Mobile speed in automotive

Department | 21/01/2016 | © Robert Bosch GmbH 2016. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.

Content

- What is BOSCH in Lund
- Paradigm shift in automotive
- Benefits of Academia collaboration

Department | 21/01/2016 | © Robert Bosch GmbH 2016. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.

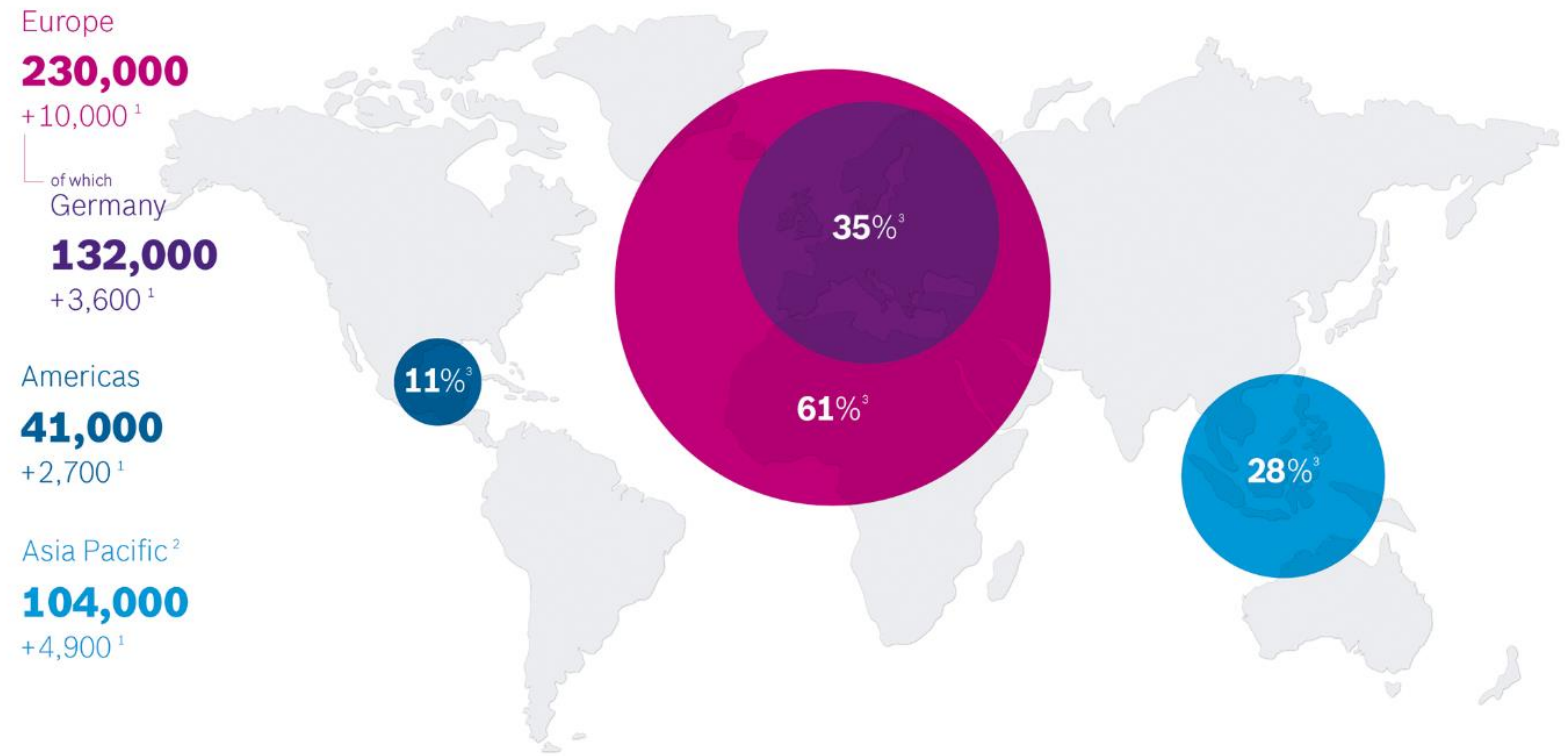
What is BOSCH in Lund

Department | 21/01/2016 | © Robert Bosch GmbH 2016. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.

BOSCH in numbers - Associates

RECORD 2015: 375,000 ASSOCIATES

17,600 NEW FACES AT BOSCH



— 1 Change from previous year — 2 Including other regions — 3 Share of total headcount

Source – Bosch Media Service

Department | 21/01/2016 | © Robert Bosch GmbH 2016. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.

BOSCH Divisions and Subsidiaries

Divisions

Mobility Solutions

- Car Multimedia
- Automotive Electronics
- ...

Industrial Technology

- ...

Consumer Goods

- ...

Energy and Building Technology

- ...

Subsidiaries

- Bosch Energy and Building Solutions
- Bosch SensorTec
- Bosch Solar Services
- Bosch Connected Device and Solutions
- ESCRYPT Security Consulting
- ...

Department | 21/01/2016 | © Robert Bosch GmbH 2016. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.

BOSCH

BOSCH Lund Office

Divisions

Mobility Solutions

- Car Multimedia
- Automotive Electronics
- ...

Industrial Technology

...

Consumer Goods

...

Energy and Building Technology

...

Subsidiaries

- Bosch Energy and Building Solutions
- Bosch SensorTec
- Bosch Solar Services
- Bosch Connected Device and Solutions
- ESCRYPT Security Consulting
- ...

Lund Office

- AE-EB
- AE-BE
- CM-CI1
- CM-CI2
- CM-CI3
- CM-NE
- BCDS
- ESCRYPT

Department | 21/01/2016 | © Robert Bosch GmbH 2016. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.

BOSCH

BOSCH Lund Office

Divisions

Mobility Solutions

- Car Multimedia
- Automotive Electronics
- ...

Industrial Technology

...

Consumer Goods

...

Energy and Building Technology

...

Subsidiaries

- Bosch Energy and Building Solutions
- Bosch SensorTec
- Bosch Solar Services
- Bosch Connected Device and Solutions
- ESCRYPT Security Consulting
- ...

Lund Office

- Connectivity
- Security
- Firmware and software over the air update

Department | 21/01/2016 | © Robert Bosch GmbH 2016. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.

BOSCH

Examples of products Lund is developing

Department | 21/01/2016 | © Robert Bosch GmbH 2016. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.

BOSCH

Examples of products Lund is developing

Department | 21/01/2016 | © Robert Bosch GmbH 2016. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.

BOSCH

Examples of products Lund is developing

Department | 21/01/2016 | © Robert Bosch GmbH 2016. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.

BOSCH

Examples of products Lund is developing

Department | 21/01/2016 | © Robert Bosch GmbH 2016. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.

Examples of products Lund is developing

Department | 21/01/2016 | © Robert Bosch GmbH 2016. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.

BOSCH

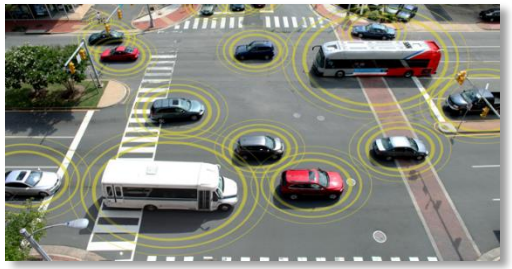
Paradigm shift in automotive

Department | 21/01/2016 | © Robert Bosch GmbH 2016. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.

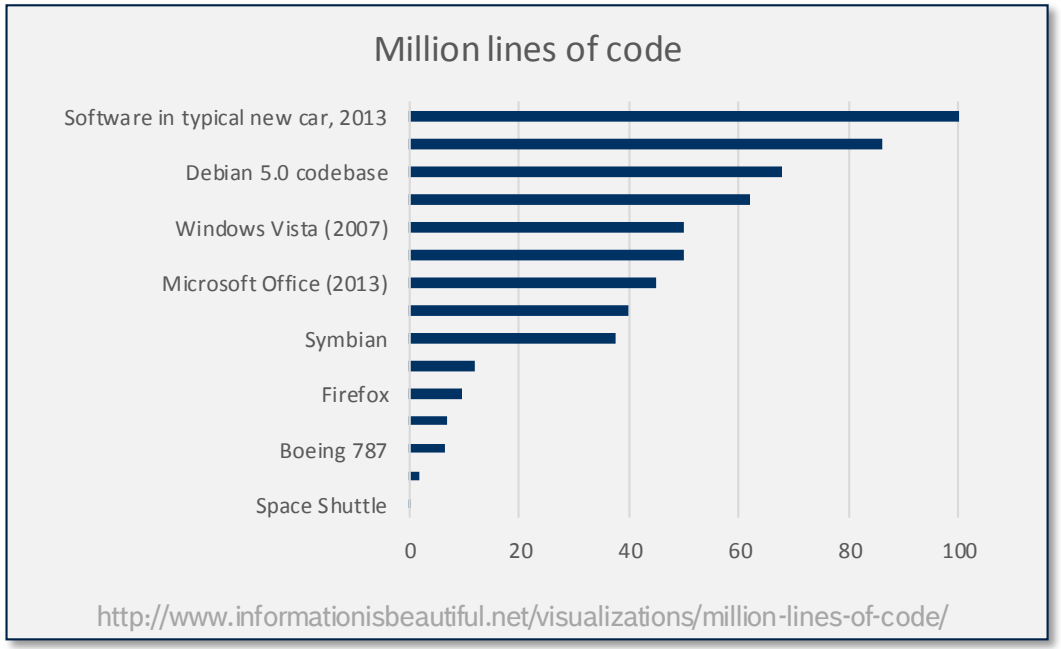
Paradigm shift in automotive

Same paradigm shift as mobile industry happens in automotive:

- Increased use of software
- Increasing need of connectivity including software updates
- Increasing need of speed in development



http://www.techeconomy.it/2014/10/09/connected-car-rischi-legali-prossima-curva/



http://www.informationisbeautiful.net/visualizations/million-lines-of-code/

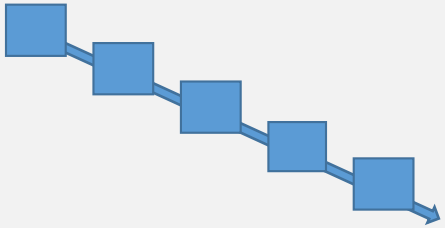
Department | 21/01/2016 | © Robert Bosch GmbH 2016. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.

BOSCH

Paradigm shift in automotive

Using software development best practices

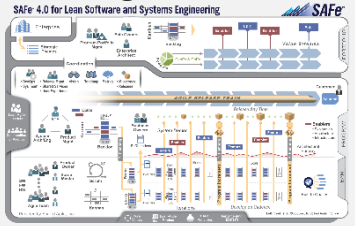
Waterfall



Monolithic architecture

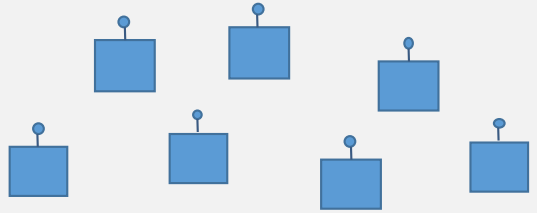
Manual review and testing

Scaled agile framework



http://www.scaledagileframework.com

Modularized with API governance



Continuous Integration

Department | 21/01/2016 | © Robert Bosch GmbH 2016. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.

BOSCH

Paradigm shift in automotive

Does not always work in automotive

Department | 21/01/2016 | © Robert Bosch GmbH 2016. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.

Modularization Example

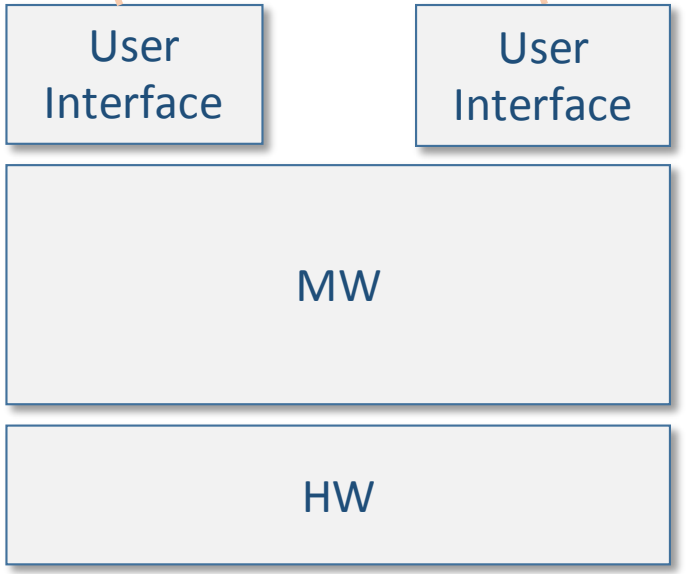
Monolith

HW

Department | 21/01/2016 | © Robert Bosch GmbH 2016. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.

BOSCH

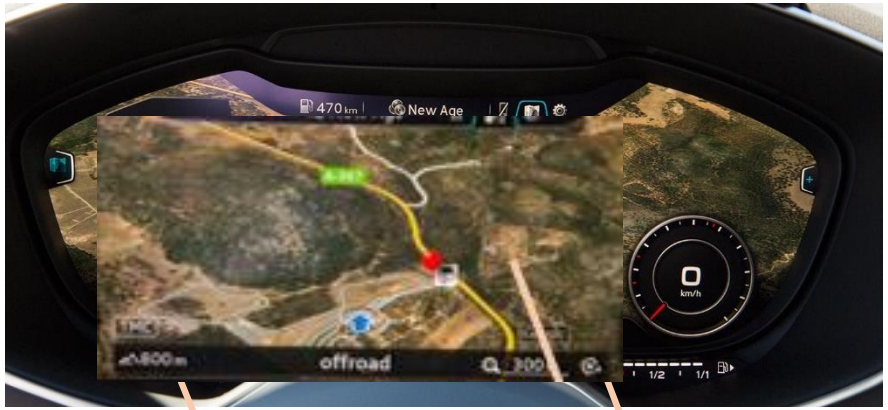
Modularization Example

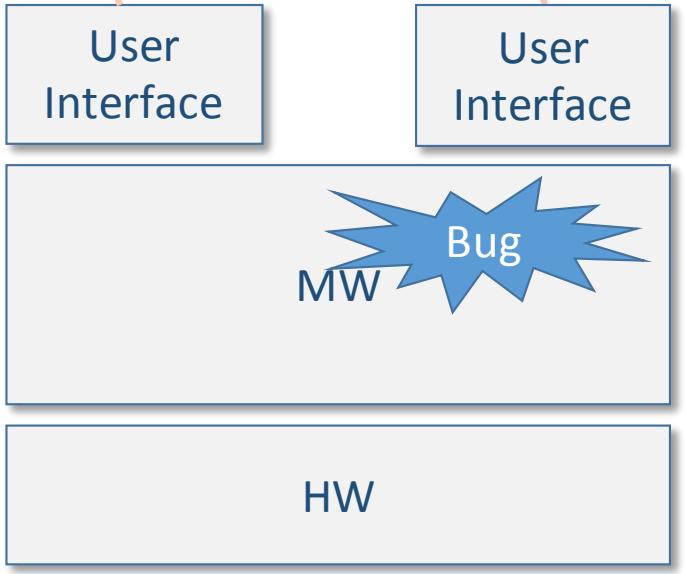


Department | 21/01/2016 | © Robert Bosch GmbH 2016. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.

BOSCH

Modularization Example



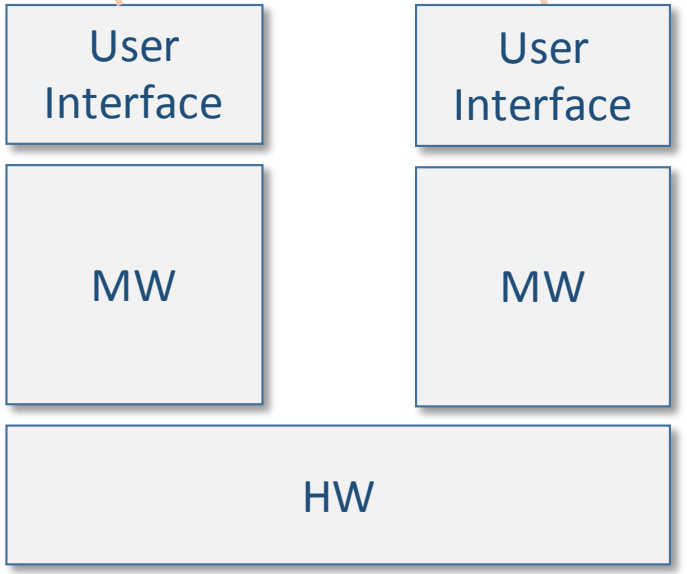


Functional Safety Standards

Department | 21/01/2016 | © Robert Bosch GmbH 2016. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.

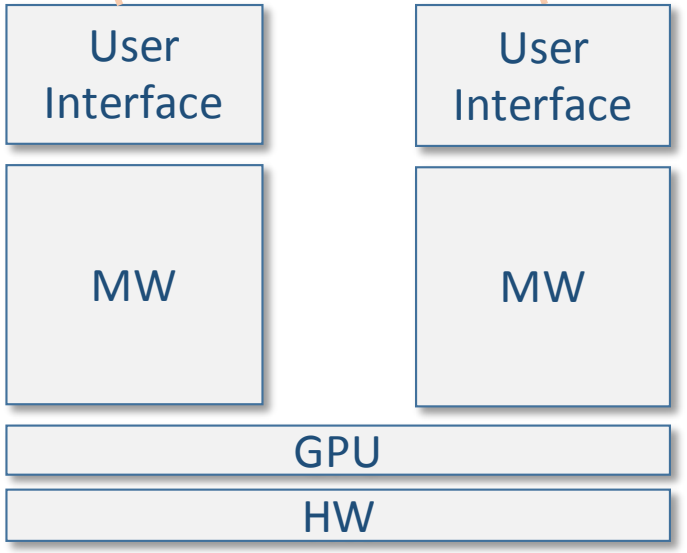
BOSCH

Modularization Example



Department | 21/01/2016 | © Robert Bosch GmbH 2016. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.

Modularization Example

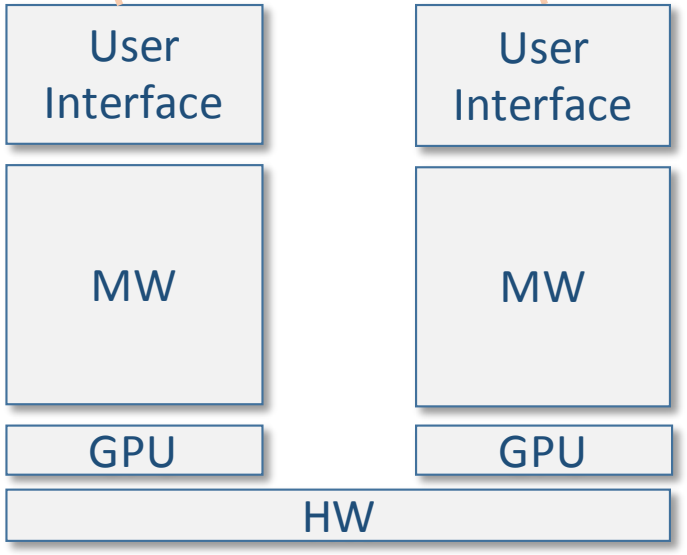


Functional Safety Standards

Department | 21/01/2016 | © Robert Bosch GmbH 2016. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.

BOSCH

Modularization Example



Functional Safety Standards

Department | 21/01/2016 | © Robert Bosch GmbH 2016. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.

Benefits of Academia collaboration

Department | 21/01/2016 | © Robert Bosch GmbH 2016. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.

2015: GROWTH THROUGH INNOVATION

— *Includes all locations with at least 50 associates (as per Dec. 31, 2015)

Source – Bosch Media Service

Department | 21/01/2016 | © Robert Bosch GmbH 2016. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.

BOSCH

Project ARAMiS

AUTOMOTIVE · RAILWAY · AVIONICS
MULTICORE SYSTEMS

aramis

The project consortium analyzed thoroughly the multicore challenges and suggested various solutions for the field of safety-critical and mixed-critical systems, for instance within software architecture.

http://www.projekt-aramis.de/

Department | 21/01/2016 | © Robert Bosch GmbH 2016. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.

BOSCH

Project Ko-HAF

Ko-HAF
KOOPERATIVES HOCHAUTOMATISIERTES FAHREN

The project consortium analyzing and suggesting solutions for highly automated driving.

http://www.ko-haf.de

OEM	Suppliers	Small and medium-sized companies	Public institutions	Research organisations
Opel	Bosch – Technik fürs Leben	3D Mapping	bast	IZVW
Audi	Continental		Hessen	Technische Universität Braunschweig
BMW	Visteon			TUM Technische Universität München
Daimler				Universität Passau

Department | 21/01/2016 | © Robert Bosch GmbH 2016. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.

Project UR:BAN

UR:BAN

The project consortium is researching and developing advanced driver assistance and traffic management systems for cities. The focus is on the human element in all aspects of mobility and traffic.

http://urban-online.org

Project "Cognitive Assistance"

Adam Opel AG, AUDI AG, BMW Forschung und Technik GmbH, Bundesanstalt für Straßenwesen, Continental Safety Engineering International GmbH, Continental Teves AG&Co. oHG, Daimler AG, MAN Truck & Bus AG, Robert Bosch GmbH, Volkswagen AG

Project "Human Factors in Traffic"

Adam Opel AG, AUDI AG, BMW AG, BMW Forschung und Technik GmbH, Bundesanstalt für Straßenwesen, Daimler AG, DLR, Fraunhofer IAO, MAN Truck & Bus AG, PTV AG, Robert Bosch GmbH, RWTH Aachen, TU Braunschweig, TU Chemnitz, TU München, Universität der Bundeswehr München, Uni Würzburg, Volkswagen AG

Project "Networked Traffic System"

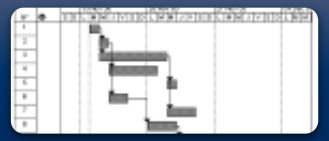
Adam Opel AG, BMW AG, Continental Automotive GmbH, Daimler AG, DLR, GEVAS, HTW Saarland, ifak Magdeburg, Landeshauptstadt Düsseldorf, MAN Truck & Bus AG, PTV AG, Stadt Kassel, TU Braunschweig, TU München, TomTom, Transver GmbH, Uni Duisburg-Essen, Uni Kassel, Volkswagen AG

Department | 21/01/2016 | © Robert Bosch GmbH 2016. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.

BOSCH

Examples of research areas

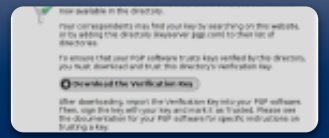
Mobile/Consumer Electronics



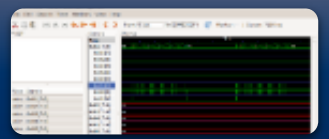
Project Steering

Requirement Engineering

Architecture



Verification and Validation



Toolchain and Automation

Documentation and Traceability

Automotive

Department | 21/01/2016 | © Robert Bosch GmbH 2016. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.

BOSCH

Thank you !

Department | 21/01/2016 | © Robert Bosch GmbH 2016. All rights reserved, also regarding any disposal, exploitation, reproduction, editing, distribution, as well as in the event of applications for industrial property rights.