

Towards Understanding of Software Engineer Motivation in Globally Distributed Projects

Research proposal

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Abstract— Motivation in software engineering is reported to be a source for performance improvement, which leads to project overall success. Since it is a soft factor and difficult to quantify it is usually neglected. Research in this field is rather scarce and outdated. On the basis of a recent systematic review of software engineers' motivation we set an agenda for further investigation of the role of motivation in contemporary projects. As software organizations nowadays seek opportunities inherited in both - global software development (GSD) and agile projects, it is important to understand how different project environments influence motivation.

Keywords-motivation; distributed teams; agile teams; distributed agile teams

I. INTRODUCTION

Nowadays in a quest for cheaper and faster high quality software development many organizations have turned toward globally distributed software development [1]. GSD declares to allow organizations to overcome geographical distances and benefit from access to a larger resource pool, and to reduce development costs [2]. Although, it is claimed that one of GSD benefits is reduced time-to-market achieved by using time-zone differences and having round-the clock development [3], there exist evidences that utilising geographically distributed teams decrease software development project performance in terms of productivity and conformance quality [4]. GSD emphasizes the importance of developers' human aspects [5] which among other potential reasons of drawbacks are often neglected since they are not easy definable and quantifiable.

Team motivation in software engineering is reported to have the largest impact on practitioner productivity, software quality management and project overall success [6]. Lately considerable empirical research work done on agile projects compared with former research on traditional projects shows that employees working in different types of projects have different motives to perform well [8, 9, 11], but there is less evidence about motivation in GSD although it has already become one of today's normal form of working. As it still confirms itself as rather unsuccessful approach, there is a growing need to understand how to motivate employees to perform better in order to gain more of GSD promised

benefits. On the basis of preliminary investigation of different symptoms of motivation and demotivation in agile and in global projects [7] we generate questions for further research aiming at understanding motivation in blended distributed agile projects.

II. RESEARCH OBJECTIVE

The aim of this study is to understand how to achieve higher productivity and success ratio of distributed software projects by increasing software engineers' motivation.

On the basis of a pilot study about symptoms of motivation and demotivation in agile and GSD projects [7], we formulate the following working assumptions:

A1: Distributed projects are more de-motivating than motivating by their nature.

A2: Agile software development approach has a positive impact on software engineer motivation.

The objective is to acknowledge what motivates and de-motivates software engineers working in differently distributed software development projects and in agile projects, and to investigate if motivators and de-motivators are universal for different cultures. The research questions are the following:

RQ1: What motivates and de-motivates software engineers working in distributed software development projects?

RQ2: What can we learn from agile projects to increase motivation in distributed software development projects?

RQ3: How do differently distributed software development project settings influence software engineer motivation?

RQ4: Are motivators and de-motivators universal for software engineers belonging to different cultures?

III. BACKGROUND AND RELATED WORK

Motivation has been described as a source of performance improvement, which leads to productivity gain

through exploitation of effective teamwork, in which team members act selflessly and contribute to the greater good [8].

Elton Mayo conducted first experiments that demonstrated the influence of the team motivation on productivity in 1924, but later studies have confirmed the same results in several industries [9]. Mayo's experiments for the first time evidenced that workplaces are social environments, where people are motivated by many factors other than economic interest. He concluded that recognition, security, and sense of belonging were more important to productivity and morale or motivation, and a friendly relationship with the supervisor was very important in securing the loyalty and cooperation of the team [9].

In 1981, Barry Boehm reported that motivation has the single largest influence on quality and productivity than any other factor in software development, while in 1999 DeMarco and Lister's survey showed that the lack of motivation is one of the most frequently cited causes of software development project failure [6]. So far there are no other aspects claimed to have bigger influence on project effectiveness than developers' motivation, therefore it is important to understand what motivates software engineers to perform well and also what de-motivates them.

In 1978, Couger and Zawacki began a discussion whether software engineers form a distinct occupational group with similar needs and motives, and the discussion is still on going. They surveyed the job perceptions of more than 6000 people from different professional areas and concluded that software engineers found their work less meaningful and rated their jobs less favourably than other professionals, their need to interact with others was negligible; they had very high growth needs and were concerned about learning new technology [10]. Beecham et al. in their systematic review on motivation confirmed that a little more than a half of empirical studies (54%) conducted in this field until year 2006 regarded software engineers as a distinct occupational group, while 24% of the studies denied this categorization [6].

There are several classical motivation theories, which can be applied in order to explain what motivates software engineers (such as Abraham Maslow's Hierarchy of needs, Clayton Alderfer's ERG theory, Frederick Herzberg's Motivation-hygiene theory, David McClelland's achievement motivation theory and others). Contemporary understandings of the factors that influence motivation often divide them into intrinsic and extrinsic factors [9]. Intrinsic factors address the work itself and the goals and aspirations of the individual, such as achievement, possibility for growth, social relationships, security, etc. Extrinsic factors are concerned with the surrounding environment brought by the organization to the individual, such as praise, communication, office space, responsibility, money etc.

Beecham et al. in their report on the motivation of software engineers have gathered motivators and de-motivators for software engineers from 92 empirical studies

[6]. They have identified some of those factors as inherent for software engineering. In total, 29 motivators and 15 de-motivators have been collected. It is worth noting that the authors also captured the external signs associated with motivated and de-motivated software engineers, such as retention, productivity, project delivery time, budgets, absenteeism and project success [6]. They have also found that the existing models of motivation do not address the needs of software engineers in their cultural and environmental settings [6].

In another paper Beecham et al. have reported how Extreme Programming practices meet the motivational needs of software engineers from team-centric perspective [11] and there are several other studies reporting agile practices as beneficial for productivity and job satisfaction increase [e.g. 8, 9, 12, 13].

As far as we know, no research dedicated to motivation in distributed software development can be found. To fill this gap, we address motivational needs of software engineers belonging to different cultures and working in differently distributed projects.

IV. RESEARCH METHOD

To address research questions, first, we will acknowledge different aspects of distributed projects, which should be taken into account when investigating software developer motivation, e.g., number and location of sites, type of collaboration model, if communication among project team is synchronous or asynchronous etc.

Secondly, we will conduct a literature review on motivation of software engineers working in different projects. We plan to base our investigation on the results of systematic literature review performed by Beecham et al. [6] where they have identified several motivating and de-motivating factors affecting software engineers' will to work well.

Further, we will conduct several case studies comprising a self-administered survey and semi-structured interviews about motivation of software engineers working in differently distributed projects. We intend to survey both – sender and receiver sites, but the choice of the research objects is highly dependent on the organizations, where the research will be conducted. It is planned to perform analysis of data from homogenous projects within one organization practicing globally distributed development. Thus we will avoid mixing different organizational cultures and will be more able to recognize cultural differences regarding motivational needs. Further steps will aim to replicate our findings in another similar software organization to evaluate the generalizability of the findings.

The aim of the survey is to investigate the trends towards motivation in the distributed software development projects and to serve as a basis for interview questions design. The survey will contain indirect questions addressing motivating and de-motivating factors in work, and external signs of motivation [6]. In survey design closed

questions will be predominant. After the analysis of survey data individual face-to-face or video interviews with survey respondents will be conducted to clarify their answers if needed and investigate their personal motivation and demotivation in more details. A semi-structured approach will be used in order to provide an opportunity to clarify some answers as it allows improvisation and exploration of the studied objects [12]. This kind of approach for information retrieval is chosen because we do not have yet a comprehensive instrument for motivation research in distributed software development projects therefore we are going to do a pre-study in a form of survey and then based on the results of it we will elaborate a set of interviews to gather detailed information which further will be qualitatively analyzed. The result will include statistical values and summarized qualitative attitudes, and opinions of industry professionals.

V. RESEARCH PROGRESS

So far literature review has been conducted and results addressing RQ1 and RQ2 have been reported in [7], in which we have investigated what motivates and de-motivates software engineers, and how the influencing factors are manifested in global software projects on the basis of the systematic review of software engineers' motivation [6]. Our observations suggest that in distributed projects many motivating factors are hindered while several de-motivating factors are inherent in their nature. Despite contradictory fundamental principles of agile and distribution, the paper suggests that blending agility into distribution might solve problems inherent in distributed environment.

VI. EXPECTED RESULTS

At the end of the study we expect to have a better understanding of motivating and de-motivating factors in blended distributed agile software development projects and evidences of peculiarities in motivational needs of software engineers belonging to diverse cultures and working in different environments. Moreover, we expect to have useful knowledge of how to improve distributed software projects through software engineers' motivation.

VII. EVALUATION

As each project is unique the results will not be generalizable but some trends interesting to research community and practitioners could appear.

In order to conduct more objective and comprehensive research the author seeks for collaboration with other researchers and PhD students.

ACKNOWLEDGMENT

Līva Šteinberga express her sincere gratitude to dear research advisor Dr. Darja Šmite, senior researcher at Software Engineering Research Lab, Blekinge Institute of Technology, and associate professor at Department of Computing, University of Latvia.

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