Towards Model-Driven Requirements Analysis for Context-Aware Well-Being Systems

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Abstract

Research interest in the domain of pervasive systems has seen a rapid increase, evident from the amount of research papers being published each year. These systems are to blend in with everyday life, being completely unobtrusive. Through the use of sensors, pervasive systems can become context-aware. As such, they are able to use this context information in order to improve the services provided to the user. Interesting fields of application are those of health-care and well-being. The COMMIT SWELL project aims to improve both physical and mental well-being by developing a sensor-based context-aware system. This system is to (i) aid the user into improving his own lifestyle by giving him insight in his personal activity, and (ii) support the user in his work.

In the domain of context-aware systems, we find that requirements have to align perfectly with the features to be offered by the system. If not, the system will become a hindrance to the user, who will then neglect it. Requirements engineering and architectural development for this type of system is largely unexplored territory. A bottom-up approach is often used: little attention is paid to requirements engineering up front, and architectures are created without having reuse in mind. Our objective is to improve the reuse of system requirements and architecture, resulting in an improvement of alignment between these artifacts. In order to facilitate this alignment, we aim to create a model-driven method that allows for bi-directional transformation between requirements and architecture at design time.

Current results in the project include a literature study, a list of domain requirements for context-aware well-being systems and a reference architecture and descriptions for two demonstrators within the COMMIT SWELL project. From literature, we found that current methods for requirements engineering in this domain are either too high, or too low level, preventing proper reuse of artifacts in the next phase of the design process, as well as the need for high levels of both domain and system modeling expertise. Furthermore, we found that tool support model-driven development of context-aware well-being applications is currently lacking.

Future research will initially focus on the specific requirements found in the context-aware application domain. After this, we will be looking at the link between specific requirements and architectural components, and whether this link exists uni-directionally or bi-directionally. Finally, we will be investigating if automatic alignment between requirements and architecture can be achieved.