Enterprise Architecture for traditional industries in a globally transforming digital age

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Sebastian is an IBM Distinguished Engineer who is continuous driving optimized business solutions through IT innovation specifically with automotive clients. In this activity he was the inventor of many unique optimization algorithms.

He is the Chief Technology Officer for IBM Automotive Industry Japan leading the technical strategy for data-centric business models and connected vehicles to create new solutions to address the physical and virtual mobility demands of the industry.

Sebastian has more than 21 years experience in the IT and 12 years in the Automotive Industry. He has a strong reputation recognized globally within and outside IBM as a member of IBM’s IT Architect profession, IBM Academy of Technology Leadership Team, and IBM Technology Team Advisory Council.

Before joining IBM Research & Development Laboratory Germany as chief IT architect for payment systems in banking environments in 1998 he managed and owned two software development companies.

He graduated (Associate's Degree/Diploma) both in Mathematics (Cryptography) and Computing Science (Computational Mathematics) in 1997 and received his Doctorate Degree in Mathematics (Number Theory) from the University of Tübingen in 2001. Between 1998 and 2005 he set many mathematical computation world records and led the project ZetaGrid which was the first large distributed computation grid within IBM connecting 11,000 systems. In 1993 he was winner at the 12th German Nationwide Contest for Computing Science (BWINF).

Sebastian is a member of the International Association of Software Architects (IASA) and Association of The Open Group Enterprise Architects.
This may be a wonderful tool

Photo: Nespresso
But this a wonderful experience!
Product orientation – example Bill of Material…thousands of parts

Automobile

Subsystems
- Powertrain

Modules
- Internal combustion engine

Groups
- Cylinder head

Subgroups
- Valvetrain

Parts
- Globe valve
- Valve spring
- Camshaft

Photo: Daimler AG
Individualized products for target customer segments
But we need to think about the way we architect a system

**An engineering approach:**
- A product is complete, if you cannot **add** functionality to it…

**Purpose oriented approach:**
- A product is complete, if you cannot **remove** functionality any more without breaking it…

Photos: Victorinox
Growing importance of Information Technology in Automotive

### 1886 Benz Patent Motor Car

<table>
<thead>
<tr>
<th>Product</th>
<th>0% IT</th>
<th>Calculation support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research &amp; Development</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Marketing &amp; Sales</td>
<td>0%</td>
<td></td>
</tr>
<tr>
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<td></td>
</tr>
<tr>
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### 2014 New Mercedes

<table>
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<td>&gt;60% (HR, Finance, Procurement)</td>
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Digital Transformation of the product and supporting processes

Vehicle Architecture

Enterprise Architecture
Scope of Enterprise Architecture

Enterprise Architecture

Business Orientation

IT Orientation
IBM Automotive Industry Domain Model – High Level Overview

- Product Management & Marketing
- Procurement
- Research & Development
- Pre-Production / Construction
- Production
- Sales
- Financial Services
- Mobility Services
- Aftermarket
- Supply Management & Fulfillment Logistics
- Business Administration
- General Support Functions
# IBM Automotive Industry Business Capability Model

## Product Management & Marketing
- Portfolio Management
- Product Requirements Mgmt
- Product Documentation
- Customer Change Management
- Customer Relationship Mgmt
- Information Mgmt

## Procurement
- Supplier / Procurement Strategy
- Supplier Management
- Tender Process
- Contract Management
- Performance Management

## Research & Development
- Dev. Project Mgmt
- Dev. Standards
- Requirements
- Design
- E/E & Software Dev.
- Mechanical Dev.
- Digital Validation
- Physical Validation
- Development Support
- Research
- Documentation

## Pre-Production / Construction
- Process Planning
- Assembly
- White Body
- Tooling
- Die/Mold design
- Production Engineering
- (Robot, Machining)
- Plant design
- Digital Factory
- Type test (Vehicle certification)
- Issue Tracking

## Production
- Factory Management
- Production Planning
- Scheduling
- Component Production
- Assembly
- Production
- Maintenance
- Quality Management

## Sales
- Sales Strategy
- Demand Forecast
- Analysis
- Sales Planning
- Lead Management
- Order Mgmt
- Fulfillment
- Sales Documentation
- Service Mgmt
- Financial Services
- Vehicle Service Offerings

## Financial Services
- Product / Portfolio Mgmt
- Lease Mgmt
- Contract Mgmt
- Credit Admin.
- Contract Accounting
- Contract Origination
- Funding Mgmt
- Service Comp. Mgmt
- Collection Mgmt
- Banking
- Brokerage
- Remarketing
- Compliance
- Risk Mgmt

## Aftermarket
- After sales Strategy
- Relationship Mgmt
- Service Mgmt
- Parts/Svcs Offering Mgmt
- Vehicle Service
- End-of-life Service
- Logistics / Supply Mgmt
- Aftersales Documentation
- Warranty / Quality Mgmt
- Service Training

## Mobility Services
- Mobility Strategy
- Infotainment
- Connected Navigation
- Safety and Security
- In-Vehicle Driver Guidance
- Vehicle Diagnostics
- Electric Vehicle Srvcs
- Fleet Management
- Mobility 2.0 (Car Sharing, PAYD Insurance, Intermodal Travel, Traffic Mgmt)

## Supply Management & Fulfillment Logistics
- Supply Chain Strategy
- Supply Chain Integration Mgmt
- Partner Relationship Mgmt
- Warehouse Mgmt

## Business Administration
- Shareholders & External Relations
- Financial Performance Report
- Enterprise Financial Consolidation

## Controlling
- HR
- IT
- Internal Control / Audit Mgmt
- Tax Mgmt
- Planning and Forecasting

## Real Estate Mgmt
- Env. Compliance, Security, Safety
- Fixed Assets Administration
- Knowledge Mgmt of Corp. Inform.
  (lifecycle mgmt, maintenance process)
Sourcing strategy of IT Functions – Examples Heat Map General Motors

Application Landscape “a list of the live applications” is influenced by many technologies – Examples for a business domain “Sales”
IT hot spot of Enterprise Architecture

**KPI Categories:**
- Compliance
- Innovation
- Capability provision
- Transparency
- Homogeneity
- Redundancy
- Project execution
- Cost
- Disaster tolerance
- Security
- ...

**Practical compromise needed to reduce complexity**
But coming back to Vehicle vs Enterprise Architecture

The reality is still far away from the theory!

<table>
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The Enterprise Architecture depends on the Business Model

Internet is a feature in cars

Vehicle as an integral part of the customer’s personalized network

Different Business Models

“owning car” business ---- car related business ---- beyond car business

production leasing car rental car sharing inter-model mobility chauffeur service
What is the reason for mobility and creating the Automotive Industry?
Mobility is about getting from A to B

Options to a set of mobility services

Profile
- Time
- Costs
- Convenient
- Comfort
- ...

Start
A

Use Case
- Business
- Leisure
- Shopping
- ...

Platform to Mobility Service Providers
Risks regarding endangering reputation and brand value
Google Executive Chairman Eric Schmidt famously (or infamously) said “Google’s policy is to get right up to the creepy line but not to cross it”

Traditional brand values: comfort, safety, longevity, reliability, …
Risks regarding endangering reputation and brand value
Example: Autonomous Driving

Why do I need to own a car?

Driving as a service

Why do I need vehicle insurance?

Why do I need parking?

Can I change the individualization of the car per ride?

Getting from A to B might be free of charge

Safety is critical

Next generation of Advanced Driver Assistance Systems

Driving remains with the car

Patent 8,630,897
Transportation-aware physical advertising conversations

My creepy line

Photo: Google

Photo: Daimler AG
New and emerging technologies will combine to transform industries

Value chains will fragment

Industries will converge

Ecosystems will emerge

Source: IBM Institute for Business Value – Digital Reinvention
The Shift to Services … IBM Mobility Domain Model – High Level Overview

Product/Services Management & Marketing

Procurement

In-Vehicle R&D

Production

Multi-Channel Sales

Financial Services

Aftermarket

Mobility R&D

Service Enablement

Business Administration

Mobility Marketplace

Supply Management & Fulfillment Logistics

Data Services

Quality Management

General Support Functions
Summary hot spots of Enterprise Architecture

Enterprise Architecture

Need to be accurate and open for significant changes

Practical compromise needed to reduce complexity
Thank You!