

Communication in Firm-Internal Global Software Development with China

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Abstract. Globally distributed software development projects are on the rise. However, 69% of cross-regional projects fail completely or partially, because of lack of cross-cultural understanding. This paper presents a qualitative study of the impact of communication on Global Software Development (GSD) within firms due to cultural differences. In particular, we provide a model of problems and solutions related to communication of German/Chinese and American/Chinese collaborations in GSD. The model was derived using grounded theory to study six globally distributed software development projects. The results may not only help companies understand cultural problems, but also help them overcome these problems. To this end, we discuss the solutions adopted by the multinational software companies that we studied.

Keywords: Global Software Development, Cultural Differences, Communication, Qualitative Research, China Collaboration.

1 Introduction

Globally distributed software development, also called global software development (GSD), is growing as the software industry is experiencing an increase in globalization of business [1]. The reasons motivating GSD are reduction of costs, access to skilled labor, getting closer to customers, time difference utilization, and improving the quality of work [2]. Yet, according to a study by a major auditing firm, 69% of all outsourcing projects fail completely or partially [3]. Main reasons are the lack of cultural harmony between the vendor and the client and poor relationship management. In this paper, we present the results of a qualitative study on how to address cultural differences in GSD. We interviewed six project managers from six different globally distributed software development projects. All projects were firm-internal projects, with at least one team on each project being based in China. We applied a Grounded Theory (GT) approach to analyze the interviews and related data and to develop the model.

The two central categories that emerged from our GT-based analysis are communication and trust, of which this paper reviews the communication category. As a key result, we present the solutions as best practices, which practitioners in large multinational corporations can adopt to address problems of GSD.

2 Related Work

The existing literature provides a number of relevant studies that explore the impact of communication on GSD.

For example, Persson et al. [4] discover a set of challenges related to the lack of face-to-face communications in agile distributed software development. Damian & Zowghi [5] present a model of how remote communication and knowledge management, cultural diversity and time differences negatively impact requirements gathering, negotiations and specifications. Holmstrom et al. [6] find that temporal, geographical, and socio-cultural distances have an impact on communication, and present solutions based on qualitative interviews of American and Irish companies.

There are also studies that try to understand the reasons of communication issues. For example, Bjørn & Ngwenyama [7] investigate communication breakdowns that can be attributed to differences in life world structures, organizational structures, and work process structures within a virtual team. Keil et al. [8] investigate the effect of culturally constituted views of face-saving on the willingness to communicate bad news regarding a software development project in the USA and in South Korea.

Most studies investigate communication issues in GSD, and very few present solutions for the discovered issues. In our study, we show the issues related to communication and their particular solutions in the projects. Although some of the communication problems have been already mentioned in other studies, such as, the problem of the lack of face-to-face communication, the face-saving problem, and the language barriers [4, 6, 8], our study does not describe only problems, but also solutions from industry.

Our findings improve or extend prior work due to different contexts, difference in data collection, different way of analysis, and novel results.

3 Study Preparation

We use a Grounded Theory (GT) approach for our research [9].

We chose interviews as the main method of data collection. Our interviewee sample included six individuals in German and American multinational software companies. Two of them were Germans representing German companies, and four were Chinese representing American and German companies. All participants held managerial roles with direct engagement in the development process. Moreover, they have between four to ten years of cross-cultural experience in the field.

Our research process started by reviewing the existing literature including papers, articles, books, etc. This allowed us to form the initial research question that served as a starting point for interview preparation. For each interview, we prepared open-ended questions on various areas of the effects of cultural differences in GSD to be addressed during the interview. These questions were used solely to navigate the interview, and were not given to the interviewee beforehand. Furthermore, we refined questions after each interview based mainly on the analysis results of the previous interview, as well as the existing literature. The analysis provided us with focus areas that we could address further in the next interview. After six interviews, we reached data saturation, i.e. we did not receive new information, rather interviewees were repeating each other. At this point, we decided to move forward towards forming the model.

We interviewed six individuals in multinational software companies. The interviews were divided equally between German and American companies. Moreover, we interviewed industry partners from different sectors in the software industry, for example electronics, energy, or enterprise solutions. This variation allowed us to gain more knowledge about the effects of culture in software development from different angles and also to see if different sectors have different problems or not. We had two personal face-to-face interviews that took place in China, and four interviews over the phone. “American” person in this paper means a person from the U.S.A. Each interview took around 1 – 1.25 hours.

4 Research Results

The result of our analysis is a model (or theory), consisting of two main categories *Communication* and *Trust*. *Communication*, in turn, is based on the key concepts *Reporting Failure*, *Communication Behaviors*, and *Collaboration across Regions*, while *Trust* is based on the key concepts *Transparency* and *Delegation and Traveling*. For reasons of brevity, we omit Trust from the discussion. The interested reader is referred to the first author’s Master Thesis [10].

Our data analysis uncovered fourteen problems and eighteen solutions related to *Communication*. All problems and solutions were explicitly mentioned by our interview partners.

4.1 Communication

Data analysis showed that 153 out of 199 quotations are related to Communication, i.e. 77% of all quotations relate to Communication. Table 1 shows additional details for each of concept.

4.1.1 Reporting Failure

Half of our participants (3, or 50%) mentioned explicitly some situations where they encountered this problem. Table 2 shows a list of the encountered problems.

Moreover, the analysis revealed six solutions that were used to overcome some of the encountered problems in table 2. Table 3 presents a list of these solutions.

4.1.2 Communication Behaviors

The majority of our interview partners (4, or 67%) observed several differences in the communication styles of Chinese developers in comparison with their American or German peers. Table 4 presents a list of related problems.

Moreover, the analysis revealed three solutions that were used to overcome some of the encountered problems in table 4. Table 5 illustrates a list of these.

Solutions “SL2” and “SL4” that are listed in table 5 were also mentioned to overcome problems “PR4” and PR5”.

4.1.3 Collaboration across Regions

This concept presents problems that may occur in managing the collaborations across regions, as well as some suggested solutions. The majority of our interview partners (5, or 83%) mentioned repeatedly several differences in capturing requirements, defin-

ing tasks, language barriers, and so on. Table 6 presents a list of related problems that were explicitly mentioned by our interview partners.

Moreover, the analysis revealed nine solutions that were used to overcome some of the problems in table 6. Table 7 shows a list of related solutions.

Table 1. Percentage of participants for each concept in “Communication” category

Concept	Participants		Quotations	
Reporting Failure	3 (P1,P3,P4)	50%	34	17%
Communication Behaviors	4 (P1,P2,P3,P5)	67%	37	19%
Collaboration across Regions	5 (P1,P3,P4,P5,P6)	83%	82	41%

Table 2. Problems related to “Reporting Failure”

ID	Problem	Participants
PR1	Chinese developers are more reluctant than German and American developers to report mistakes during projects.	2 (P1,P3)
PR2	Chinese make late notifications if not being able to meet the deadline. Yet, they are willing to spend long after work hours to finish the task.	1 (P3)
PR3	Strictness of Chinese team leaders makes it difficult for some developers to report mistakes or delays.	1 (P4)

Table 3. Solutions related to “Reporting Failure”

ID	Solution (Best Practice)	Problem ID	Participants
SL1	Ask management to appreciate reporting mistakes during projects.	PR1	1 (P1)
SL2	Create workshops to articulate ideas with anonymous identities, because anonymity helps Chinese avoid sharp direct feedback.	PR1	1 (P1)
SL3	Use a progress-tracking system, where a developer updates the status of his task daily to avoid late notifications.	PR2	1 (P3)
SL4	Choose software development method that encourages communication, e.g., Scrum, or other agile methods.	PR1	1 (P1)
SL5	Assign a local Chinese expert to get back to in case of problems.	-	1 (P4)
SL6	Bring up the message that delays are acceptable in presence of a strong justification.	PR2	1 (P3)

Table 4. Problems related to “Communication Behaviors”

ID	Problem	Participants
PR4	Chinese developers have less tendency than Germans and Americans towards asking questions in group meetings.	3 (P1,P5,P3)
PR5	Chinese developers seldom discuss their tasks with their superiors.	2 (P1,P2)
PR6	Chinese’ “yes” or “no” has a different meaning for Americans.	1 (P3)
PR7	Chinese have a formal communication style, while Americans have an informal style.	1 (P5)

Table 5. Solutions related to “Communication Behaviors”

ID	Solution (Best Practice)	Problem ID	Participants
SL7	Ask the management to bring up repeatedly the message of the importance of open conversation.	PR4,PR5	2 (P2,P5)
SL8	Do not take “yes” or “no” for an answer. Chinese developers should write a document of their opinion after important sessions.	PR6	1 (P3)
SL9	Create a relaxing work environment for Chinese developers, where you can speak freely and informally with colleagues, and formally only with clients.	PR7	1 (P5)

Table 6. Problems related to “Collaboration across Regions”

ID	Problem	Participants
PR8	Chinese developers need detailed requirements about their tasks.	3 (P1,P3,P4)
PR9	Chinese cannot easily talk in English due to language barriers.	3 (P3,P4,P6)
PR10	Chinese are detail-oriented, while Americans and Germans see the big picture.	3 (P1,P3,P4)
PR11	The U.S.A. and China have different holidays. For example spring festival in China, and Christmas in the U.S.A.	1 (P4)
PR12	Chinese developers omit context when discussing tasks.	1 (P5)
PR13	Chinese developers like to be challenged.	2 (P3,P5)
PR14	The terminology is documented only in the country’s language, i.e. Chinese in China and German in Germany.	1 (P6)

Table 7. Solutions related to “Collaboration across Regions”

ID	Solution (Best Practice)	Problem ID	Participants
SL10	Create smaller and deeper tasks deliberately and associate them with specs and context.	PR8	1 (P1)
SL11	Split up the development cycle across regions, where you can exploit the benefits of each one, for example Americans deal with customers, Chinese design, and Indians implementation.	-	1 (P3)
SL12	Pay more attention when defining requirements in order not to leave any space for guessing.	PR8	2 (P1,P3)
SL13	Use a wiki-like system for technical discussions. Yet, it is not useful in case of urgent issues.	PR9	1 (P4)
SL14	Remind Chinese developers repeatedly of the importance of providing context when discussing tasks.	PR12	1 (P5)
SL15	Create discussion groups, where Chinese developers discuss technical problems with their American colleagues.	PR13	1 (P5)
SL16	Provide Chinese developers with challenging tasks.	PR13	1 (P5)
SL17	Create English training sessions in both sides. The training focuses on business terms used in the industry.	PR9	1 (P6)
SL18	Unify the terminology by creating a map table in the three languages: English, Chinese, and German, where each term is associated with its corresponding in English.	PR14	1 (P6)

5 Conclusion

In this research, we present a grounded-theory-based study of problems and solutions of German/Chinese and American/Chinese collaborations. Our data was gathered through six interviews with six participants in multinational software companies that have development centers in China.

As a result, a model with two main categories emerged: Communication and Trust. In this paper, we reviewed the Communication category for reasons of brevity. Each category contained a number of concepts, where each concept identified a set of problems and corresponding solutions. The resulting concepts in the Communication category pinpoint major areas where communication problems are likely to occur.

All problems and solutions were explicitly mentioned by our interviewees. Although some of the problems were already mentioned in other studies like the problem of face-to-face communication and language barriers, our model does not describe only problems, but also solutions from the industry.

This model provides companies with in-depth insights about the problems they might encounter, and they can turn to the specific solutions adopted by multinational software companies that we report about.

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