Win-Win with Embedded Software Components as a Product

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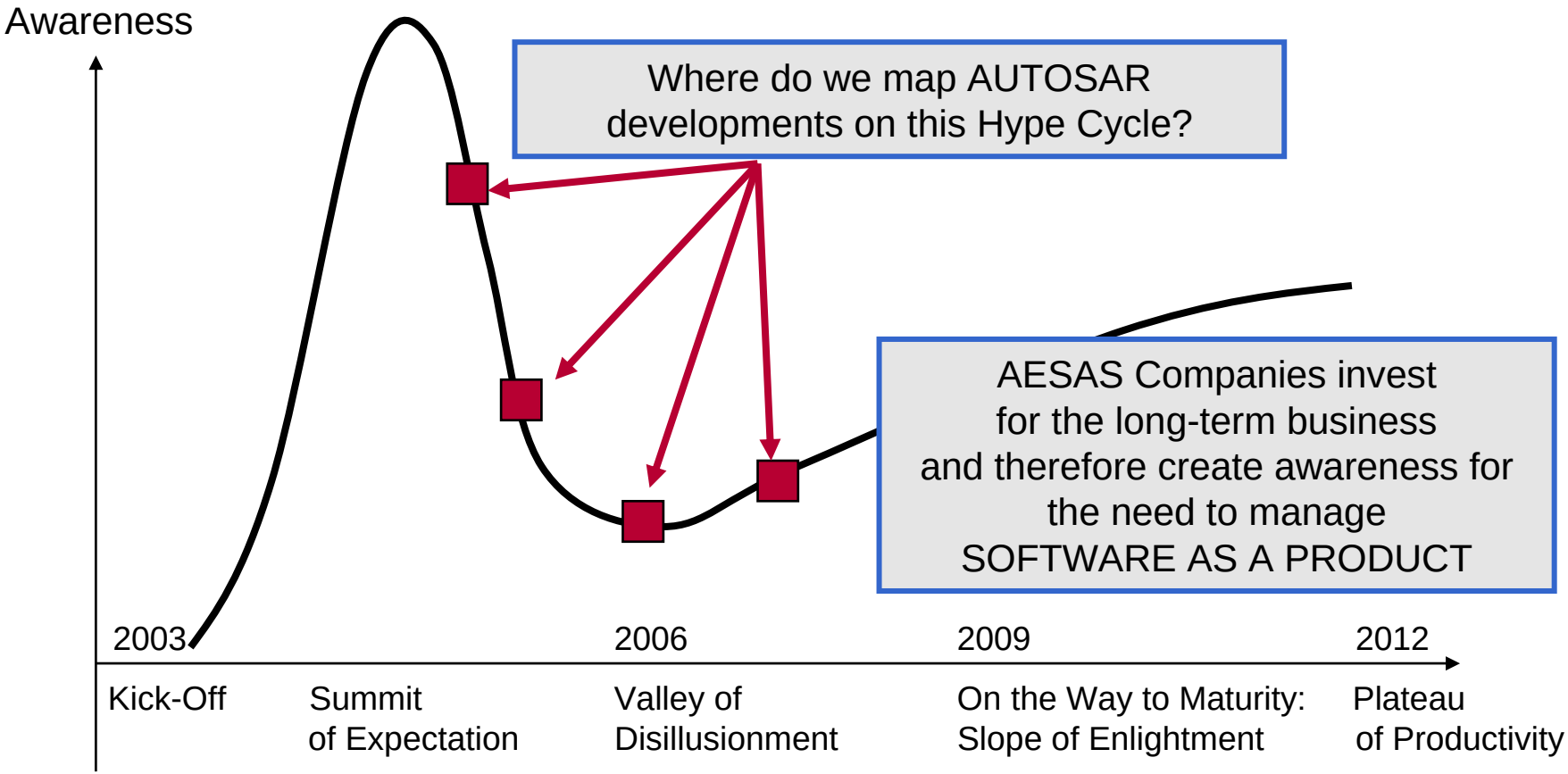
AESAS
Association of European Suppliers for Automotive Software
at the AUTOSAR Premium Member
Conference in Brussels, December 12th, 2006

HypeCycle of New Technologies and AUTOSAR™



HypeCylce by Gartner Group

Agenda

- Update on AESAS
- Changes for software companies with AUTOSAR
- Embedded software as a product
- Source code vs. object code
- Summary and next steps

AESAS Summary

Association of European Suppliers for Automotive Software

- AESAS stands for **A**ssociation of **E**uropean **S**uppliers for **A**utomotive **S**oftware
- AESAS is an industry association of medium-sized companies that develop and distribute software and related services to the automotive industry

AESAS Members Update

Association of European Suppliers for Automotive Software

Working Groups and Activities

- Business Models
  - Assessment of current business models
  - Issues with current models
  - Recommendations for business models
  - Ready in H1 2007 to present results
- Source Code
  - Content of this presentation
- Image
  - Create awareness for the values provided by automotive software companies beyond the program code.

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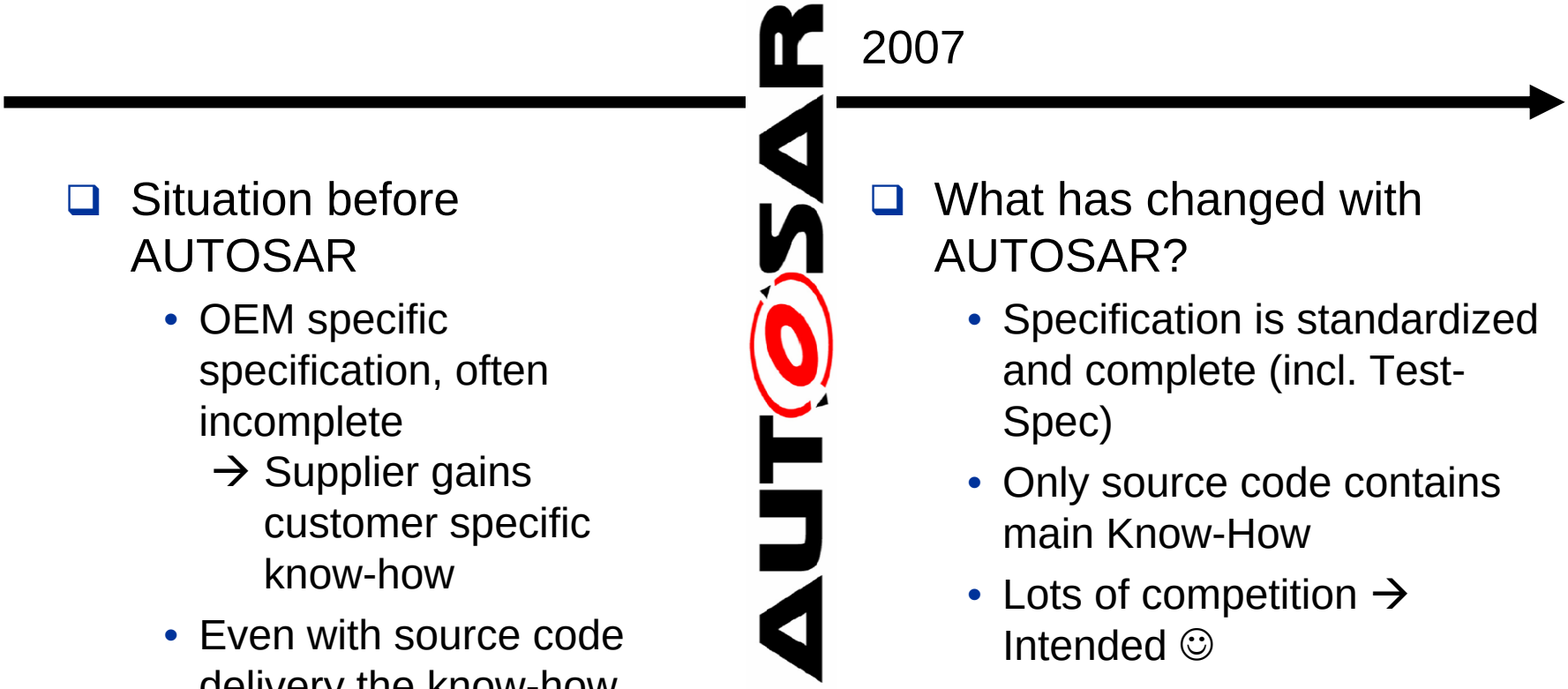
Why now ?



- Situation before AUTOSAR
  - OEM specific specification, often incomplete
    → Supplier gains customer specific know-how
  - Even with source code delivery the know-how advantage was maintained

- What has changed with AUTOSAR?
  - Specification is standardized and complete (incl. Test-Spec)
  - Only source code contains main Know-How
  - Lots of competition → Intended ☺
  - Big Specification requires major investments

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Properties of Automotive Embedded SW

- Functional Requirements / Properties
  - Embedded software. The software is an integral component of an electronic system (close proximity to hardware).
  - Distributed software. Logical software entity is distributed over several ECUs.
  - Great demands on safety. Verification of functional safety is a prerequisite for type approval for use in public traffic.
  - Great demands on real-time properties. The required time span between the occurrence of an external event and its treatment in the ECU is very short
  - High demands on availability. A vehicle function is not permitted to fail.
  - High cost pressure on hardware. Great demands on software optimization.

Source: “Prototyping”, M. Maier, Nikkei Automotive Technology Days 2005, Tokio

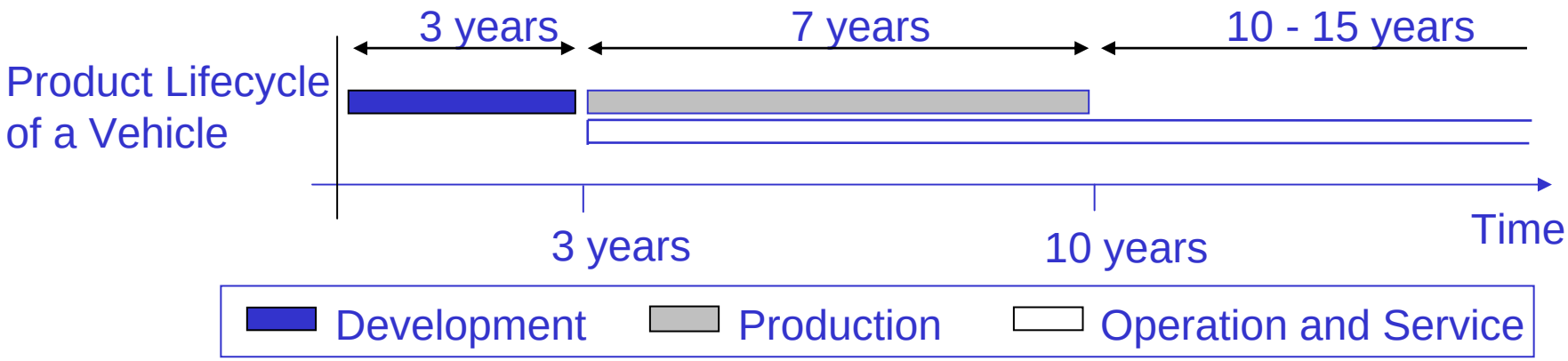
Properties of Automotive Embedded SW

- Non-Functional Requirements / Properties
  - Long-Life Cycle. Due to the nature of the Automotive Business, the Embedded Software must remain active (in maintenance) for a long period of time. Typically from start of development over production to service (10 to 15 years)

Source: “Prototyping”, M. Maier, Nikkei Automotive Technology Days 2005, Tokio

Lifecycle of Automotive Embedded SW

Source: “Automotive Software Engineering, Dr. Th. Zurawka, Jörg Schäuffele



Additional Challenge: Complex Development Partnerships

- OEM, Tier-1, Tier-2 and BSW Module Supplier need to be integrated
  - Different ‘modes’ of operation are common in the Automotive Industry
  - Each Development Partner has unique Know-How that contributes to the overall success of the project

Automotive Embedded SW as a Product

Source: “Automotive Software Engineering, Dr. Th. Zurawka, Jörg Schäuffele

- Result: Automotive Embedded Software is a Product
  - Applies to Basic Software Modules especially
  - Development, Timing, Budget, Conformance and **Service** must be guaranteed over the life cycle
- Win-Win with Automotive Embedded Software
  - In order to address the unique challenges of Automotive Embedded Software, a win-win situation for all development partners is the key for success

→ Business Models of Development Partners need to ensure the Win-Win situation in order to guarantee the long-term success

Different Types of License Models

Examples for License Models:

- Service Contract
- Contract for work and labor
- Buy-Out
- License agreement (Usage rights)
- Mix of above

- AESAS defines, based on the unique experience of its members, recommendations for business models
  - Focus is to ensure the long-term success of Automotive Embedded Software and AUTOSAR

Type of Contract

Practically all usual types of contracts:

- Service Contract
- Contract for work and labor
- Buy-Out
- License agreement (Usage rights)
- Mix of above

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Customer Statements (I)

- “We need source code (SC) for review, to judge the quality”
- “We need SC to debug (in laboratory and field test) to analyze problems”
- “OEM: We want the Tier to take the responsibility (liability) for one ECU and therefore we want to give him access to SC”
- “Why changing now if we always got source code?”
- “We want the buyout to develop and maintain the code further”
- “We need SC for fast and cost efficient porting”

Customer Statements(II)

- Tier 1 and Software Supplier as an integrator:
  - “Our (T1 customer) concern is with seeing the SC, that the originator may claim, we violated the copyright with our own implementation (this would require a clean room implementation)”
  - “The integrator of the AUTOSAR validator (seeing SC) agreed not to create BSWC within the next years”
- “Ensures maintenance and support in case of relationship problems with supplier (insolvence, etc.)”
- “SC in connection with configuration enables more efficient solutions (RAM, ROM, Speed)”
- “In case of safety critical applications we prefer object code (OC)”
- Tier 1: “We give our developers for the drivers only object code, so they cannot modify the SC”

Product Updates

How to do product updates with source code delivery?

- Will the SW-modules (only) be maintained by the customer?
- Will the SW-vendor get feedback about improvements or bug fixes etc.?
- How will the changes of customer and vendor be synchronized?

Liability and Warranty

- If the BSWC supplier delivers the software in source code, the need for warranty and liability restrictions for the BSWC supplier is even much higher: Since the OEM is then able to modify and/or extend the software, he may create bugs in the software for which the BSWC must not be held liable.
- The warranty obligations of the BSWC supplier must be limited to the software provided by the BSWC supplier to the OEM.

Copyright and Property Rights

Three legal areas to consider:

- Copyright (object and source code)
- IP protection (especially source code)
- Patent rights

How to protect the immaterial rights with source code?

- Act in good faith (only with NDA)
- Escrow
- Digital signature
- Generated source (know-how embedded in generator tool)

IP Protection

Different levels of potential damages:

- Medium (User):
  - Development department at OEM, Tier1 or Tier2
- High (Competitor):
  - Integrator/competitor who is/has developing /-ed the same modules
  - T1/T2-department, who is developing the same modules
- Very High (Competitor):
  - Companies in areas with limited attention to copyrights

Possible Solutions

Recommendations to limit the risk:

- Deliver only object code
- Turn around principle
  - Not standard to deliver source code
  - In case of SC delivery only with limitation of user community (e.g. company name or department)
- Source code for review only (OEM and ECU supplier)
- SC for OEM only (no right to pass on further)
- SC for T1 (no right to pass on and specification of user community within company)
- SC to integration company (Competitor with specific source code NDA between vendor and integrator)

Compatibility

- Software interface specifications and certification:
  - AESAS-members would like to certify the compatibility of the different modules (within AUTOSAR and outside)
- Development of AESAS recommended practices including appropriate certifications:
  - AESAS would like to establish recommendations for the development with high quality and introduce a quality standard to guarantee a high quality level

Win-Win with Software

- User (OEM, T1)
  - Standard BSW enable vendor (IC, T1 and SW vendor) independent implementation of customer feature
  - “Commodity-zation” of BSW
- SW Vendor
  - Has an interest in IP protection to ensure long term business, which leads to long term support of the customer
  - Differentiation through design and add-on tools

Next steps

- Show possible recommendations to establish a successful business in automotive software
- Solve contradiction: Object code only vs. source code
- Establish a common vocabulary of concepts/terms between members and customers
- Establish „AESAS-Compliance“ quality argument/level

→ **To join AESAS please send email to contact@aesas.org**