AUTOSAR 4 CLEAN-CUT IMPLEMENTATION

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OUTLINE

- BACKGROUND
- HOW
- STATISTICS
- CONCLUSIONS
- FUTURE OUTLOOK

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Drivers for Premium Electrical Architecture

Technical steps

Competitor, Supplier and Market trends

Quality Attributes

Limitations with present electrical system

"Functional Growth"
- New customer functionality within "Green + Safe + Connected"

<table>
<thead>
<tr>
<th>Green</th>
<th>Safe</th>
<th>Connected</th>
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<tbody>
<tr>
<td>Minimize CO2 and emissions</td>
<td>No one shall be injured in a Volvo car</td>
<td>Always be connected everywhere, anywhere</td>
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<tr>
<td>Energy Efficient Components</td>
<td>New Active Safety functions</td>
<td>Internet</td>
</tr>
<tr>
<td>Stop-Start</td>
<td>New Passive Safety functions</td>
<td>Car-to-car</td>
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<td>PHEV</td>
<td></td>
<td>Car-to-Infrastructure</td>
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Tomorrow

Today

Technical steps

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A 10+ YEAR JOURNEY

2004 FMC enters AR as Core Member. Volvo Cars represents at EB, SC and PL and populates working groups.

2008 ECU by ECU migration plan

2010 Volvo Cars was separated from FMC

2010 New platform development with limited legacy.
New EE architecture needed -> Window of opportunity for change in BSW

New system design toolbase needed -> Window of opportunity to change exchange formats and the logical architecture.
OPEN ARCHITECTURE AND STDS

Open Platform
- Autosar 4.0
- Genivi

Standards
- ISO 26262
- ISO 14229
- ...

Industry solutions
- CAN
- LIN
- Flexray
- Ethernet
- MOST150

Updating the Electrical Platform by:

1. New Architecture
2. New Base Technology concepts
3. New Methodology & Tool chain

Prerequisite: Leverage common industry solutions & standards & tools aiming at an open platform
VOLVO

Vehicle level requirements

System Component and Test Specifications

Signal Data Base

Integration Environment

Elektra Electrical System Design

Inhouse SW Development (Simulink, et. al.)

Logical Architecture Design

Diagnos info

ECU supplier

Autosar SWC Implementation Tool-set

Autosar ECU config tools

Requirement Management, e.g. Doors

TOOLCHAIN

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THE HOW, ARCHITECTURE CONCEPTS

All legacy concepts are now according to Autosar

• Timing model
• Diagnostic kernel
• COM (PostBuild)
• NM
• RTOS
• Application interfaces

Examples of new or elaborated concepts

• Mode management
• ECU startup/shutdown
• Watchdog handling
• NVRAM handling
• OS
• E2E Safety
• .....
THE HOW, OPEN SUPPLIER BASE

Pro’s

+ Natural competition
+ Clear tier 1 responsibility
+ Conformance to standard, limited proprietary solutions
+ Possibility to swap BSW
+ Possibility to integrate mixed supplier BSW

Con’s

- Effort to coordinate BSW suppliers
- Less flexibility
- Suffer from immature AR spec’s
- OEM intervention needed when multi supplier BSW are integrated
Facts and figures

Car models based on Autosar

NUMBER OF AUTOSAR ECU'S IN VOLVO PRODUCTION

7 different suppliers of AR 4.x BSW (Volvo Cars 2015)
A clean cut implementation is a huge task
Close cooperation with Tier2’s (and Tier 1’s) was key to success
The need for a holistic tool set is fundamental
AR configuration space with dependencies (ECU Extracts >4000 parameters)
The AR standard has developed without serious competition.
Open market helped enforce standard compliance.
Thank you!

Questions?