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Identification of success and failure factors of two agile software development teams in an open source organization

Periklis Tsirakidis, Felix Köbler, Helmut Krcmar

Department of Informatics
Technische Universität München
{*tsirakid,koebler,krcmar*}*@in.tum.de*

Abstract

Agile Software Development Methods and Free/Libre Open Source Development have been two embracing movements in the software industry for more than a decade. However, little is known about the composition of both while today a variety of studies provide us with key characteristics of each one. The study extracts the similiarites and differences of both topics by means of an extensive literature review focusing on teams as research unit. Furthermore this study investigates two agile software development teams in an open source organization based on an explorative research design. The focus is on the empirical identification of success and failure in the application of agile methods in teams with open source background, structure and characteristics and in comparison with the literature findings. This study is still in progress, however first results as well as the methodology will be presented hereafter.

1. Introduction

Agile Software Development Methods (ASDM) are a widely known trend in the software development industry for more than ten years. These methods have been mainly developed by software practitioners and consultants out of past experiences and merged in a statement of four values and twelve principles, known as the Agile Manifesto. On the other hand Free/Libre and Open Source Development (FLOSSD) is also a widespread and community intensive development paradigm within the software industry as well as the research community [1]. Each of them has so far raised the interest of research in many ways. According to the respective literature there are significant differences in their inputs and processes, but also a wide range of similarities. The latter exist in the topics of inputs and mediators (processes and emergent states) around the Inputs-Mediators-Outputs-Inputs framework [2].

ASDM and FLOSSD team inputs are shared goals, where a shared understanding, shared beliefs and shared values how to achieve these goals are embedded in the programming activity. Furthermore it was found that either teams are self-organized with focus on collective code and product ownership while an on-site customer is present in a co-located (ASDM) or virtual (FLOSSD) environment. In addition another common input similarity is the ability of team leaders to achieve idea creation and support its scaling during the development. Moreover in the mediators ASDM and FLOSSD are similar in terms of collaboration through instructive materials (e.g. wikis) and standardization of source code. The project management is shared among team members and is also embedded in the programming activity. Knowledge creation in ASDM and FLOSSD teams is held tacit and its transformation is supported by tools and collective reflection. Finally, trust has been identified to be the only common emergent state to influence team effectiveness and accomplishing change in distributed environments. In contrast a variety of differences exist in the topics of inputs and processes. ASDM teams are by definition small, co-located and integrated in organizations whereas FLOSSD teams consist of large numbers of volunteers, globally dispersed and not per se part of an organization. However, organizations can be part of FLOSSD teams. In addition ASDM provide definitions for planning, testing and design, while no obvious patterns of these activities exist in FLOSSD teams. The collaboration in FLOSSD teams is mostly asynchronous through ICT media and differs from the co-located synchronous ASDM collaboration dichotomously. Finally, the last instance in ASDM teams for decision making is the management, whereas decision making in FLOSSD teams is a quorum consensus.

2. Case study

This research is based on an explorative and comparative embedded case study with two units of analysis.

2.1. Data sources

The data sources included in this study consist of three types: documentation, archival records and semi-structured interviews. The documentation data was provided prior to the study by the organization to identify the units of analysis

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and for the case study design itself. It includes the organization's profiles of each team obtained by surveying the team managers separately. The documentation data consists of demographic information about each team as well as a list of the applied ASDM. The second data source were semi-structured interviews with each member of both teams at the organization's annual developers meeting. They were based on two interview guides developed previously for each target group, the team managers and the team members. In total fourteen interviews were collected from both teams, seven developers plus team manager of the first and five developers plus the team manager of the second team. The last data source captured for this study were the mailing lists of both teams, two of the first team and one of the second team. Each mailing list was provided by the organization for the time period from March 2004 until November 2008.

2.2. Units of analysis

Each unit is an ASDM team of the same FLOSSD organization. The teams are coded as *DT001* and *DT002*. Their characteristics according to the documentation data and the interview results are a high geographical and time zone dispersion, high adoption and reliance on information and communication technology (ICT) as well as application of the same ASDM. Both teams developed similar products for supporting separate target groups of the organization's main product line. The DT001 team consists of eight software developers and one team manager. All team members are located in seven different locations spread over three countries: Germany, Netherlands, U.S.A. In addition the DT001 time zones are: UTC+1, UTC-8, UTC-5, UTC-6/-5. The DT002 team consists of five developers and one team manager. They are located in: Austria, Germany, Ukraine, Argentina and Finland. The DT002 time zones are: UTC+1, UTC+2, UTC+3, UTC-3.

2.3. Pre-analysis assumptions

Three categories of pre-analysis assumptions were made. Firstly, this study identifies only the success and failure dimensions on team performance. Team performance is measured in terms of team-produced outputs on time and on required delivery quality. Furthermore it is assumed that successful teams should be able to produce high-quality products while maintaining a high level of satisfaction among team members in respect of the products, the development approach and the team. DT001 was assumed to be the failing team, because it did not meet its objectives according to the documentation data. Secondly assumptions include the similarities and differences of both teams in terms of *team size, reliance on ICT, availability of ICT, geographical and time zone dispersion, cultural diversity* and *assignment to project*. Similarities exist in reliance and availability of ICT, in geographical and time zone dispersion and in assignment to project. A difference could be identified in the DT001 team size as it consists of three more developers. The cultural diversity differs also in both teams, as the DT001 consists of six U.S.-Americans and two Germans and the DT002 consists of two Austrians, one German, two Ukrainians, one Argentinean and one Finn. Finally assumptions were made on the similarities and differences of the applied ASDM. For both teams a consistent mixture of ASDM was assumed. The set included Scrum, test driven development, collective code ownership, refactoring and coding standards. There is also usage of co-located and distributed pair programming.

2.4. Analysis process

The analysis process focuses on theory building. The implementation of theory building is based upon the works of [3] and [4]. The underlying orientation is inductive hypothesis generation and explanation building. The processing of the interview data took place after the complete collection, due to the limited time frame comprising only two days. The interview guidelines were used to analyse the collected data. Finally the mailing list data have not yet been processed in the current state.

3. Preliminary results

The findings are currently induced from the interview data. They include four success and two failure factors. The success factors comprise *(1) constant and synchronous communication, (2) consistency in methodological development approach, (3) geographical dispersion management through an extensive testing culture* and *(4) FLOSSD experience in accepting and handling the environmental limitations.* The two failure factors are *(1) inconsistency in methodological development approach* and *(2) information hiding in separate mailing lists*. Failure was extracted from DT001 and the success factors (1), (3) and (4) were from both teams.

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