Introducing Software Engineering Innovations in Open Source Projects

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1   Introduction

The growing importance of the Open Source development paradigm for industry and public institutions leads to the question of how the efficiency and productivity of projects under this paradigm can be improved. The notable difference to a process improvement effort in an industrial setting (for instance using the CMMI), is the collaborative nature of the project: the absence of hierarchical power makes it impossible to drive change in a top-down fashion. This on-going Ph.D. thesis seeks to provide a thorough understanding of the mechanisms for introducing tool and process improvements into OSS projects from the perspective of the individual stakeholders to increase the success chances of their improvement efforts.

As an example situation where a project could benefit from the introduction of a process improvement consider information management in OSS projects: New participants need to know for instance which tasks are open or being worked on, how to set-up the development environment and how to commit code to the code repository. If this information is not managed correctly, the project might face questions being asked on the mailing-list repeatedly or spend inadequate amounts of time maintaining information rarely accessed.

The thesis is embedded in the larger context of qualitative software engineering at Freie Universität Berlin and scheduled for completion in 2008.

2   Methodology

As the first part of this thesis a set of tools and process improvements was designed and implemented in collaboration with students to specifically match problems prevalent in OSS projects like missing face-to-face interaction, lack of end-user documentation and insufficient information management. It is now planned to conduct an iterative series of case-studies (using a Grounded Theory approach) to introduce these innovations in three OSS projects each. Action research methodology and sometimes participant observation

will be used to gather qualitative data in collaboration with the particular OSS projects.

3 Preliminary Results

A first pilot introduction of the information management based process improvement has been successfully conducted. In combination with theories from social science and innovation research the results were used to create preliminary hypotheses about the interaction between the innovator and the project. Most interestingly we have seen a large amount of reinvention with the process improvement, i.e. reshaping of the improvement idea by the project participants in ways unintended by original design. For instance regarding the software build process, project participants were expected to gather information primarily for lowering the entry barrier for new developers to compile the project. Instead it was found that this information was repeatedly accessed by experienced developers who wanted to ensure that the project was consistent and could be built from scratch. For evaluating introduction success both product and process metrics and a survey were deployed. With the other two improvements, prototypes were successfully developed, but production quality still needs to be achieved.

4 Conclusion

This research contributes several important aspects to the discussion of the workshop: (1) Before research on the implications of software engineering technology in real-world settings is possible, both the theoretical concept and a production-ready implementation need to be produced, which causes considerable delay. (2) Open Source projects are suggested for empirical studies of software engineering technology as a third choice beside home-grown trials and industry-trials. (3) The essentially qualitative nature of real-world interactions and the lack of control point to the need to further develop the empirical methodology of software engineering research.

5 Acknowledgements