

Effective Negotiation Practices in Global Software Development: An Empirical Evaluation

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Abstract — Requirements collection and implementation in global software development (GSD) is quite difficult due challenges such as geographical distance, time zone differences, language barrier and culture variation. In GSD, where proper communication among vendors and clients become difficult, proper discussion on requirements also become difficult. In this research work, best practices needed for effective negotiations are validated from real software industries using empirical study. The outcome of empirical evaluation shows that ‘Use effective communication mechanism for discussing the requirements’ and ‘Clear escalation path whom to talk when things gone wrong’ are most strongly agreed practices.

Keywords - Practices, effective negotiations, Global Software Development, Empirical Evaluation.

I. INTRODUCTION

Requirement engineering is systematic way of software requirements collection [1][2]. There are different phases of requirement engineering i.e. requirement elicitation, requirement analysis, requirement specification and validation phase [3][4][5]. During requirement elicitation, requirements of software system are collected from clients using any proper elicitation technique. Different elicitation techniques are categorized into either traditional ways such as background study, interview, apprenticeship, questionnaire or collaborative ways such as brainstorming [6]. In GSD, where clients and vendors are far away and there exist geographical distance, thus it is very difficult to apply traditional ways of elicitation techniques and thus proper implementation of requirements and quality of software is affected [7][8]. In GSD, there exist challenges such as time zone differences, language barriers and culture differences [9]. Due to time differences between two countries, clients and vendors cannot timely communicate on requirements and sometimes this difference is big and when there is day in one country, other country have night and which become big challenge [10][11]. Similarly, difference in languages and terminologies of clients and vendors make it difficult to understand each other's and communicate properly [12] [13]. Culture difference is critical challenge identified by many authors as people belong to different cultures have different beliefs and ways of doing activities [14]. According to, when culture issues arise, it become difficult to trust on each other's [15]. In GSD, trust building is considered to be most important factor [16] [17].

In GSD, due to the stated critical challenges, proper discussion and negotiations process is affected. Different studies identified best practices for proper negotiations and discussion in GSD [18][14]. In one of the their studies, author identified all possible best practices of effective negotiation and discussion during requirements implementation in GSD using systematic literature review from thirty papers as shown in Table 1 [17]. Frequency of these practices are shown in Table 1. Aim and objective of this research work is to validate these practices from real software industry.

Table 1: Practices for effective negotiations in global software development

S/No	Practices/Solutions	% of Practices via SLR (N=30)
1	Video channels	5
2	Advance Collaborative tools for GSD should be used	10
3	Asynchronous means of communication	5
4	Human facilitation of distributed requirements negotiations	1
5	Schedule ongoing informal meetings	4
6	Clear escalation path. It has to be clear whom to talk to when things go wrong.	4
7	collaboration and coordination is required	1
8	Focus on interests rather than positions	1
9	Knowledge management techniques in distributed structures	1
10	Hard-copy documents such as the RS are used as vehicles for discussion and decisions	1

II. BACKGROUND STUDY

For proper negotiations, effective ways of communication such as video channels is necessary. According to [19], video channels provide synchronous ways of communication which brings vendors and clients on direct communication face to face meeting makes it easier to discuss on requirements. Videoconferencing is generally considered as the most appropriate medium to conduct requirements negotiations between remote stakeholders. According to [20], for effective communication, use of collaborative tools design for GSD favor not only synchronous ways of communication but it provides facility for asynchronous communication. Asynchronous communication is necessary where there exist time differences and language barriers. Through asynchronous communication such as email etc. clients and vendors get enough time to discuss properly requirements. With these needs in mind, author developed a new collaborative tool named EGRET (Eclipse-based global requirements tool) for distributed requirements management [21]. According to [22], role of human facilitator and coordinator becomes important. Human facilitator play important role when clients and vendors have different languages and terminologies and difficult to understand each other languages. Multimedia Web-based meeting tools such as NetMeeting are becoming ubiquitous for communication on the Internet. By providing audio and video channels and real time sharing of applications, they emerge as potentially useful tools for such communication. According to [23], informal communication and building personal relations can increase coordination among vendors and clients and thus facilitate effective communication. With scheduling informal communication, collaboration among vendors and clients increase and thus build trust relations among them. According to [14], if any thing gets wrong during requirements collection and implementation, experts or who have knowledge about requirements inside organization should be accessible. This help in correction of requirements on time. Focus should be on interests rather than positions. Ultimate goal is proper implementation of requirements. According to [24], effective global project management play significant role in requirements management and regarding this, role of project manager is very important. Effective leadership bring coordination in team and this create an environment for proper discussion. Global project management tools should be used. According to [25], documents such as SRS should be used as medium for requirements discussion. With discussion on SRS, after requirements collection, any conflicts can be removed before implementation.

III. RESEARCH METHOD

3.1. Survey Design

Survey is empirical study that is conducted to validate our outcomes from results of SLR that was formerly conducted [14]. When maximum responses in short time are to be collected, questionnaire survey is best choice. In this research work, online survey is led with software engineering experts. Structured questionnaire method is adopted for gathering data from the experts working in GSD projects.

The questionnaire consists of practices for effective negotiations that were identified through SLR. Five point scale was used to state the importance of the identified intercultural challenges. The respondents were requested to choose one of the seven options i.e. strongly agree, agree, slightly agree, not sure, disagree.

3.2. Data sources

Only those software organization were selected that work on GSD projects. Different organizations were finalized for this purpose and questionnaire were distributed amongst them.

3.3. Data analysis

A total of 30 participants responded to the survey belong to different software houses as shown in Table 2. Among them 5 responses were rejected because of our quality criteria. Final list of responses contain 30 experts. Percentages of strongly agreed, agreed, slightly agreed, not sure and disagreed responses will be calculated for every practice. This calculation is necessary to analyze these practices and to identify factors that are more critical.

Table 2: List of software houses selected for questionnaire

S/No	Software Company Name	Address
1	Datumsquare IT Service	STP -3, Block A, Ground Floor, Plot # 155, Service Road North, Sector I-9/3, Islamabad
2	Seven Software Development (Private) Limited	3rd floor, software technology park, Service Road North, Sector I-9/3, Islamabad
3	Developer Desk Technologies	House No 258, Street 90, I-8/4, Islamabad
4	DiscreteLogix	Software technology park, Service Road North, Sector I-9/3, Islamabad
5	Techaccess Private Limited	F-8/2, Islamabad
6	StepNex Services (Pvt) ltd	Deans Trade Center, FF-51, Peshawar
7	Trend micro logics	Deans Trade Center, FF, Peshawar
8	Grey Beard Solutions	F-6, Islamabad
9	Vizteck Solutions	Software Technology Park, Plot 156, Sector I-9/3, Islamabad
10	xFlow Research	Software Technology Park, Sector I-9/3, Islamabad

IV. RESULTS

Results after conducting questionnaire survey are given in Table 3 below. It shows that factor 'Use of effective communication mechanism for discussing the requirements' is most cited and critical factor identified in real practice from software industry that is mostly strongly agreed while factor 'clear escalation path' as second most critical factor identified in real practice from software industry. Percentages of all other factors are given in Table 3 below. There are some factors such as 'initial face to face contact', 'focus on interests rather than positions' are those that are quite disagreed which shows there is less significance of these factors. Figure 1 shows critical practices identified from survey in descending order with percentages of strongly agreed greater than 30.

Table 3: Questionnaire response from real software industry

Practices	Expert Responses = 30					% of Strongly Agree
	Strongly Agree	Agree	Slightly Agree	Not Sure	Disagree	
Use effective communication mechanism for discussing the requirements	22	8	0	0	0	73%
Clear escalation path. It has to be clear whom to talk to when things go wrong inside organization	13	15	2	0	0	43%
Schedule ongoing informal meetings	10	15	5	0	0	33%
Initial face-to-face contact	3	10	10	0	7	10%
Advance Tools should be used	5	10	15	0	0	16%
Remote collaboration is required	4	15	10	1	0	13%
Use of the shared electronic workspace	2	8	12	6	2	6%
Focus on interests rather than positions	0	12	10	3	5	0%
Knowledge management techniques in distributed structures	4	8	12	6	0	13%
Hard-copy documents such as the SRS are used as vehicles for discussion and decisions	10	15	5	0	0	33%

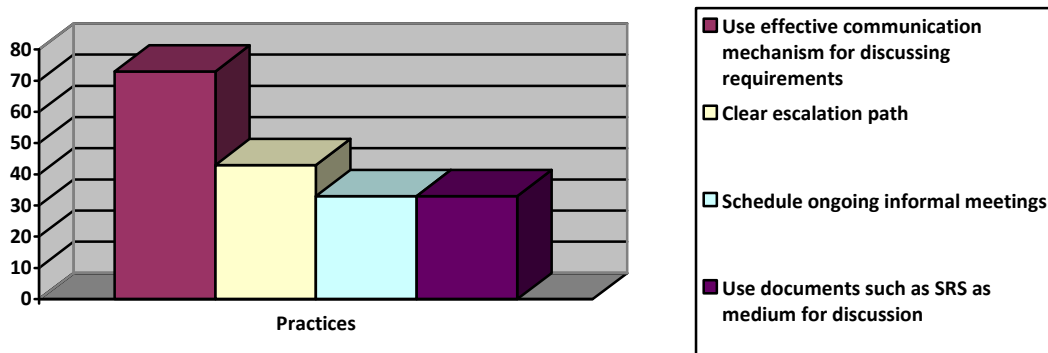


Figure 1: Critical practices for proper negotiations and discussion

V. CONCLUSION AND FUTURE WORK

Practices identified previously in one of our research study for effective negotiations in GSD are validated from real software industries. Feedback from 30 experts were collected with different options given to them i.e. strongly agreed, agreed, slightly agree, not sure and disagree. From the results, factors Use effective communication mechanism for discussing the requirements, Clear escalation path. It has to be clear whom to talk to when things go wrong inside organization, Schedule ongoing informal meetings and Hard-copy documents such as the SRS are used as vehicles for discussion and decisions are marked as most strongly agreed. In future, we aim to design and develop effective negotiations model that can assist vendors in better implementation of requirements. The proposed model will be evaluated using case studies.

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