

# Proposal for Master Thesis in Software Engineering

**Author:** Sebastian Stein

**Email:** sstein.master@hpfsc.de

**Title:** Software Process Improvements in a Small Organisation - an Empirical Study

**Size:** 20 Credits

**Advisor:** Kari Rönkkö

**Link to Master Project:** <http://quality.hpfsc.de/>

**Start and End Date:** 1st of April to 31st of January 2006

**Thesis Type:** Empirical Study

**Background:** Quality systems like ISO 9000:2000 and the Capability Maturity Model Integrated (CMMI) [4] describe criteria for good processes [10], but they do not describe a particular instantiation for such a process. This instantiation is up to the organisation implementing the quality system and it is a general perception that such an instantiation always creates bureaucracy and paper work. The before mentioned quality systems were developed for large organisations, therefore they seem not to be applicable for small organisations at all.

Previous studies [6, 5, 8, e. g.] have taken this as a starting point to develop quality systems tailored for small organisations. Those studies have for example identified the most crucial problems through industry wide surveys [6, 8, e. g.] and focused their quality systems around solutions for those problem areas.

In this study a small German software company with 35 employees at 2 different locations (Halle and Chemnitz, both Germany) is studied. The company develops a production planning and control system as a software product-line [1]. For each customer an individual version is created in a bespoke project. The company has only very few documented processes, from the quality system point of view the company is immature. Especially the impact of change requests on the whole product-line is not considered and no clear strategy for the development of the whole system exists. For example it can happen, that the same functionality is developed twice for different customers. Also requirements elicitation [3, e. g.] is considered to be not very effective, because it is too dependent on the ability of the conducting project manager.

**Research Aim:** This master thesis observes a process improvement effort in a small organisation and seeks to understand what problems occur and how to solve them. It is not the aim to find any truth, but to provide a concept about what is happening during introduction of a quality system in a small organisation.

**Research Objectives:** Several research objectives can be identified and formulated as questions, which need to be answered in this master thesis:

1. What is needed to initiate a process improvement effort in a small organisation, which is not used to any quality system?
2. How can such an effort be conducted within the limited resources available in a small organisation?
3. How can the organisation members be involved in a process improvement effort and how to motivate them?
4. What problems is a small organisation facing with during the introduction of a quality system?
5. Is it possible to give general guidelines or support to ease the introduction of a quality system in a small organisation?

**Expected Outcomes:** The author is going to help the company to improve some of their processes. This is seen as a first step to introduce a quality system in this company. The author documents what he observes during this process improvement effort. From this work he concludes what one has to be aware of when introducing a quality system in a small organisation.

**Research Methodology:** The author is embedded in the company for the duration of this master thesis. He is participating and observing the project work and the process improvement effort. Data is gathered by interviewing members of the company, observing the work done, and by analysing work artifacts and other available documents. This research approach is therefore an ethnographical study [2]. To analyse the gathered data the author is reflecting on the observations, relating them to literature, triangulation, and by trying to identify patterns. Since the company is rather small, it is impossible to use statistical data analysis techniques. The author is aware of that a qualitative empirical study is not concerned with collecting verifiable data, but instead with understanding a social world, which is continuously in the process of construction [7]. According to Wohlin et al. [9] software engineering is mainly a social process, therefore an empirical study is a valid research methodology in this context.

## References

- [1] P. Clements and L. Northrop. *Software product lines: practices and patterns*. Addison-Wesley, Boston, 2002.
- [2] D. M. Fetterman. *Ethnography*. Sage Publications, 2nd edition, 1998.
- [3] G. Kotonya and I. Sommerville. *Requirements Engineering: Processes and Techniques*. Wiley, Chichester, 2004.
- [4] CMMI Product Team. Capability maturity model integration version 1.1 continuous representation, 2002. CMU/SEI-2002-TR-028.
- [5] J. Olsson. Requirements for an ISO 9000 certification on a small company. Master's thesis, Blekinge Institute of Technology, Karlskrona/Ronneby, Sweden, 1999.
- [6] J. Redestig and E. Starck. A proposal for a quality improvement framework for small organizations. Master's thesis, Blekinge Institute of Technology, Karlskrona/Ronneby, Sweden, 1999.
- [7] S. Talburt. Ethnographic responsibility without the "real". *Journal of Higher Education*, 75(1):80–104, 2004.
- [8] D. Vasiljevic and S. Skoog. A software process improvement framework for small organizations: A research approach. Master's thesis, Blekinge Institute of Technology, Ronneby, Sweden, 2003.
- [9] C. Wohlin, P. Runeson, M. Höst, M. C. Ohlsson, B. Regnell, and A. Wesslén. *Experimentation in software engineering: an introduction*. International Series in Software Engineering. Kluwer Academic Publishers, Norwell, USA, 2000.
- [10] S. Zahran. *Software Process Improvement: Practical Guidelines for Business Success*. Addison-Wesley, Harlow, 1998.