Qualitative Research on Practice in Small Software Companies

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INTRODUCTION

The importance of small companies to economic activity, employment, innovation and wealth creation in many countries is widely recognized in literature (Bell et al., 2004). The number and the importance of very small software companies in world economies are growing. Many researchers reported the share of small software companies in the economies of some countries or regions. For example, according to Richardson and von Wangenheim (2007) small software companies represent up to 85 percent of all software organizations. Coleman and O'Connor (2008) reported that 61 percent out of a total of 630 indigenous software companies in Ireland employed 10 or fewer people. Laporte et al., (2006) reported that 85 percent of IT sector companies in Europe have between 1 and 10 employees, while over 50 percent of companies in Montréal area in Canada have fewer than 10 employees.

Most of the software engineering researches are rather devoted to providing recommendations and suggestions to practitioners what they ought to do, then they concentrate on understanding what actually happens in the practice (Glass, 2003). Researchers often do not know what actually happens in practice, while practitioners think about the current duties and deadlines, which lead towards the gap between research and practice. People in small software companies are fully dedicated to daily activities and deadlines attached to current tasks. The daily practice of small software companies is mainly improvisational (Dyba, 2000) and influenced by various internal factors, or context dependent factors, and global factors related to trends in global economy. In addition, the complexity of the human behaviour, and individual and organizational characteristics significantly influence daily practice in small software companies. The deeper understanding of these behaviours and characteristics is necessary in order to provide the relevant basis for practice as-

sessment and improvement. Because of constraints in resources, small software companies need effective software engineering practices tailored to their size and type of business (Fayad et al., 2000). Observed state of the practice and research enabled acceptance of qualitative research methods for investigating the practice in small software companies.

Qualitative research methods have long history that includes various development directions. Early development of qualitative research methods, starting from 17th century, is mainly connected with ethnographic studies (Denzin & Lincoln, 2005). Modern qualitative research methods, starting from 20th century, have been developed through eight movements, starting with the traditional period in the first four decades of 20th century. Next movements like modernist phase and blurred genres started in 1970s enabled researchers to use several complementary paradigms and methods in their research. In last two decades other movements appear, and several qualitative journals began to publish contemporary qualitative researches.

Qualitative methods originated in social sciences and later get attention in education and technical sciences. In qualitative research, sometimes defined as interpretive research, the emphasis is on interpretations of human experiences. Qualitative research involves the researcher working in the field, and getting close to the people and circumstances to capture what is happening (Patton, 2001). Silverman (1998) suggested the view of qualitative methods as how people do things, rather than how people see things. Qualitative research is based on qualitative data that are source of well-grounded and rich descriptions of human processes. Qualitative data help researcher to generate new conceptual frameworks about observed phenomenon, or to revise existing ones.

Because of the inherent complexity of the contemporary practice, and the recent attention to people issues in software engineering, qualitative research methods are gaining more and more attention in research

community. The primary concern of investigating the professional practice is to achieve deeper understanding that will enable generating rich accounts about the practice. Qualitative research methods are appropriate choice for studying the practice that is context dependent. Through the interpretation of the experiences of practitioners, qualitative researcher increases the understanding of the nature, processes and experiences of practice (Higgs & Cherry 2009). Actually, qualitative research is appropriate for investigating everyday practice of software engineers (Dittrich et al., 2007). Furthermore, qualitative research methods enable exploration of specific organizational context with the focus on people issues, and development of insights and knowledge about individual experiences in the workplace.

Although it has been widely recognized that software engineering is an intensely people-oriented activity little is known about how software engineers perform their usual daily work. According to Lethbridge et al., (2005), it is essential to conduct field studies to explore how software practitioners solve real problems, which requires understanding of the techniques suitable for conducting the study. These techniques originated from the fields such as sociology and psychology, and have been adapted to the field of software engineering.

With recognized acceptance of qualitative research in software engineering empirical research, it becomes important to discuss some methodological issues that researchers face. This article presents a discussion of issues that influence the researcher fieldwork and the choice of qualitative methods for investigating practice in small software companies.

BACKGROUND

In discussion about three theoretical schools in system development research in Scandinavia, Bansler (1989) noted that Norwegian researcher Rolf Høyer in 1970 had argued that effective system development require attention to human factor. This standing attracted several researchers to initiate research projects about socio-psychological implications of computer systems during 1970s and 1980s. This movement in research has caused the use of qualitative research methods in information systems research.

Software engineering research is mainly based on quantitative methods, as any other engineering discipline. However, deeper understanding of all issues relevant for practice cannot be achieved through research based only on quantitative data. The adoption of qualitative research methods in software engineering, starting from 1990s, is related to recognition of importance of management and organizational issues, or people problems, for the field progress and industrial practice (Seaman, 1999). Curtis et al., (1988) published the first qualitative study in software engineering. Seaman (1999) suggested the combination of quantitative and qualitative methods for achieving results that are more fruitful. Sim et al., (2001) advocated using multidisciplinary techniques, like qualitative methods, in empirical studies in software engineering. However, Sim et al., (2001) argued that multidisciplinary techniques must be understood before they can be appropriately applied. Recently, qualitative methods have gained more attention in software engineering community through organization of specialized workshops (Sim et al., 2001), growing number of published qualitative studies and special issues in leading software engineering journals (Dittrich et al., 2007).

Although small software companies have became significant on global market, qualitative studies on their practice are still rare. Small software companies have small and dynamic teams where human factors are crucial for their functioning. Therefore, qualitative methods are essential for deeper understanding of practice that is highly dependent of people that perform the practice. In published studies the use of several qualitative research methods have been reported. Basri and O'Connor (2010) reported the use of both qualitative and quantitative methods for understanding the issues of process standards adoption by very small companies. Qualitative and quantitative analysis were done separately, and results were merged. Qualitative part of the study used semi-structured interviews and focus groups for data collection, and grounded theory coding (Strauss & Corbin, 1998) for analysing data. Stojanov (2012) presented exploration of automation level of software change request process during software maintenance phase. In depth interviews and focus groups were used to collect data from software experts, while constructivist approach to grounded theory (Charmaz, 2006) was used for developing

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