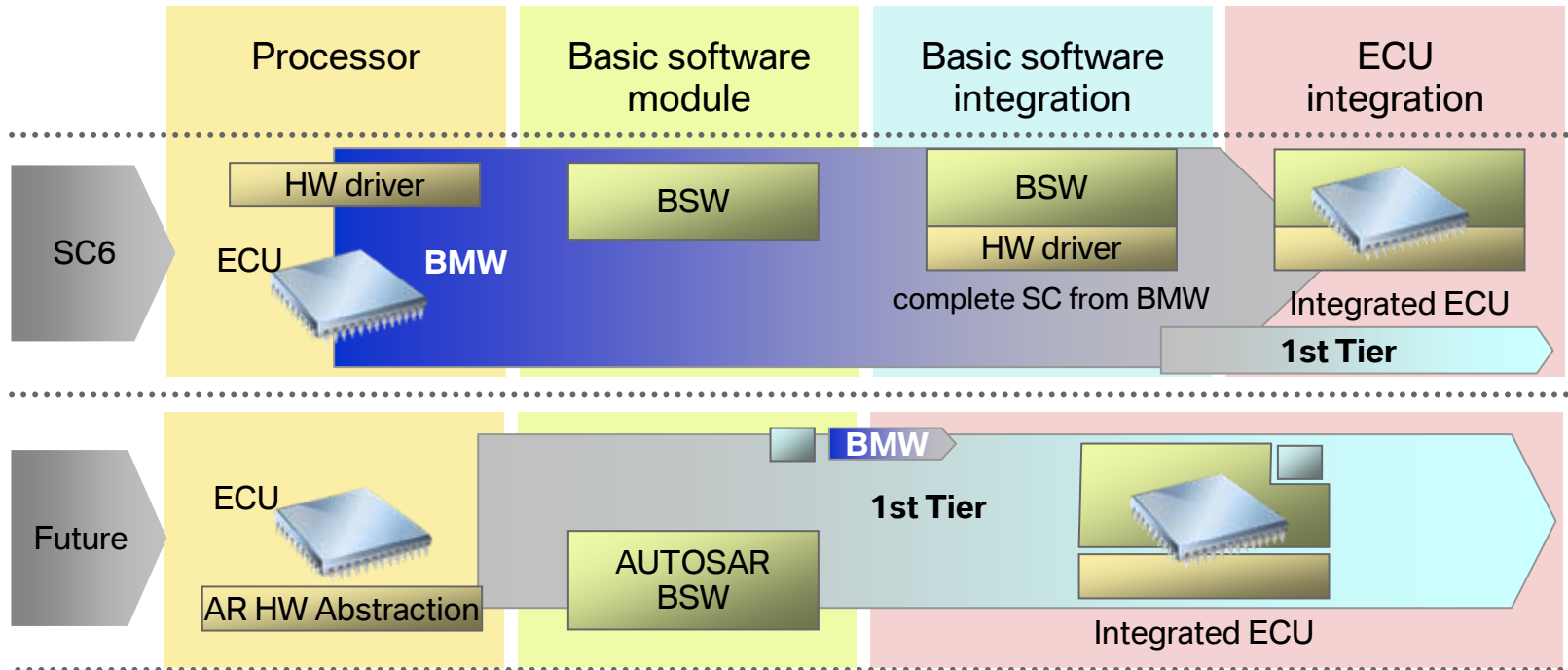
Increasing support of
µC -derivatives caused by:

- shorter lifetime of µC
- new or upgraded µC in development cycle
- project optimized µC
- different 1Tier uses different µC
- increase of user group

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AUTOSAR – BMW's strategy to introduce AUTOSAR. Change in business model.



- 1st tier is able to implement or buy AUTOSAR Basic Software modules.
- Precondition: Support of AUTOSAR interfaces to enable the integration of BMW Modules.

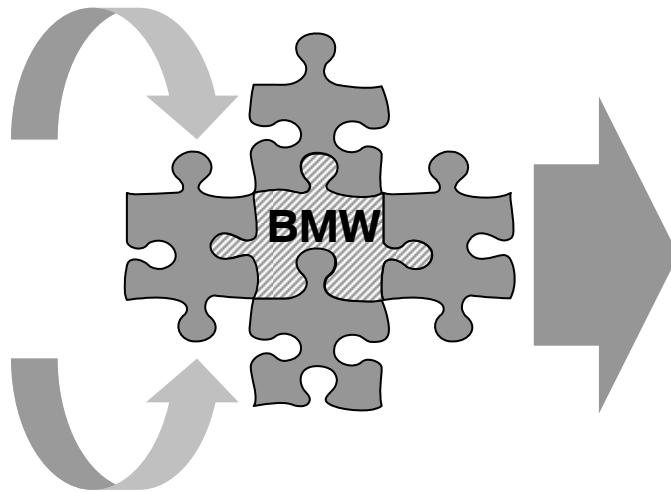
AUTOSAR – BMW's strategy to introduce AUTOSAR. Proof of Concept.

		Step 1	Step 2	Step 3	
proof of concept	BMW system functions and compatibility modules	✓			
	Supplier 1	✓			
	Supplier 2		✓		
	Supplier 3		✓		
	open for supplement			✓	
ECU integration	1st Tier A		✓		
	1st Tier B			✓	
	1st Tier C			✓	
	1st Tier D	✓			
	next step			✓	

- BMW system functions (via software delivery from BMW) are functional proven within a reference implementation of AUTOSAR in the first integration phase of the latest BMW product line.
- The integration of the BMW modules in different AUTOSAR implementations is proven by further reference implementations and tests (AUTOSAR platforms of important suppliers and 1st tiers).
- The most important 1st tiers and suppliers are qualified to integrate AUTOSAR and the BMW modules plus system functions in advance.
- Further 1st tiers und suppliers can use the verified portfolio of implementations.

AUTOSAR – BMW's strategy to introduce AUTOSAR. Comparison of two suppliers.

Supplier 1

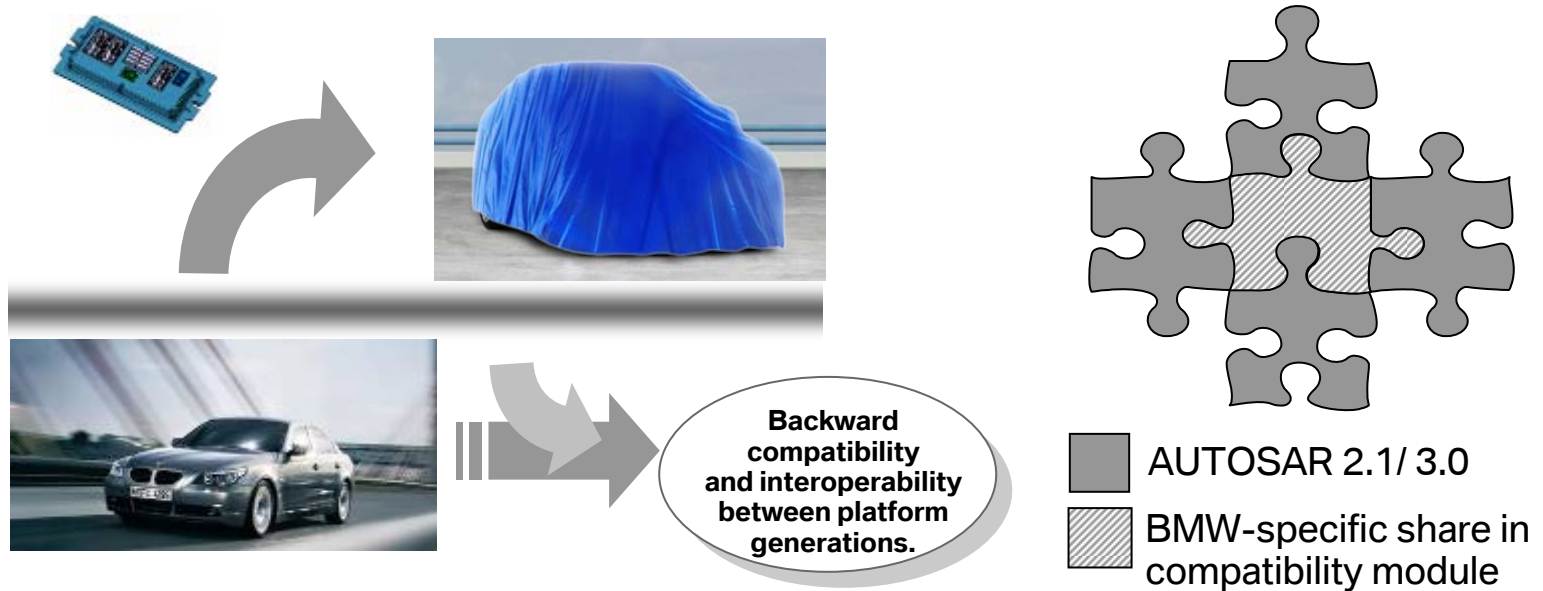


**... 200 change requests generated
... thereof only 8 are critical “no go’s”
... resolution within 1 week possible**

Supplier 2

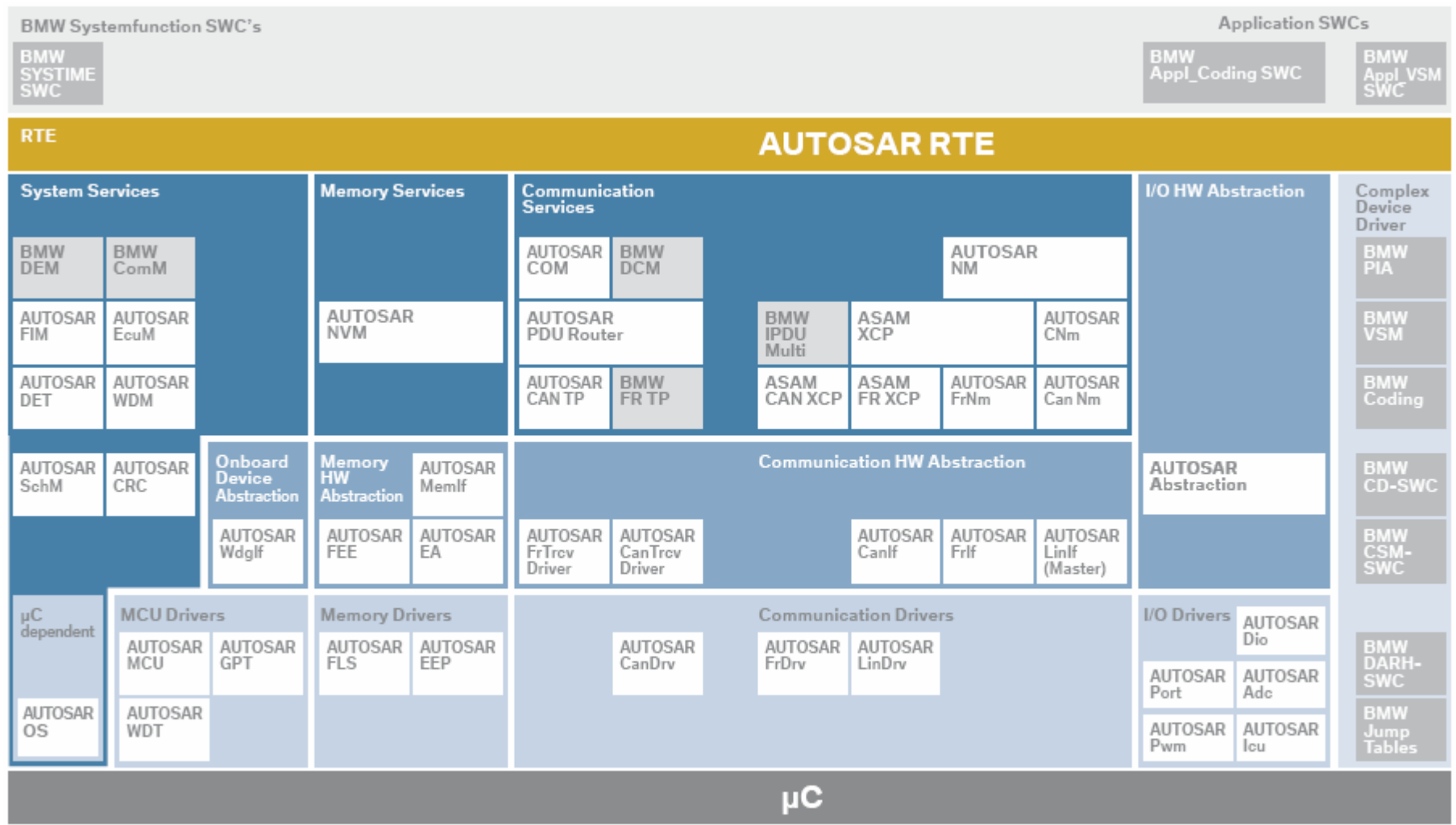
- AUTOSAR implementations are not similar.
- Differences are (still) solvable throughout the key players in AUTOSAR.
- The “fastest” key players establish the standard.

AUTOSAR – BMW's strategy to introduce AUTOSAR. Migration with respect to the existing situation.



Compatibility modules enable an evolutionary migration to the AUTOSAR standard by supporting backward compatibility and interoperability of BMW Standard Core and AUTOSAR ECUs.

AUTOSAR – BMW's strategy to introduce AUTOSAR. Five compatibility modules.

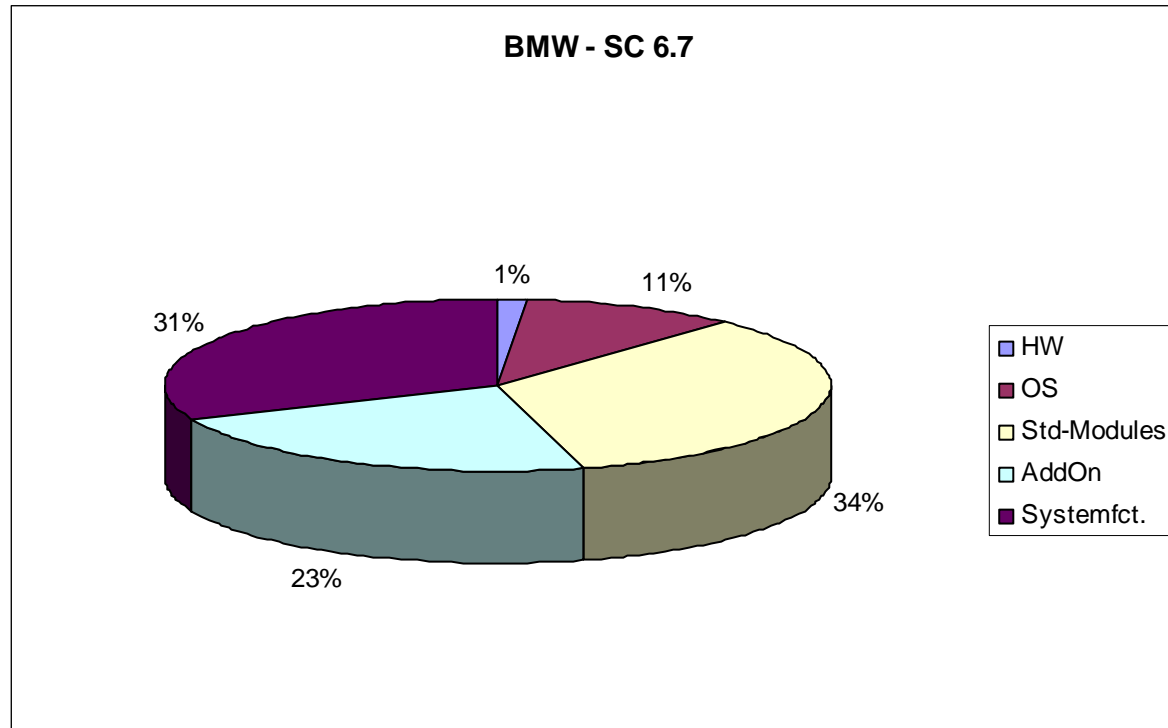


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AUTOSAR – BMW's StandardCore

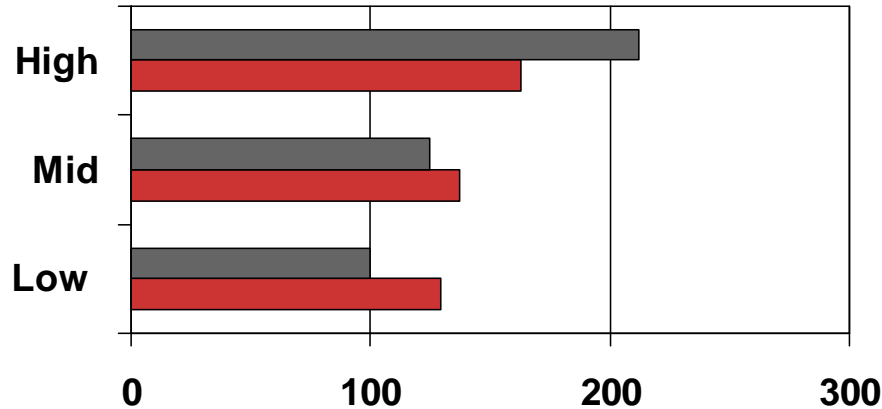
Characteristics of StandardCore SC 6.7.



The system-functions are BMW specific.
The AddOn implements BMW AUTOSAR enhancements.
The Standard-Modules are equivalent to AUTOSAR Modules.

AUTOSAR code comparison.

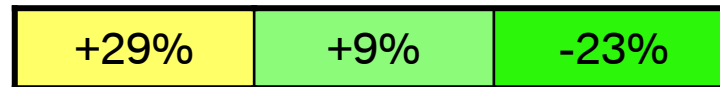
BMW Standard Core (SC6) and BMW AUTOSAR Core.



BMW Standard- and AUTOSAR Core contains complete system functionality, diagnostic and error memory.

Overhead calculated with prototype configuration and BMW reference stack for three series ECU's.

	Low	Mid	High
■ SC6	100	125	212
■ BAC2.1	129	137	163



- AUTOSAR approach reduces the complexity. The code overhead is in an acceptable range.
- The AUTOSAR behavior will depend mainly on the configuration know how.
- Even those results will be improved, as they are caused by prototype tools.

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AUTOSAR – BMW's strategy to introduce AUTOSAR.

- The 1st tier will get the responsibility for the basic software modules.
 - The new 7 series introduce AUTOSAR standard interfaces for the body controller.
 - The software rollout is already started.
 - The next series will increase the AUTOSAR software part. More than 20% of all ECU's will use AUTOSAR basic software (BSW).
-
- No showstopper were identified. Some challenges were solved.
 - Internal discussion to introduce an industry standard was definitely necessary.
 - Management attention helps, to introduce AUTOSAR.

... it is not important which way the wind turns, but how we make sail.



Thank you.