



Multimedia Systems in Automotive General Presentation

16-Feb-2014

Agenda

- › Multimedia in Automotive – Short History
- › Main Functionalities
- › Features
- › Products
- › Software Architecture
- › Platform and Customer Applications
- › Future of Multimedia Systems in Automotive
- › What 's this course all about?

Brief History



A Motorola car radio installation diagram (circa 1930) showed batteries, spark plug suppressors and the antenna, in addition to the radio components.



First Car Radio

First GPS Connection

First Automotive Navigation System

Infotainment Systems

Every new car has Internet connection

1930

1972

1981

2000

2015

Main Functionalities – High-End Multimedia System

- › Human Machine Interface

- › GUI
- › Speech



- › Navigation

- › Vehicle Settings

- › Connected Devices

- › BT
- › USB/SD
- › WIFI

- › Entertainment

- › Audio Video
- › Radio

Features

- › Play music from CD, hard drives or external device (USB, Memory Card, PCI FM Radio, iPod)
- › Play video from DVDs
- › GPS dynamic navigation with Points Of Interest
- › Satellite radio
- › AM/FM Radio
- › Digital or Analog TV
- › Touch screen display
- › Voice Input/Output, Text-To-Speech
- › Internet browsing
- › Mirrorlink, Miracast
- › Hands free cell phone
- › Vehicle Settings – modify every setting from your head unit
- › Driver Assistants: Automatic Cruise Control, Lane Departure Warning, Blind Spot Warning, Parking Assistant, etc.



Our Products



Integrated Driver
Information System
Alfa Romeo



Multimedia
System
Lancia



Radio Navigation
Opel

Multimedia System BMW CCC

Radio-Navigation
for Mass-Market



Multimedia System
S-Class & SL



Multimedia System
S-Class & SL



Radio/CD
Peugeot



Opel Carphone

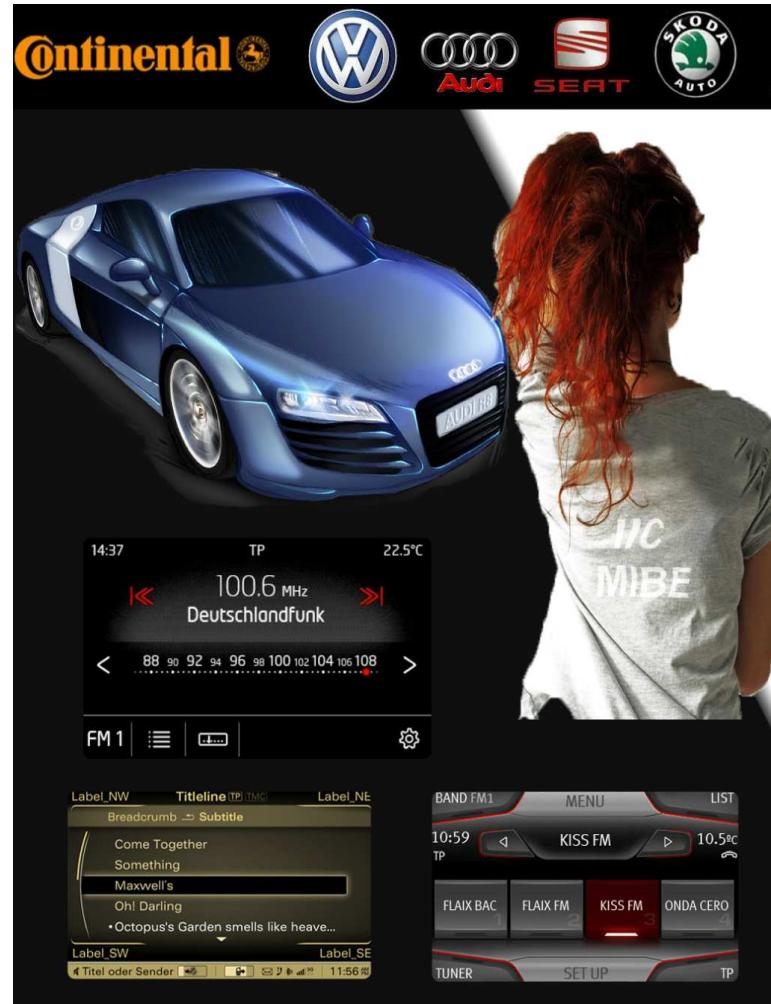


Navigation System
Renault



Multimedia System
BMW

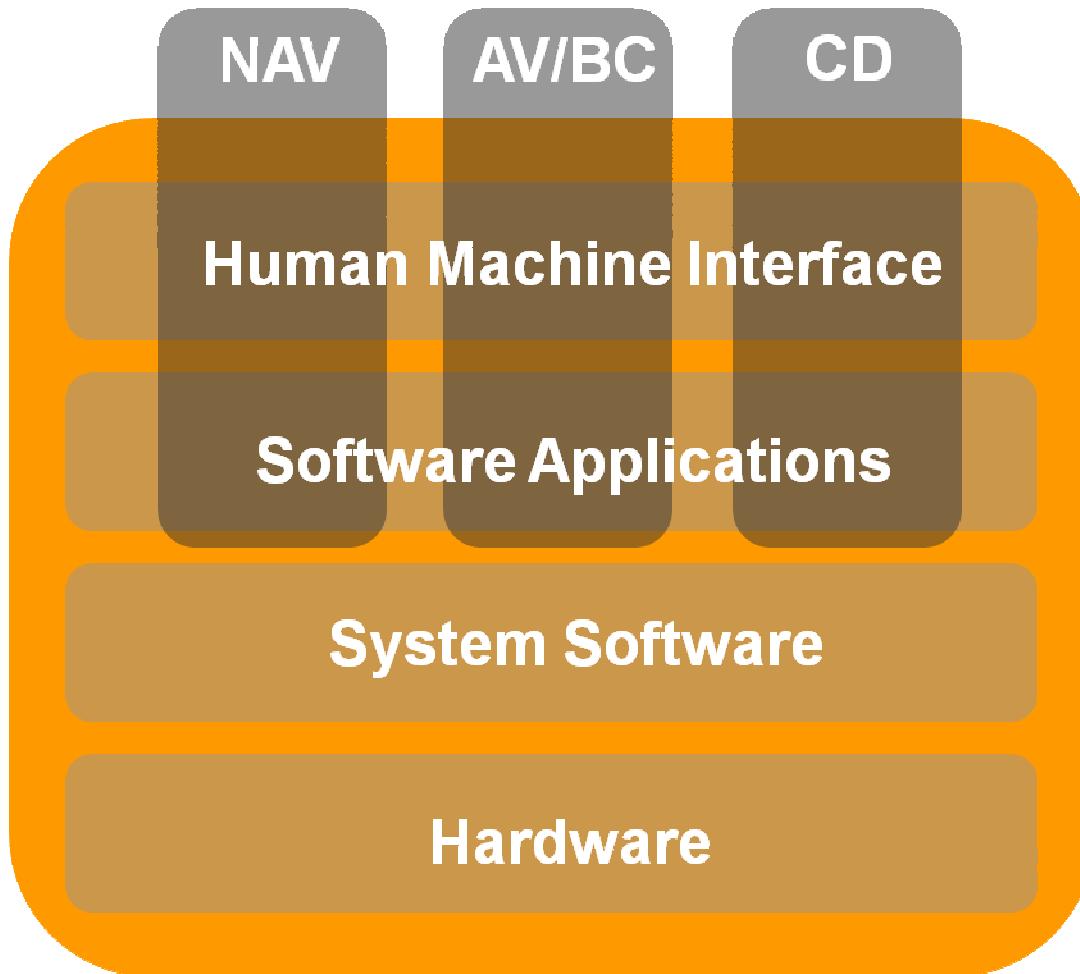
Projects (VW RNS and MIB-E)



Projects (BMW L7E)



Software Architecture Overview



Challenges



Trends in Automotive-Industry



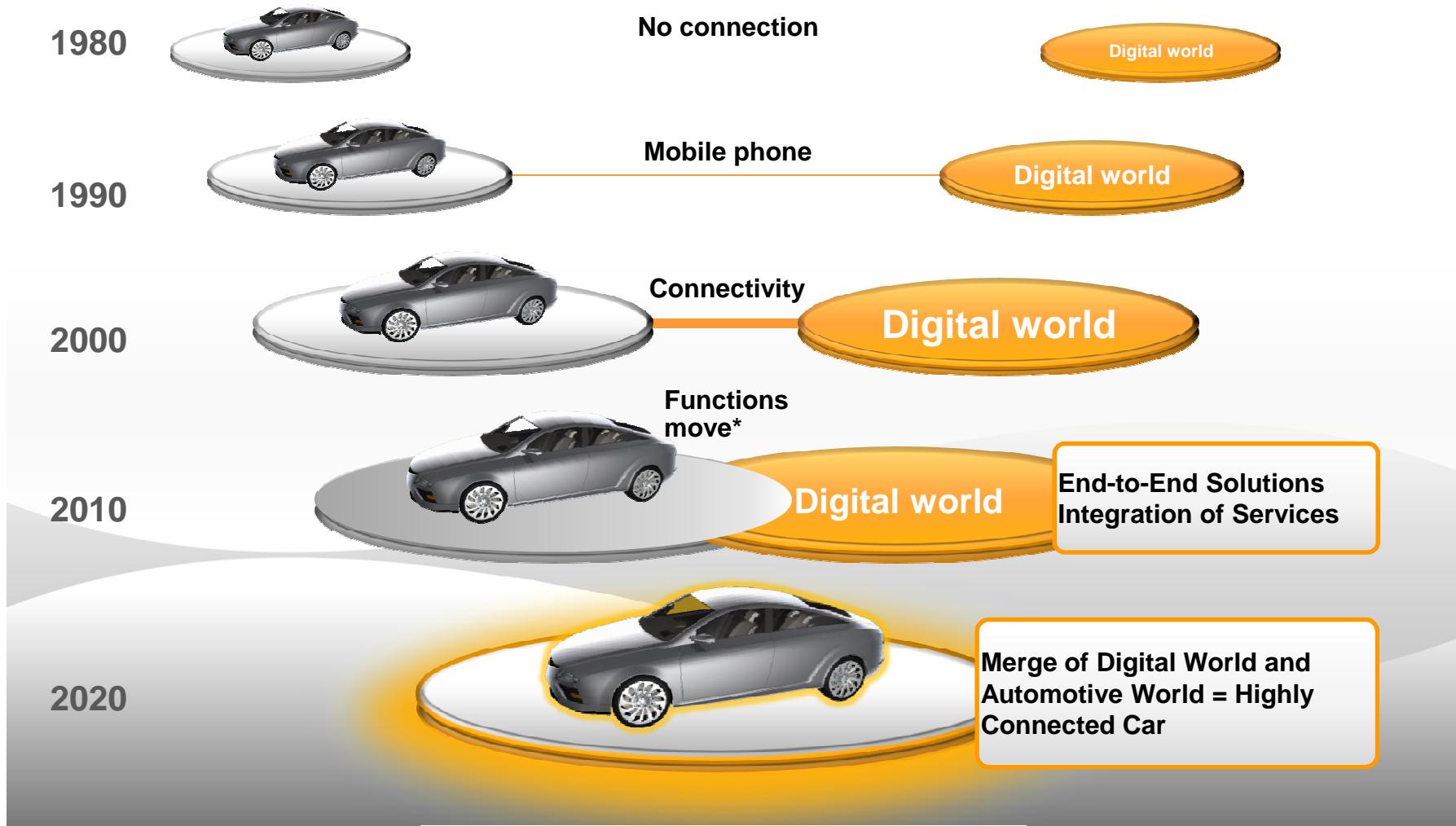
Trends



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The digital & automotive world – History & Future



Market Trends – We inform you well

Usability, HMI & Information



Attractiveness

- ▶ HD & 3D graphics
- ▶ Augmented reality
- ▶ Personalized content



Safe to Use

- ▶ Driver distraction
- ▶ Workload, simplification
- ▶ Rear & surround view cameras



We inform
you well



Driver Information

- ▶ More and larger displays
- ▶ 3D displays, holistic view
- ▶ Tablets as remote displays



Easy to use

- ▶ Multitouch, haptic feedback
- ▶ Gesture & voice recognition
- ▶ Mimic & mood recognition



**Market & end consumer need:
“I want an attractive, easy and safe to use HMI”**



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Market Trends – We connect

Connectivity, Cloud & Services



Market & end consumer need:
“I want to be connected to what matters to me”



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Market Trends – All at lower cost

Affordability, Cost Down & Time to Market



Market & end consumer need:
“I want affordable in-car infotainment”



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The Lifecycle Conflict of Car Multimedia

Multimedia is driven by ...

IT & Consumer Electronic Industry

Lifecycles of 6 - 18 months



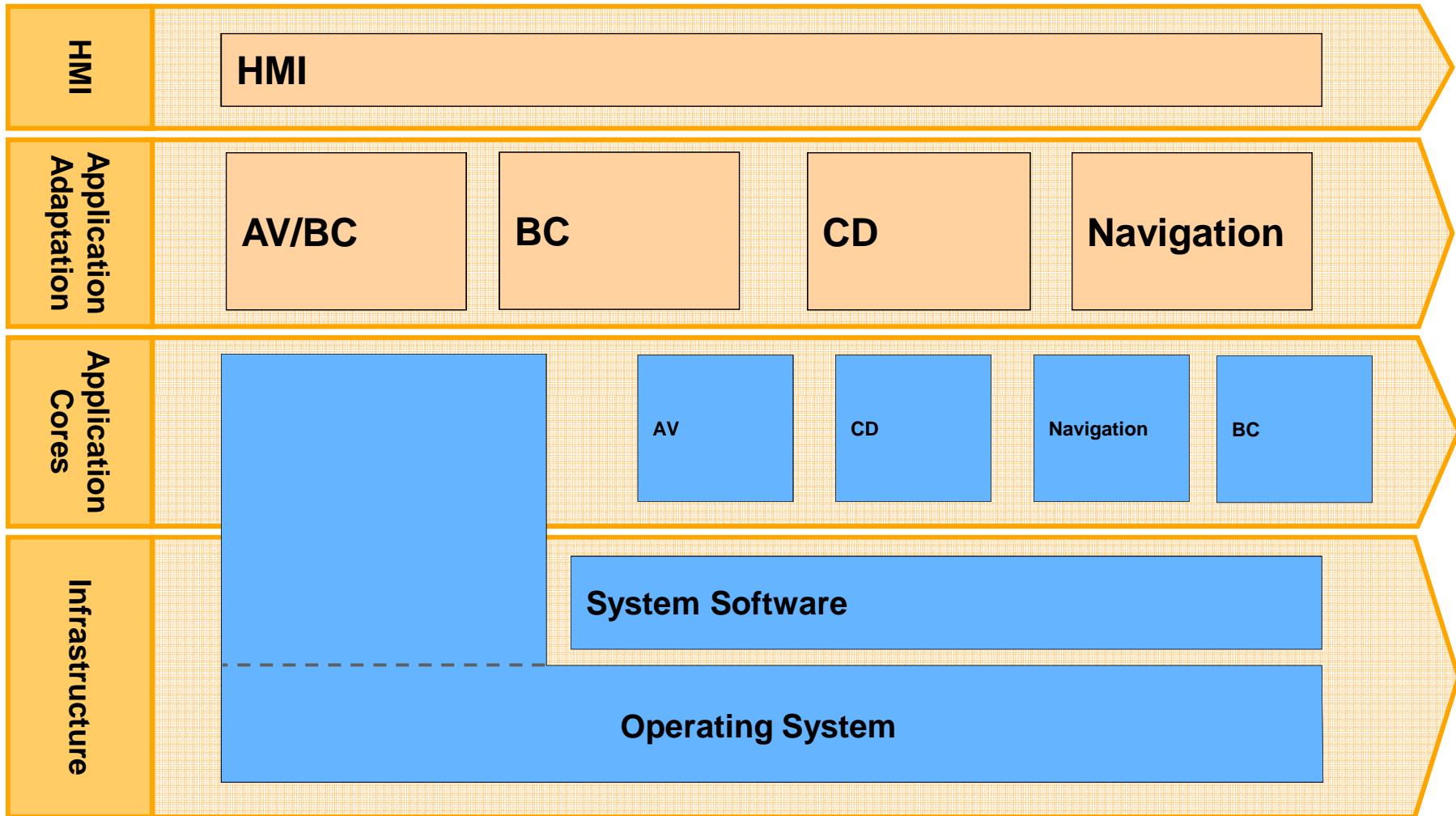
Automotive Industry

Lifecycles of about 7 years

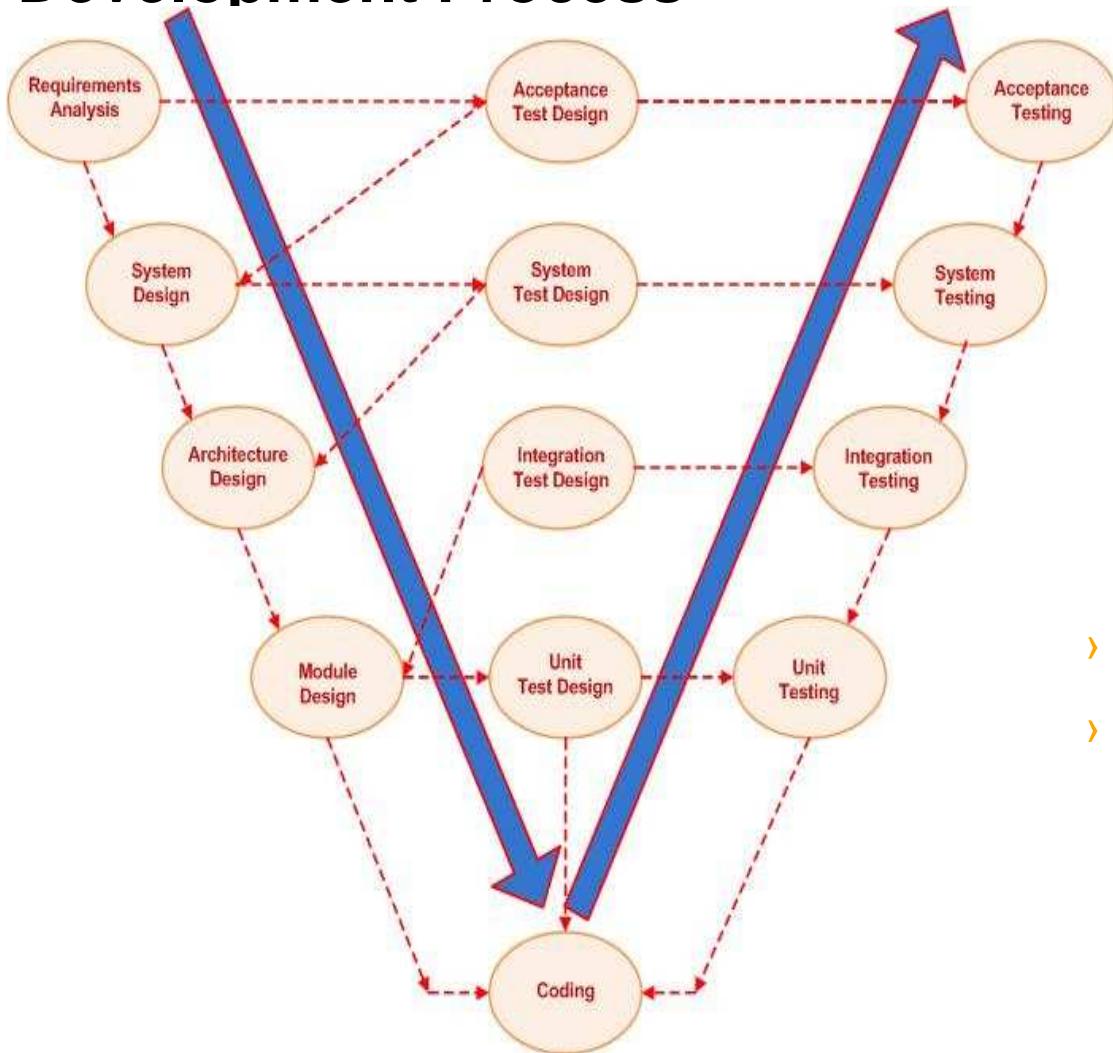


Concept Overview

Top Level System Blocks



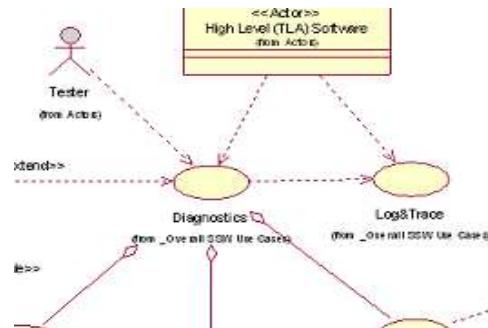
Development Process



- › V-Cycle model
- › common throughout automotive suppliers

Workflow

Architecture & Design



Implementation

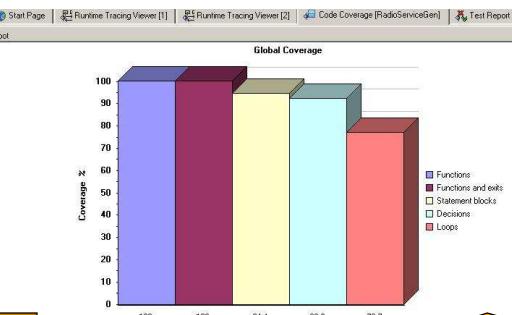
```
BOOL fRetVal = TRUE;

// Perform actions based on the
switch( dwReason )
{
    case DLL_PROCESS_ATTACH:
        // Perform any process-specific
        // initialization here
        break;
}
```

Test on hardware



Automated tests



Static code check

ISQP_SummaryResult.tsv - Notepad

Metric	Value
Total number of files	4
Number of analyzed files	4
Number of files where analysis failed	0
Number of old files	0
Total number of functions	60
Total number of Raw lines	4740
Total number of Netto lines	3179
Total number of delta Netto lines	3179
Total number of granted warnings	110
Total number of non-granted warnings	155
Number of granted deviations for MISRA rule 1	0
Number of granted deviations for MISRA rule 2	0
Number of granted deviations for MISRA rule 3	0

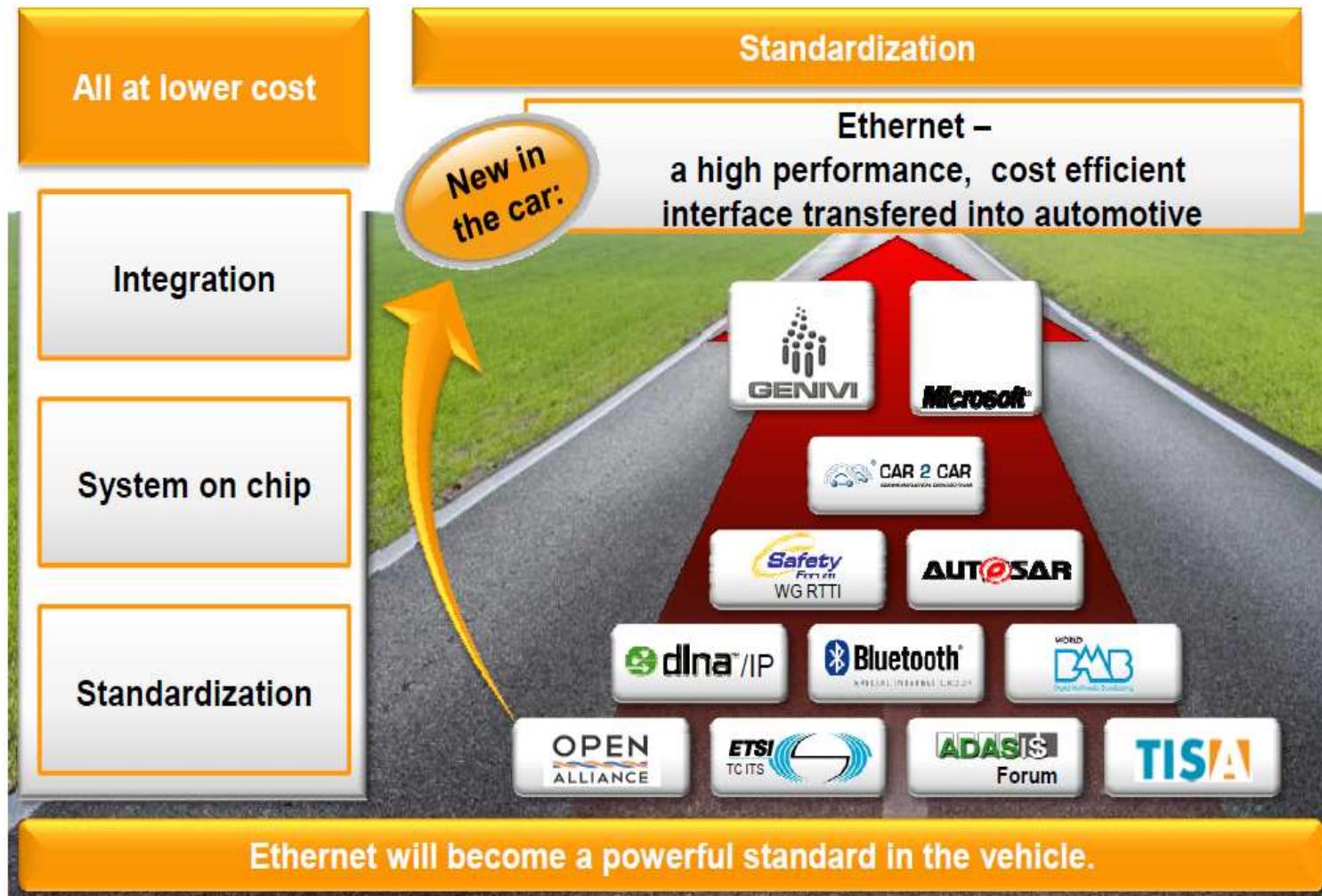


Multimedia Platform

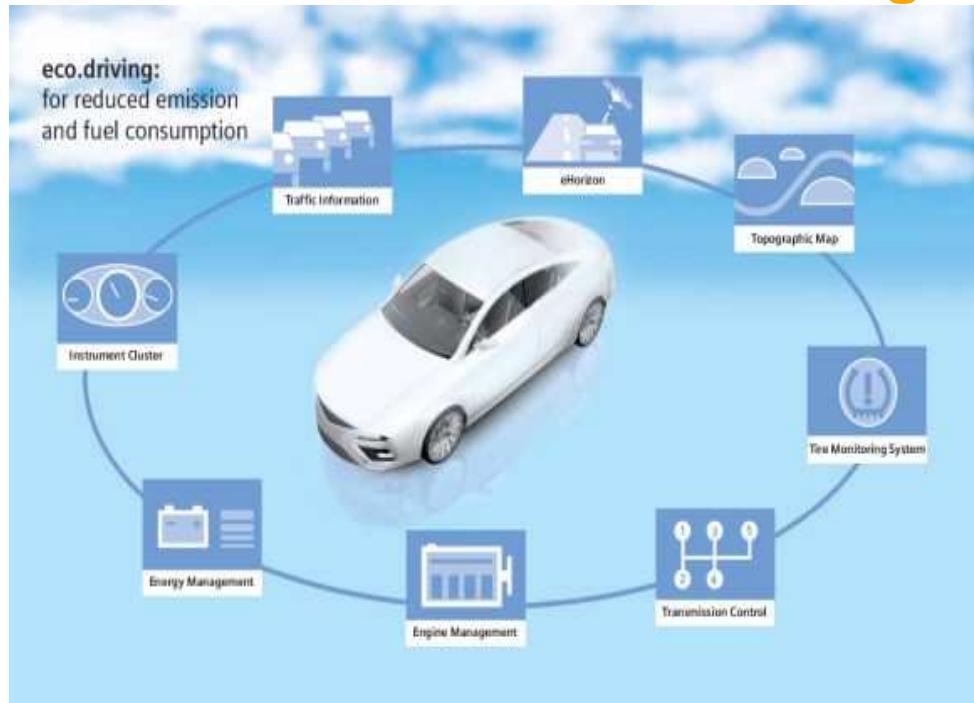
- › **Flexible** - OS allows for a short response time to consumer electronic (CE) trends
- › **Trend-setting** - easy integration of mobile devices
- › **Secure** - separation of automotive technology and entertainment function
- › **Powerful** - high-performance processors and superior graphics



Elements of All at Lower Cost

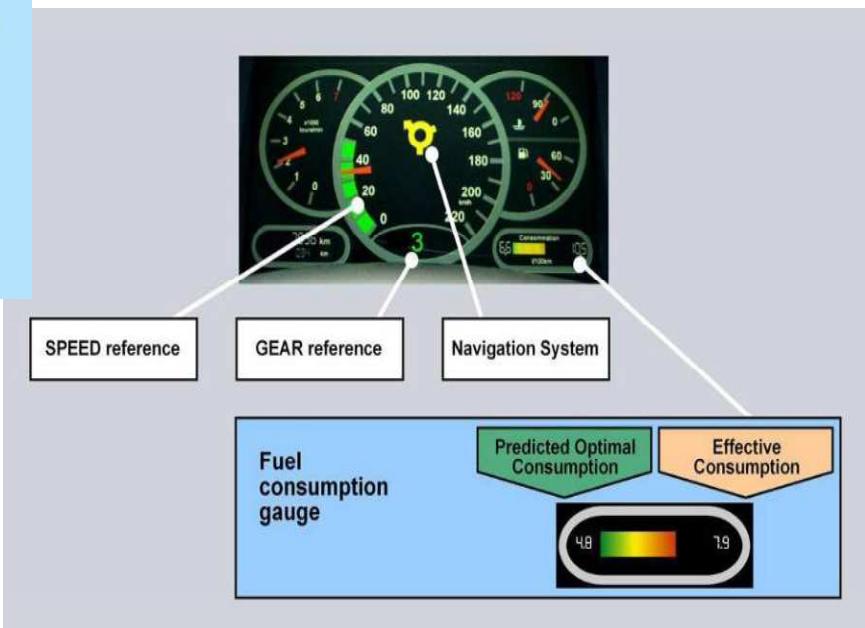


Innovative ideas - Eco Driving

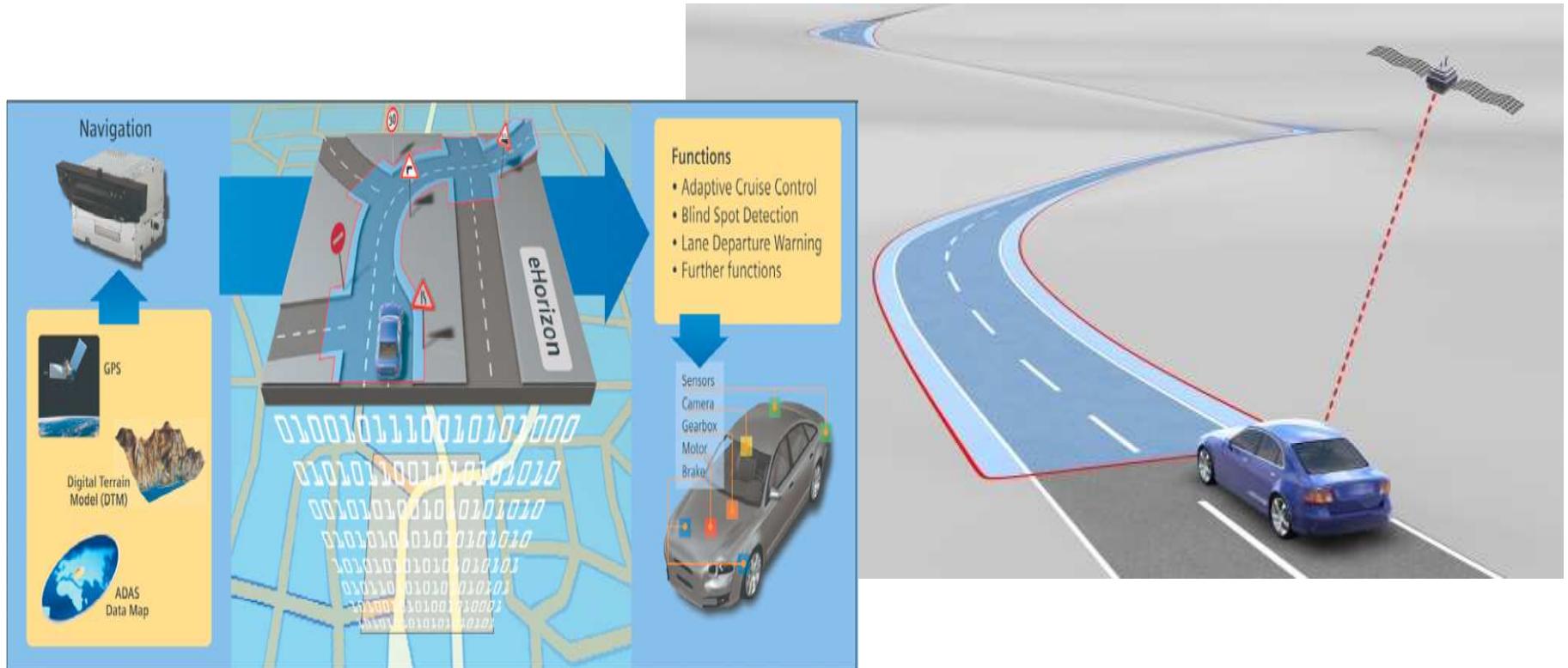


- › Navigation-based powertrain and energy management
- › Information available on front display

- Calculates the optimal speed and gear ratio
- A gauge indicator predicts fuel consumption in actual conditions
- Trip planning profile optimization from navigation system
- Communicates with external traffic center control
- Analysis of driver's impact



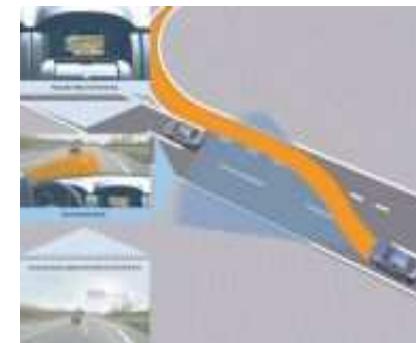
Innovative ideas - eHorizon



- **eHorizon** provides a preview of the roads which the car will shortly travel along.
- The system gives information on all relevant attributes like route guidance, route profiling, environmental and road conditions and therefore serves as an additional software based “sensor” for anticipatory driving.

innovative ideas - Augmented Guidance

- › **Intelligent** - combination of map display and real-time picture
- › **Intuitive** - easy-to-understand driving directions
- › **Safe** - current traffic situation always available



innovative ideas

- › Mood Grid



- › QNX car



- › Mercedes-Benz DIC



Technologies used and what will be done.

Courses:



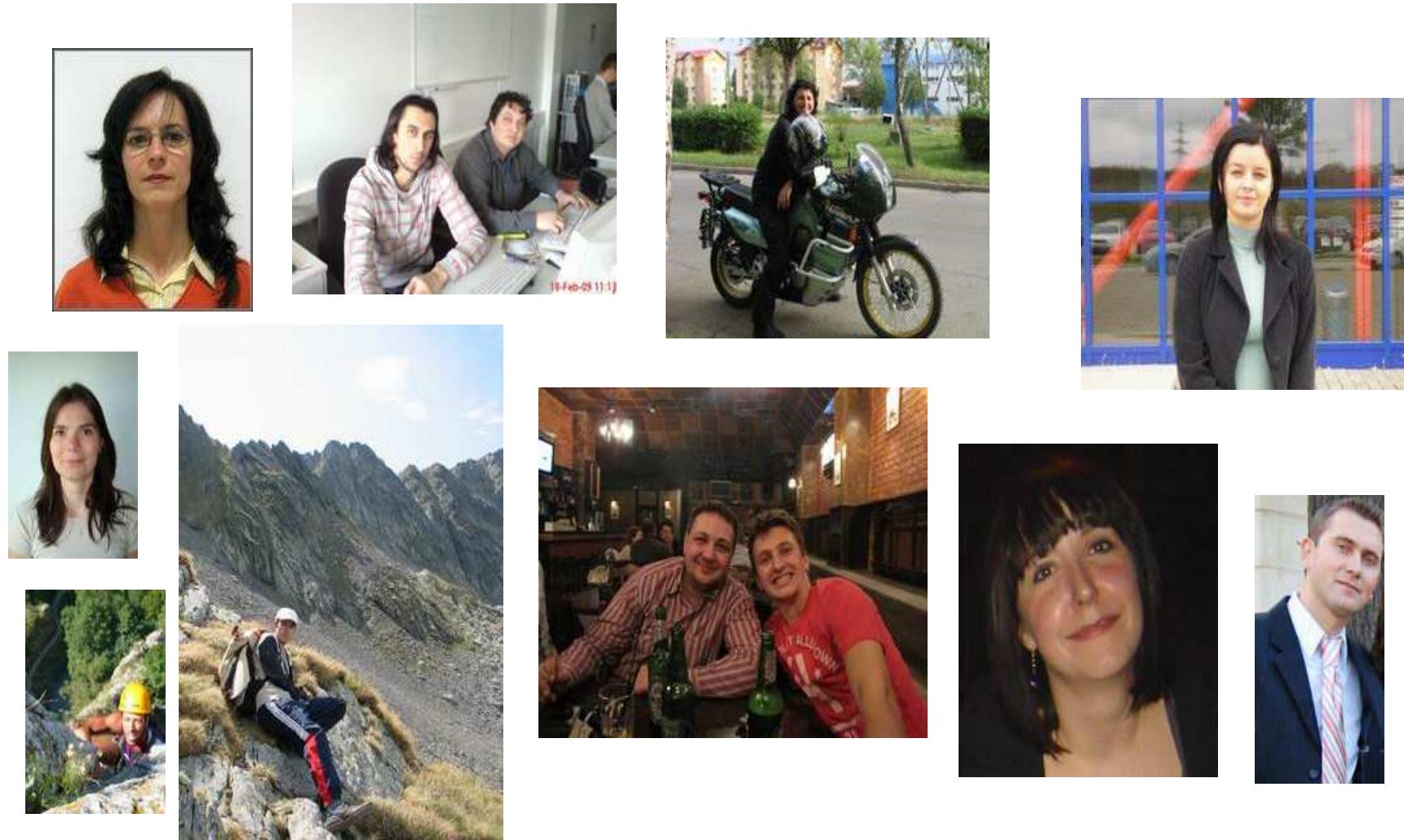
- Get familiar with the embedded world – not only on theoretical level
- Learn about all functionalities of a high end multimedia system from professionals
 - Become aware about the additional project tasks (project management, software lifecycle)
 - See how things gets done on Conti



Laboratories:

- Develop a fully functional multimedia system.
- Learn how to develop, debug, test and deliver your work.
- Get familiar with embedded technologies and frameworks.

Za team



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