Dissertation title:

Smart Engineering Apps für eine mobile und situationssensitive Bereitstellung von Engineeringdaten

Eva Hoos

Global megatrends, such as increasing individualization of products, shortened product life cycles and increasing complexity of products, lead to significant challenges in the engineering, known as product and production process development.

The resulting complexity of products and processes cannot be handled and managed without information technology.

The provisioning of engineering data is time-consuming and complex. Hence, the support of engineering processes by information technology is insufficient.

Simultaneously, the potential of new technologies, such as mobile apps or situation-aware applications, are barely used. To address these issues, the focus of this thesis are smart engineering apps (SEA), which enable mobile and situation-aware provisioning of engineering data.

The goal of this thesis is the conception and strategic application of SEAs to optimize engineering processes. Based on a comprehensive literature review and a case study in the automotive industry, three fundamental challenges are identified: insufficient location-independent IT support (H1), lack of information about the situation of the user (H2) as well as time and knowledge intensive information provisioning (H3). To address these challenges, the concept of SEAs are developed. At the one hand SEAs are mobile since they run on mobile devices, such as smartphones and tablets, and on the other hand they are situation-aware since they capture the situation of the user and leverage these situations, e.g., to adapt the behavior of their execution. In order to develop and apply SEAs strategically, there is a lack of concepts and methods.

The contributions of this thesis comprise the conception and prototypical implementation of SEAs as well as the development of concepts and methods for their strategic application and development. The contributions regarding concepts and methods can be partitioned into three areas: (1) A processoriented analysis method is provided to identify systematically app potential in engineering processes. The method enables the identification of activities benefitting from the usage of mobile apps. Furthermore, the method is applied to multiple engineering processes in order to get an overview about the app potential and business benefits of mobile apps in the engineering domain. (2) The development framework for situation-awareness conduces

the systematic design of the situation-awareness. It provides a metamodel for situations as well as development methods and building blocks to model and gather situation data. (3) The situation-aware provisioning of engineering data is a key functionality of SEAs. The developed concept enables the realization of SEAs, which only provides engineering data necessary to fulfill the current task.

On the basis of these concepts and methods, two SEAs are realized. The SmartNoting app automatically captures the current situation of the user in order to create a problem description. The DIPPing app enables to capture situations to automatically provide the appropriate engineering data to solve the current problem.

The evaluation of the contributions is done by the application of concepts and methods during the development of SmartNoting and DIPPing. This shows that the contributions can be applied in real use cases and that they support design of SEAs. Moreover, an expert evaluation shows that through the usage of SEAs process improvements regarding the goal dimensions time, flexibility and quality can be reached.

To summarize, SEAs address the challenges in the information provisioning in the engineering domain. The contribution of this thesis supports the design and development of SEAs. The application of SEAs contributes process improvements in the engineering domain.