Tutorial: Case Studies in Software Engineering

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Abstract. This document presents a tutorial on case study research methodology in software engineering, held at the 10th International Conference on Product Focused Software Development and Process Improvement (Profes).

Keywords: Case study, research methodology, tutorial.

1 Introduction

Software engineering and software process improvement are complex activities, which success or failure depends on many interrelated factors. This complex interaction cannot be fully studied in isolation, but needs empirical studies in real world settings. Case studies offer the opportunity to conduct this kind of studies. A case study is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between the phenomenon and context are not clearly evident. [1]

The area of software engineering involves development, operation, and maintenance of software and related artifacts. Research on software engineering is to a large extent aimed at investigating how this development, operation, and maintenance are conducted by software engineers and other stakeholders under different conditions. This means that the activities are carried out by individuals and groups of individuals, and social and political questions are of importance for this development. This means that many research questions in software engineering are suitable for case study research.

Case studies focus on phenomena in their context, especially when the boundary between the phenomenon and its context is unclear. This is particularly true in software engineering. This is to a large extent what is needed when conducting research in software engineering.

The term "case study" appears every now and then in the title of software engineering research papers. However, the presented studies range from very ambitious and well organized studies in the field, to small toy examples that claim to be case studies. However, case studies which are conducted and reported as stories of what a positive participant has experienced do not fulfill the criteria of solid independent research. This tutorial aims at presenting and applying guidelines for case study research that fulfill scientific criteria of good research.

Case study research focuses on the investigated case as such and does not have the same objectives of generalization as less flexile research approaches. This makes case study research an attractable research approach not only from a researcher's point of

view, but also for industry representatives. Industry representatives can conduct case studies as part of their ongoing improvement work in order to understand the benefits and costs of investigated new methods and ways of working. University researchers can take part in this process in order to investigate the suitability of investigated approaches in different environments.

2   Content

The tutorial is based on lectures, intertwined with practical tasks for the participants. The tasks involve analyzing published case studies and defining procedures for new ones.

The attendant is provided with a set of practical guidelines, which helps setting up new case studies as well as assessing the information in published case study reports, summarized in [2]. The following topics are covered in the tutorial

1. Definitions: What is a case study? What is action research? Quantitative and qualitative aspects of a case study. Fixed and flexible designs in empirical studies.
2. Setting up a case study: Defining scope and goal of a case study. Setting up contracts between the researcher and the studied organization. How to conduct a case study as part of an ongoing improvement process.
3. Data collection: Defining procedures for data collection. Questionnaire design. Interviews. Metrics collection. Archival data collection.
4. Data analysis and interpretation: Data filtering. Qualitative and quantitative analysis. Data interpretation in conjunction with the organization.
5. Reporting: What should be reported in a case study. Issues of secrecy and publicity.
6. Validity issues: Analysis of validity and actions to improve the validity of a case study.

References

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