



Success Story: Robert Bosch GmbH –
Business Area Chassis Systems Control (CC)

PROCESS INNOVATIONS IN AUTOMOTIVE SOFTWARE ENGINEERING

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OUR COMPETENCIES

- Use of agile methods and practices in regulated environments (Automotive SPICE)
- Scalability of agile methods
- Determination of the potential of agile methods and practices
- Evaluation of new techniques/methods/tools and their impact on the process
- Data-driven improvement of processes

YOUR BENEFITS

- Get to know current trends and approaches in the area of process innovations
- Know the added value of innovative techniques/methods/tools
- Identify improvement potential in your engineering process
- Keep your engineering process up to date and benefit from new developments

WHAT IT IS ALL ABOUT

Since 2016, Fraunhofer IESE and Bosch Chassis Systems Control (CC) have been collaborating successfully in various fields of software process innovation in the context of the development of embedded automotive systems. The spectrum of topics considered is very broad: It ranges from identifying the potential of agile methods and practices to the use of innovative knowledge transfer concepts and the influence of the digital transformation on the engineering process. The aim is to identify current trends and approaches from applied research, adapt them to the needs of Bosch CC, and implement them hands-on in projects.

Topics from recent years include, for example:

- Identification of the potential of agile practices and methods in a regulated environment
- Teaching about agile development approaches via a Pocket Guide
- Use of agile scaling approaches (such as SAFe) for large, distributed development projects
- Agile maturity models for development projects
- Integration and knowledge transfer of systems engineering practices into an agile development world (using the example of the agile test manager)
- Knowledge transfer concepts for teaching about »Continuous Integration«
- Data management in the engineering process
- Influence of the digital transformation on the engineering process

The cooperation with Fraunhofer IESE always helps us to identify new trends and topics for improving our engineering processes and to take a look at current developments in the area of applied research. IESE's experimental approach assists us in quickly evaluating new approaches in terms of their benefits for Bosch CC and in adapting them for us.

Peter Fröhlich
Director Engineering Methods, Tools and Licenses
Chassis Systems Control (CC)
Robert Bosch GmbH



THE CHALLENGE

In recent years, the role and significance of software in the automotive sector has changed dramatically. More and more functionality is being implemented in software and is only made possible by software (e.g., automated driving functions). The way software is developed has also changed – from standardized architectures such as AUTOSAR to the generation of code from models. In addition, the speeds at which new functionality must be delivered and at which new approaches and technologies are emerging has also increased dramatically. This has major implications for the requirements on an efficient software engineering process and how it must be changed.

THE SUPPORT

At the beginning of the collaboration between Fraunhofer IESE and Bosch CC, the focus was on examining the potential and the practical application of various agile practices and methods in a regulated environment. This included the identification of a suitable level of agility via a potential analysis developed by IESE, frameworks for scaling agile methods and practices with regard to large, distributed development projects with teams working in parallel, as well as models for determining the agile maturity level of a project. Projects were coached accordingly during the testing and introduction of promising approaches.

In 2019, work started on knowledge transfer concepts for imparting classic engineering topics and adapting them to the world of agile development. For this purpose, the role model of an agile test manager was developed as an example and discussed with users. At the same time, knowledge transfer formats were collected and compared in order to identify suitable formats with which classic engineering topics can be communicated attractively and efficiently in an agile environment. In 2020 and 2021, knowledge transfer concepts for teaching about »Continuous Integration« were discussed and elaborated together with Bosch. The approach

consists of simulation-based hand-on training, where participants learn in an environment that is as realistic as possible what to look out for in Continuous Integration in the context of embedded software engineering.

Since 2020, the project team has been looking at how the digital transformation directly affects engineering processes. First, the engineering process itself increasingly generates Big Data that needs to be accessible and usable (for example, in the context of developing automated driving functions). Here, approaches for data management as well as the lifecycle of data and the value of data were examined. Another aspect that has been worked on since 2021 is how data and analysis methods (e.g., Machine Learning) can be used to identify potential for improvement in the process and make workflows more efficient.

In an annual rhythm, new trends and topics are presented by IESE as part of the collaboration, and are jointly aligned with the current needs of Bosch CC. Subsequently, the work plan for the coming year is defined.

THE RESULT

Through this collaboration, Bosch CC has learned about current trends and approaches in the area of process innovation from the perspective of applied research and has been able to assess their added value and improvement potential better. The results were used to integrate new methods and processes into the engineering process of Bosch CC in a targeted manner and transfer them to their employees.

Name: Robert Bosch GmbH

Industry: Electronics and Information Technology, Automotive

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