



AUTOSAR:
Were expectations fulfilled?

Vector Congress
Alte Reithalle, December 2, 2010

Were expectations fulfilled?

Long story short:

- > Many are.
- > Some still need a few steps to go.



Let's look back in history

Introduction of OSEK OS 10 years ago

▶ Quote:

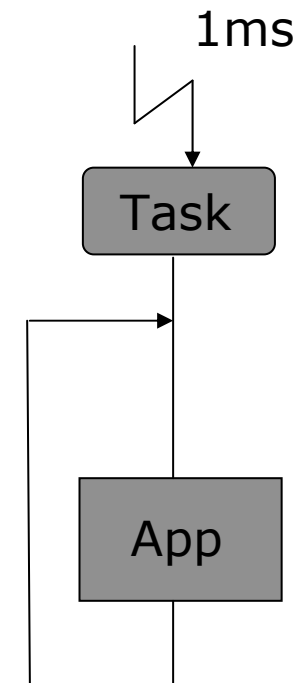
“ I moved my application to OSEK,
paid 30kEUR for the license,
needed 8kByte more memory,
where is the benefit?”

▶ Question:

“ How do you use the OS?”

▶ Answer:

“My application runs in a 1ms task”



> What has been accomplished

Areas for Improvement

Situation

OEM's point of view

Supplier's point of view

Standard software provider's point of view

What has been accomplished (examples)

AUTOSAR

- ▶ is a key enabling technology to manage the growing electrics / electronics complexity. (www.autosar.org)
- ▶ leads to a common "language", "understanding", and "methodology" in the community
- ▶ facilitates the exchange of software and hardware (www.autosar.org)
- ▶ allows an implementation of basic system functions as an OEM wide "Standard Core" solution (www.autosar.org)

Agenda

What has been accomplished

> **Areas for Improvement**

Situation

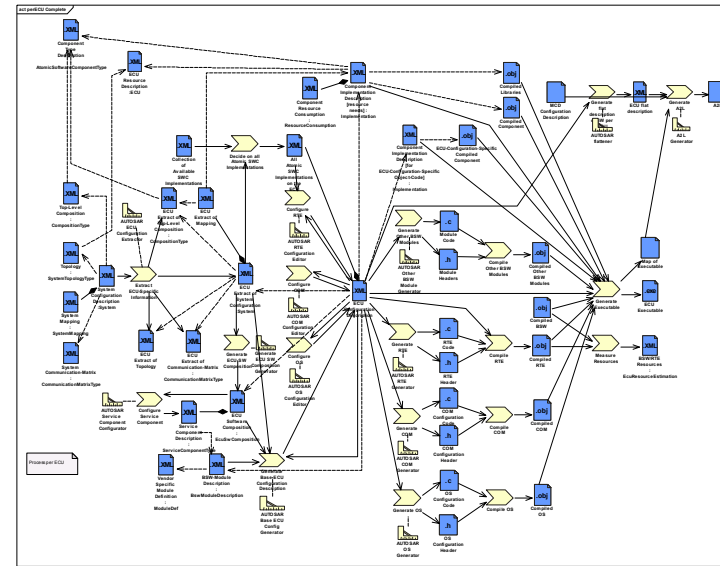
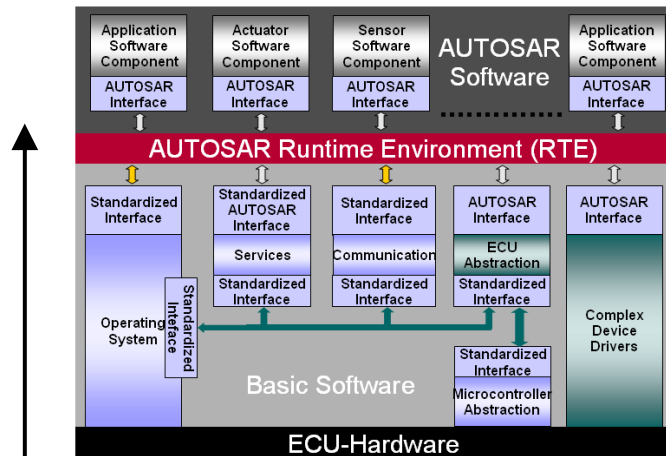
OEM's point of view

Supplier's point of view

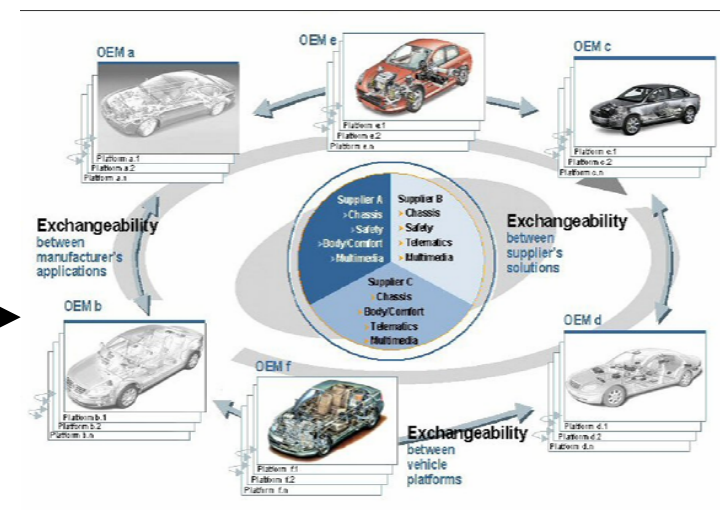
Standard software provider's point of view

Dimensions of AUTOSAR

Scope & Functionality



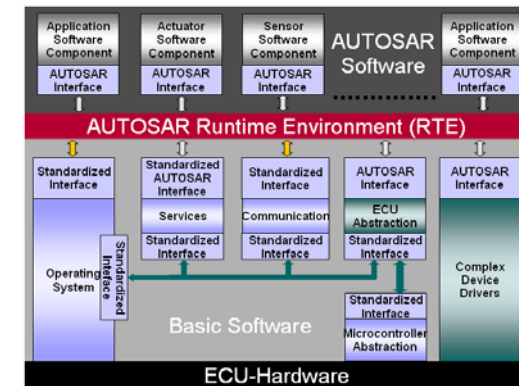
Methodology



Business/Cooperation Models

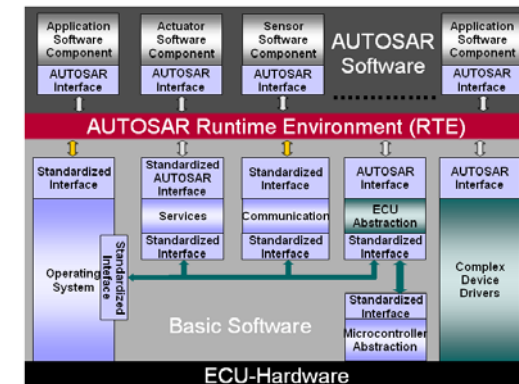
Scope & Functionality: AUTOSAR Versions

- ▶ 3.x is mature and fits for series production projects
 - ▶ 3.x solution can be enriched by 4.x features where needed
 - ▶ 3.x will be in use for many more years
 - ▶ Customers, who evaluate AUTOSAR, can use this version as well
 - ▶ 4.x will be ready to be implemented soon
 - ▶ Customers, who plan to use AUTOSAR for series production 2015+ or later, shall evaluate this version
- + OEMs: to deal with one version
○ Tier1s: to use two different versions in future
○ SW-Prov.: have to implement and maintain different versions



Scope & Functionality: OEM-Variants

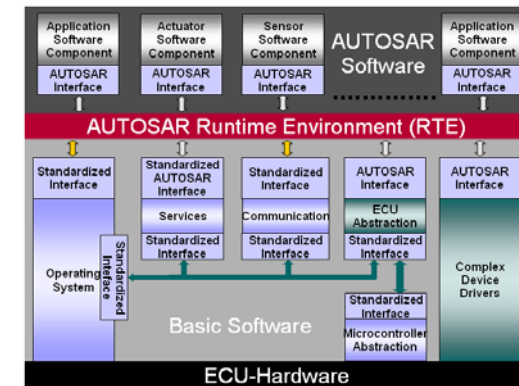
- ▶ OEMs use different scope and functionality
 - ▶ integration of legacy parts
 - ▶ features like post-build
 - ▶ OEM-specific extensions
 - ▶ OEM-specific compatibility modules
 - ▶ communication only versus “whole” AUTOSAR



- + OEMs: to deal with one version
- Tier1s: to use different versions
- SW-Prov.: to implement and maintain many different versions

Scope & Functionality: Complexity

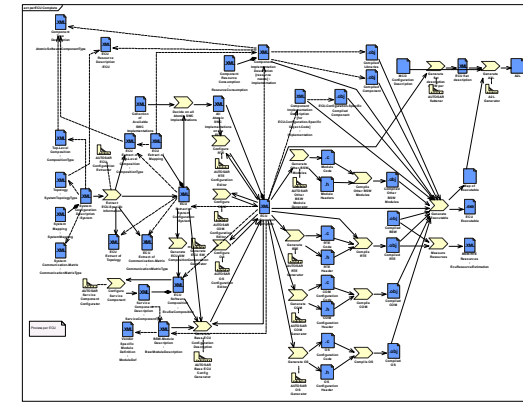
- ▶ Already version 1 of AUTOSAR increased the complexity dramatically compared to previous solutions.
- ▶ Version 4.0 and later increase it even more



- + OEMs: have to select the scope they like to have
- Tier1s: due to different scopes there is a lower level of reuse
- SW-Prov.: complexity increases the effort

Methodology: AUTOSAR-Process

- ▶ OEMs use the AUTOSAR-methodology to a different extend
- ▶ detailed architecture using SWCs versus just communication matrix
- ▶ OEMs have to adjust their processes and tool landscape
- ▶ new responsibilities and new roles



- OEMs: change not completed
- Tier1s: change not completed
have to deal with different approaches
have to deal with different completeness/maturity
- SW-Prov.: have to assist in filling the gaps
get many request for trouble-shooting

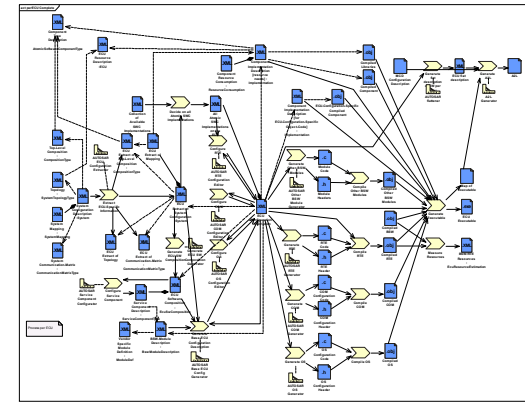
The process is currently not running smooth
at every project!

Methodology: Data Formats

- ▶ High variety of data formats
 - ▶ System description
 - ▶ DBC (different versions)
 - ▶ LDF
 - ▶ Fibex (different versions)

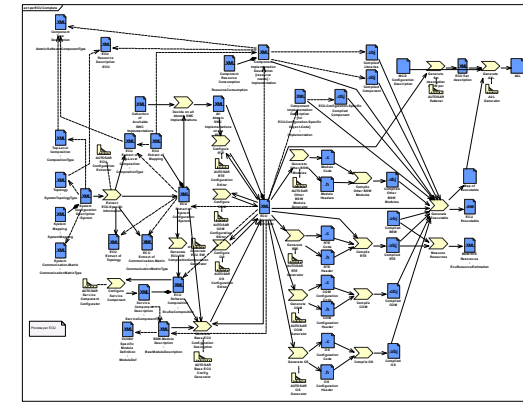
- ▶ Legacy formats have to be converted to the system description format.

- ▶ Converted data has different levels of completeness
 - OEMs: changes in the tool-chain
 - Tier1s: unexpected efforts due to incomplete SD
 - SW-Prov.: request for special tools, converters, ...



Methodology: Frontloading

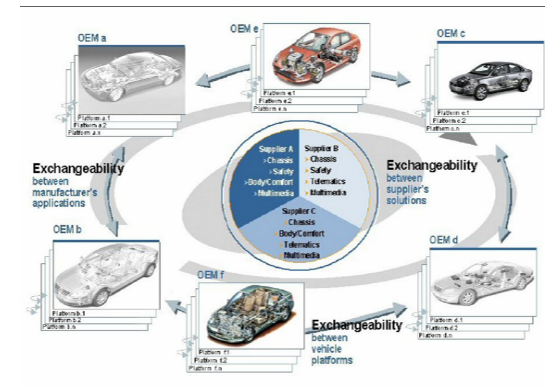
- ▶ The AUTOSAR methodology shifts efforts for specification and design to an earlier stage of the process



- OEMs: get new tasks, need new skills, have more effort
- Tier1s: have to deal with sometimes incomplete inputs
need tools to fill the gaps
- SW-Prov.: tools are requested, which assist to solve the issues
due to the changing situation.
there are “moving targets”

Business/Cooperation Models: OEM Model

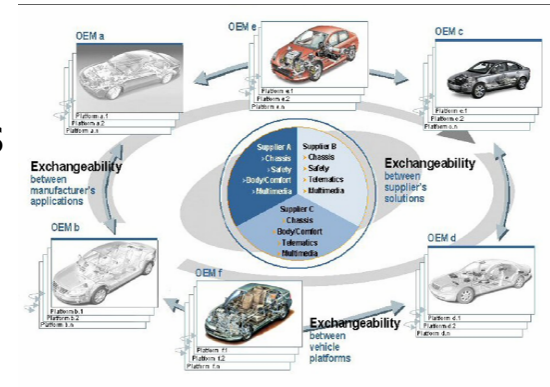
- ▶ The OEM selects one SW-Provider, who implements AUTOSAR according to the requirements of the OEM



- + OEMs: implementation fits to the needs
high degree of interoperability of ECUs
- + T1s type A: get a complete package
easy start into AUTOSAR
- T1s type B: have their own platform
hard to adapt to the OEMs requirements
- + SW-Prov. A: large project
- SW-Prov. B: harder to get into a business at Tier1s for that OEM

Business/Cooperation Models: Supplier Model

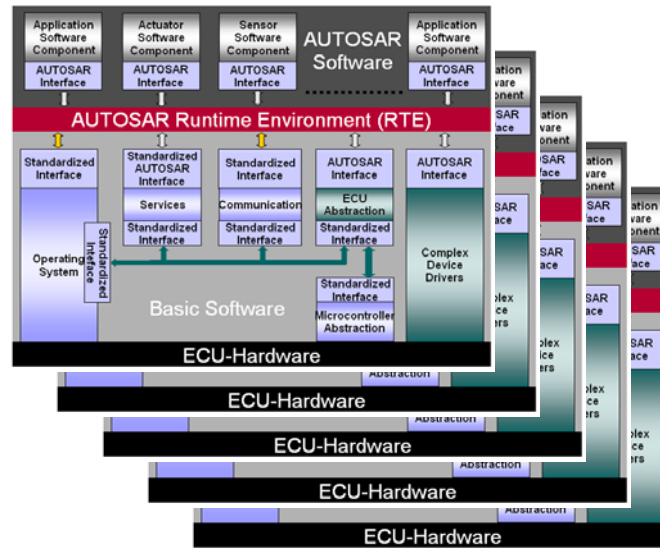
- ▶ The OEM defines the requirements and leaves the implementation to the tier1/SW-provider



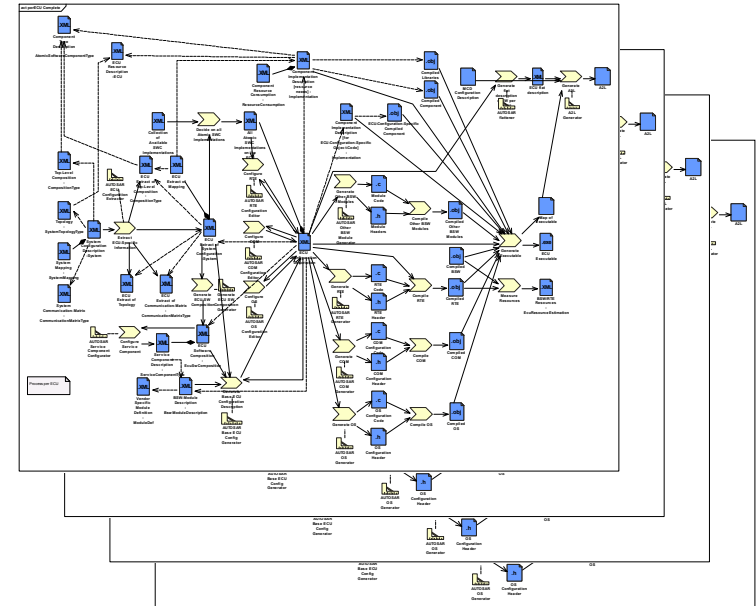
- + OEMs: no investment for the implementation
- T1s type: make or buy a solution fitting to the OEMs requirements
- SW-Prov.: to implement and maintain many different versions

Today's Dimensions of AUTOSAR

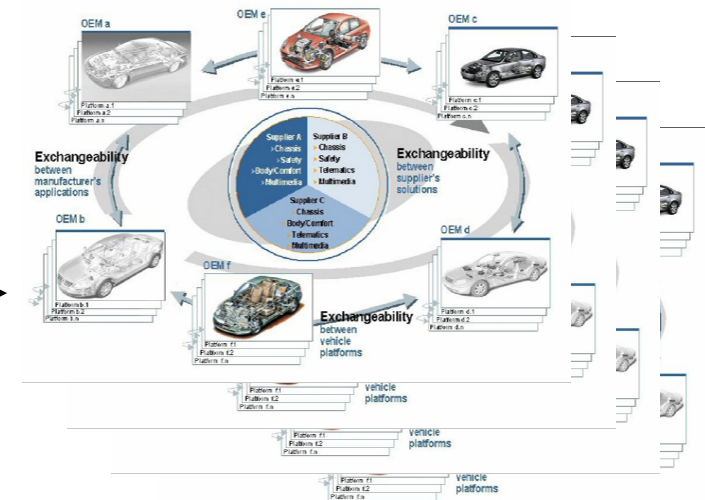
Scope & Functionality



Methodology



Business/Cooperation Models



Conclusion: Expectations fulfilled?

- ▶ Quote: "I thought ECUs based on AUTOSAR are cheaper than the former ones because
 - ▶ AUTOSAR is a Standard and
 - ▶ we will have a high competition of many SW-providers"
- ▶ Unfortunately for the time being
 - ▶ it's a standard with many variants
 - ▶ the effort for an AUTOSAR-implementation is very high
 - ▶ the market size is limited
 - ▶ SW-Provider's effort is much higher than the money they can realize

We're on the way !!

End of the Story

- ▶ If I meet a Christmas Elf who grants me three wishes to improve AUTOSAR:
 1. Let's consolidate, gain experiences, and then do the next steps.
 2. The software providers get a chance for a return on investment.
 3. Three more wishes, just in case ...



Thank you for your attention.

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