Software-innovations as key driver for a Green, Connected and Autonomous mobility

Dr. Jutta Schneider, Director eDrive & Software Technologies, Daimler AG
Automotive industry Facts

50% of EU turnover in embedded digital technologies

698 bn€
EU automotive turnover
2012
Automotive industry Facts

1/3 of R&D turnover in 2020... of embedded digital technology
Automotive industry Facts

2.3m automotive jobs

+30k jobs per year
Automotive industry
Facts

R&D on embedded digital technology
21 bn€ per year in 2020
Economic and industrial trends
E/E & Software
90% of E/E innovations powered by software

Examples derived from B-, C-, CLS & S-Class as schematic representations

Scale:

Future years require leading hard- & software technologies
Software complexity - visually expressed

40 lines of source code

1 page DIN A4
Software complexity - visually expressed

400 pages
Software complexity - visually expressed

1 binder

ABS with 16k LOC (1978)
Software complexity - visually expressed

13 binders

1 meter

Distronic

with 208k LOC

(1999)
Software complexity is growing exponentially
How to bear the challenges?

- Autonomous
- Green
- Connected
- Big Data
- Product Innovations
- Globalization
- New business models
- New Players

Research & Development

- Mastering of complexity
- Process efficiency
- Collaborations & Cooperations
- Industry 4.0
Activities and Commitment of Daimler at European Industrial Research Programs
DAIMLER

MBAT

Combine Model-Based static Analysis and Testing

Embedded Systems Descriptions

Analysis Cases

Static Analysis Results

Analysis & Test Models

Test Cases

Dynamic Tests

Further Applications

Project lead
Daimler

Total budget
34,5M€

Duration

Daimler budget
2,3M€

Daimler use case shows 15% cost reduction potential

Dr. Jutta Schneider | Software-Innovations as key driver for the Green, Connected and Autonomous mobility | ARTEMIS-IA/ITEA-Co-Summit 2015
Critical Systems Engineering Acceleration

- ARTEMIS Innovation Pilot Project (AIPP)
- Reference Technology Platform (RTP)
- Interoperability Specification (IOS)

Autonomous Driving in Specific Environments

Project lead: AVL
Total budget: 82M€
Duration: 05/2013 – 04/2016
Daimler budget: 0,94M€
Development platform for safe and efficient drive

- Reduction of development time of complex embedded applications such as advanced driver assistance systems (ADAS)
- More efficient Design Space Exploration for ADAS prototyping based on FPGA, DSP and microcontrollers

Project lead: VTT
Total budget: 25,3M€
Duration: 09/2012–09/2015
Daimler budget: 2,7M€

* Plus 6 month

Goal: 15% cost savings for newly developed functions
A test methodology for Virtual Commissioning of production systems

- Behavioural description of production lines and their individual components
- Establishing formal test methods for Virtual Commissioning
- Improving the liability and quality of the production system

**DAIMLER**

Project lead: Daimler
Total budget: 4.3M€
Duration: 11/2013 - 06/2016
Daimler budget: 0.4M€

Goal: 100% fault free implementation in production!
**IDEaliSM**

**Integrated & Distributed Engineering Services framework for MDO**

- Engineering Language Workbench with domain specific and high-level modelling languages, ontologies and data standards
- Automotive Use-case: “Cockpit in three weeks” covering
  - Cable Harness Development
  - Cable Harness Validation

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**Project lead**
- KE-works

**Total budget**
- 9,2M€

**Duration**
- 10/2014 – 09/2017

**Daimler budget**
- 0,59M€

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**Cockpit cabling within 3 weeks**

* MDO = Multidisciplinary Design and Optimisation
Multi-Core technology fulfils the ever increasing demands of applications such as autonomous driving, but additionally raise new challenges concerning programming complexity and safety properties.

ASSUME addresses these challenges by developing methods for:

- efficient parallelisation of safety-relevant, performance-critical functionality
- improved traceability of safety-relevant functionality in the development process
- efficient verification of large systems
A robust sensing platform for future autonomous systems

- Increase robustness by decoupling of sensor and dedicated function
- Improve adjustment to environment conditions
- Adaptation of functionality instead of denial in case of declined sensor data

**Project lead**
Daimler

**Total budget**
10.4M€*

**Duration**
06/2015–09/2018*

**Daimler budget**
1.14M€*

*Planned

Unprecedented robustness through intelligent sensor fusion
You can ...

... try out MercedesMe

... drive electric B-class - outside BCC

... experience S-Class assistance systems

... understand charging complexity
thanks to all of you