University of Zurich
Department of Informatics

Master's Thesis Proposal

in the Requirements Engineering Research Group

Topic / Working Title

Industrial Evaluation of the SPREBA Method to Software Product Line Requirements Engineering

Content

SPREBA[1] is an ongoing research project at the University of Zurich which explores the potential and benefits of integrated model-based requirements description and variability modeling with aspects. The SPREBA method supports specifying all relevant specifications in a single integrated diagram and provides tool support for refactoring such a requirements model to account for variability that is omnipresent in product lines and evolving software products. A major current focus in the project lies on empirically evaluating the benefits and limitations of applying this new method in a software-developing company and measuring the effects and thus the method's potential to improve upon the current state of the art and practice in requirements engineering for software product lines.

In this master's thesis the requirements engineering of an existing or evolving software product line at a company will be investigated using the ADORA/SPREBA method for software product line requirements modeling [Stoiber, Glinz 2009]. The research student will work at the company and the research method to be used will be a case study [Yin 2003]. Initially, concrete hypotheses on the utility and impact of the explored method on the studied product line will be formulated and refined together with the supervisors in academia and industry. The following tasks will be performed:

- A high-level requirements specification of all existing and planned software artifacts will be created [Stoiber, Glinz 2009], a so-called reference model. This gives an overview of all major and relevant software artifacts to be dealt with when developing a systematic software product line.
- A detailed variability analysis using the Feature Unweaving method [Jehle 2010] is performed. This allows an easy identification and documentation of variable features by refactoring the requirements model with tool support.
- A set of current and planned product specifications of the investigated product line will be negotiated and derived from this refactored model-based product line specification [Stoiber, Glinz 2010]. This allows an incremental specialization of the product line model by consecutively binding variability decisions and will finally yield concrete and consistent product specifications from the product line model with only little effort. It is possible to further refactor and adapt the variability specification if new or changed requirements appear in this process, which shall be addressed, evaluated and performed by the research student as well.

All the performed work should be documented in detail. Based on this accumulated data and the collected experiences from all involved stakeholders a systematic evaluation of the initially stated hypotheses shall be performed.

[1] see http://www.research-projects.uzh.ch/p12003.htm

Both the industrial as well as the academic stakeholders will profit from the results of this thesis:
- The participating company will benefit from a comprehensive requirements specification and variability model. This modeling will provide a basis to improve the development efficiency, the software quality and the management and evolution of the studied product portfolio.
- The participating university will benefit from gaining a comprehensive case study of the ADORA /SPREBA method with an industrial software product line. The results will be a significant contribution to the empirical validation pursued in the SPREBA project and will be valuable input for the further development and refinement of the studied methods.

Industry Case on „electronic payments" with SIX Card Solutions AG

The industry case to be studied is an evolving product line of terminals for electronic payments called Davinci II. The software for these devices is developed by SIX Card Solutions AG. The devices are built to fit for various different contexts, for example to work autonomously, within a networked environment or built into vending machines. Other optional features include combinations with cash payment and mobile vouchers.

How to proceed

- Literature study (SPREBA, ADORA, case study research) and familiarization with the ADORA modeling tool (approx. 15%)
- Familiarization with the studied product line; study of all existing requirements documents and specifications (continuously, approx. 10%)
- Requirements modeling with ADORA based on existing requirements documents and elicitation interviews; reviews and refinements (approx. 20%)
- Variability modeling with feature unweaving; identify the commonality and variable features of requirements model; reviews and refinements together with stakeholders (approx. 15%)
- Derive product specifications for all current and planned products of the product line; refine the requirements and variability model wherever necessary (approx. 10%)
- Quantitatively and qualitatively evaluate all your results (approx. 10%)
- Thesis writing (approx. 20%)

Literature

Jehle, M. Feature Unweaving: Semi-Automated Aspect Extraction in Product Line Requirements Engineering. Master's Thesis. University of Zurich. January 2010.

Stoiber, R., Glinz, M. Modeling and Managing Tacit Product Line Requirements Knowledge. In *Proceedings of MaRK'09.* IEEE CS. Atlanta, USA, September 2009.

Stoiber, R., Glinz, M. Supporting Stepwise, Incremental Product Derivation in Product Line Requirements Engineering. In *Proceedings of VaMoS'10.* ICB Research Report. Linz, Austria, 2010.

Yin, R. K. *Case Study Research: Design and Methods.* Sage Publications, Inc. 2003.

Literature research and review are also part of the thesis work. The references listed above may serve as basic starting literature.

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Workload
6 months full-time, 30 ECTS

Workplace
The student will work at both SIX Card Solutions AG and the Department of Informatics in Zurich.

Advisor	**Co-Advisor**	**Examiner**
Reinhard Stoiber	Dr. Samuel Fricker	Prof. Dr. Martin Glinz