Geographical Distance and Communication Challenges in Global Software Development: A Review

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Abstract—**Due to innumerous advantages the Global software engineering is trending now a days in software development industry. Basic drivers for this trend are flexibility, faster development and expected cost saving. Software development has moved from traditional development to the global software development (GSD). Global software development is very important and ordinary practice in the software industry. In GSD, the developers are distributed across different sites and different countries, and lots of problems arise due to the physical social and cultural barriers. Global Software development is facing a number of challenges including Geographical distance, Communication and collaboration, time, culture, trust, tasks distribution, requirements gathering and collaboration. In this paper, authors conducted a detailed study on geographical distances and communication challenges in GSD, their inter dependencies, and also the proposed solutions and guidelines to address these challenges that are very critical in the success of GSD projects. Also in this paper a detailed literature review is provided, combined results are summarized and on the basis of these studies, a comparative study is made. This research will be helpful for other researchers to draw new strategies to tackle these challenges.**

Keywords—Global Software Development (GSD); distributed software development; geographical distance challenges; communication and collaboration

I. INTRODUCTION

Global software development (GSD) is a phenomenon that is receiving significant interest from all over the companies in the world. In GSD, stakeholders from different national and organizational cultures are involved in developing software. No doubt Global software development complicates the collaboration among the team members who are working on the same project but on the different sites. GSD can offer benefits such as improving time to market, improve quality, access to a larger and Better-skilled developer pool, reduced development costs, save time and shared knowledge [3]. Author's contribution in the paper is the discussion of all the challenges in GSD and dependencies between challenges. Also, will list the benefits of GSD but main focus is GSD challenges.

The number of organizations distributing their software development processes globally keeps increasing and this change is having a deep impact on the way products are considered, designed, constructed, tested and supplied to customers GSD takes several forms. Distance (time and space) creates many challenges in communication, coordination, organization, project planning and follow up, and work allocation. Advances in communication technology and tools have carried GSD in focus [6].

In this paper, authors will discuss the Challenges of Geographical Communication in global software engineering. The purpose behind this study is to find the factors that badly affect the communication effectiveness and how they work. Section 2 contains the detailed definition of Global Software Development and *Identifying* the factors that introduce problem in global software development; Section 3 contains the detailed Literature Review and Section 4 contains the proposed methods and defining strategies to minimize GSD problems then Section 5 contains the motivation followed by acknowledgment and conclusion. Finally, the references are mentioned.

II. GLOBAL SOFTWARE DEVELOPMENT

After its first foundation in the conference which is sponsored by "NATO science committee at the end of 1960" Software Engineering industry is growing continuously [2]. Due to internal and external improvements in development method, its evolution is continuing [2]. Today one of the most and important change in software industry is Global software development which is also known as distributed software development [1]. In Globalization Technology is geographically distributed and this helps the organizations to change their operating and development models [1]. In Global Software development different teams work from different places on a same project [3]. This help companies to save cost by outsourcing developments work to low-cost countries [5] and also save time by using the strategies like follow the Sun [4]. In order to support collaborative work on projects, software engineers communicate directly and through meetings [5]. Communication, particularly informal communication plays an important role in the success of any GSD team [6]. Due to different cultures, communication and coordination among developers is a major challenge [3]. Lot of work is done to overcome on these issues like regular meetings with manger of the project can be reduced communication and coordination gap [3]. Ideal solutions of these problems still lack.

A. Identifying the Factors that Introduce Problem in Global Software Development

Most of the time the professionals working on Global Software Development projects mention that inadequate communication is the key problem in performing requirements engineering activities [7], [8]. This problem arises mainly due to the loss of communication richness due to lack of one to one interaction among the teams. Other factors which arises the challenge of communication in global software development are also the geographical distance among the teams as teams are distributed across different countries. The language proficiency is another factor that causes the problem of communication in Global software development projects.

- First of these problems are the Time difference among different countries [7].

- Second problem is the Time separation which is the additional to time difference as this includes the problems of breaks, holidays and timetable laps [8].

- Cultural diversity is another problem as development teams are distributed across the different countries so every country has it's their language, culture and religions [9], [10].

- Knowledge management is another problem in the global software development as huge amount of information is coming from many sources and need to share all the information with all the teams working on the same project [7].

III. LITERATURE REVIEW

In the section of Literature Review Authors consider the approaches used by many of researchers to discuss the geographical communication challenges in global software development [6]. They will discuss the work done by many authors and their research results on the geographical communication challenges in context of global software development.

A. Analyzing and Evaluating the Main Factors that Challenge Global Software Development

In this paper the author the author consider that Global software development is increasingly trending and adopted in development organizations due to its innumerous advantages like minimizing cost, quick delivery [10]. However, the culture diversity and the difference of time are challenge in the performance of teams especially in the activities of requirements engineering as it is very crucial to have all of the stakeholders on board.

According to author, the major problem in global software development is the inadequate communication, the time, language and the cultural difference. Also the communication got mired because of the non-availability of the knowledge management strategies.

B. Communication Effectiveness in Global Virtual Teams: A Case Study of Software Outsourcing Industry in China

As the "global virtual teams" (GVT) having staff members from across the countries working on the same project. The success of the projects is highly relay on the communication among the teams working on the project. The purpose behind this study is to find the factors that badly affect the communication effectiveness and how they work. From the literature review the author found the two aspects which are as follows "critical success factor" (CSFs) and the team characteristics [6], [11].

The author focus on importance of communication among the global working teams with specified references. Also to identify the factors that affects the communication among the teams including selection and use of ICT, GVT management, task characteristics and the demographic diversity (Fig. 1).
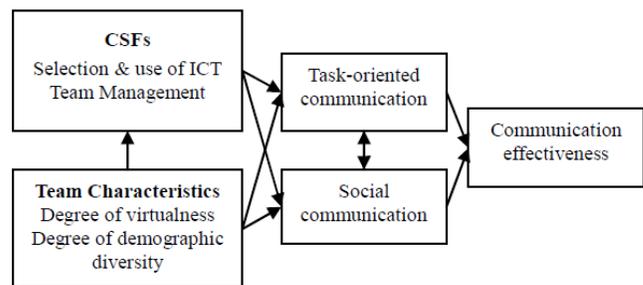
Fig. 1. GVT communication effectiveness model from the work of Min *et al.*

C. How do Distribution and Time Zones affect Software Development? A Case Study on Communication

According to the author the software projects now crossed the borders in search of talent and now consist of intra country teams that working on the same project. In this paper the author use a case study method to analyze the geographic communication difference in global software development. This case study is all about the three teams working on same project while they are student and the project continue for the two semester and the project teams are located at ten different countries [6]. This case study results that there is much difference in the communication size in the two location project and a three location project. The total amount of communication is much higher in the nearby locations or in two locations as compared to three location project. This case study also analyzes the effect caused by different time zones. On the basis of different time zones Authors can classify the project in to three time ranges which are:

- Large

- Medium

- Small

From this case study, authors found that in the small time zone range the amount of the communication is higher than the medium and the large [12]. Author also analyzes that in the small time range projects the reply to any e-mail comes faster than the projects with medium and large time range (Table I).

TABLE. I. Student's feedback for the Effect of Time one and Cultural Differences in Dose 2010, Values Range from 1-5 , from the work of Nordio *et al.*

Table # 1	Large	Medium	Small	Average
Times Zone affected quality	2.6	2.0	1.4	2.1
Times Zone affected productivity	3.1	2.5	1.4	2.5
Times Zone caused communication overhead	3.2	2.6	1.7	2.6
Cultural differences affected quality	2.2	2.0	1.9	2.1
Cultural differences affected productivity	2.3	2.2	1.8	2.1
Cultural differences caused communication overhead	2.5	2.6	1.8	2.4
Local projects: the development would be easier	4.1	3.7	4.1	4.0
Local projects: the quality would be better	3.7	3.1	4.0	3.6
Local projects: the productivity would be higher	4.1	3.3	4.0	3.8
Local projects: the communication overhead would be lower	4.0	3.7	4.2	3.9

D. Requirements Engineering During the Global Software Development: Some Impediments to the Requirements Engineering Process. A Case

The author presents in this paper that requirement Engineering is the most crucial task when teams are distributed across the countries or in case of global software development. There are two teams working on this projects that are situated in the UK and the other is software house working on the same project from New Zealand. The Phase of requirement is not easy for any software project. This paper present a case study on a project that contains distributed teams in two countries and the project was completed in the time of seven months.

The main drawback faced by the RE process during the Global software development team is communication. This issue may be further divided into the four categories [13]:

- Distribution of the clients and the development team
- Distribution of the development team
- Cultural Differences among the Clients and development team
- Cultural Differences among development team.

In Fig. 2, the author represent the intensity of communication and changes in requirement that occurs during the development of this project. As all the changes are embraced during the development of project as the Requirement engineering process is ongoing due to iterative in nature. The Curve line shows that the communication become more challenging as the requirements got changes during the development. At each stage the communication become more intense mainly due to [13]:

- Miscommunication/Misinterpretation
- Invalid Requirements
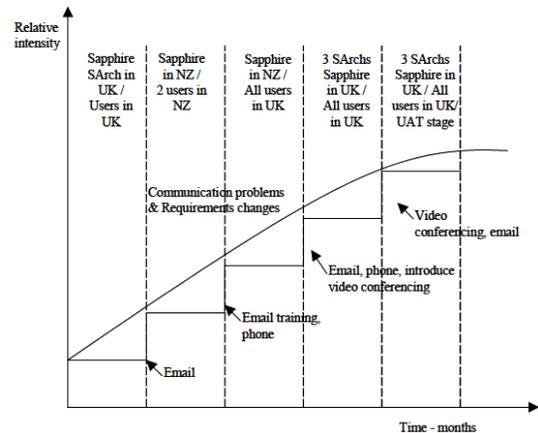
Fig. 2. Intensity of communication during the project from the work of Hanisch and Corbitt.

E. A Case Study of Customer Communication in Globally Distributed Software Product Development

In all of the cases communication of the customers was active and similar communication channels used to verify that different kinds of information are used. In development task and in developer position, coordination network is very important. Only difference in communication media is used of videoconferencing in case 2 but this is not available in case 3. Most interesting comparison which is discussed is between case 2 and case 3. IN case 3 they used agile approach and all members of 3 units were integrated through regular planning, meetings on daily basis despite time-zone difference. In all of these cases Indian and Irish development organization did not involve any user and customer. In US development organization customer group is slower in reacting due to transition from the traditional to agile approach. So rapid communication and regular agile meetings, involved customers, so they can be seen more successful communication between case 1 and in case 3 compared by US case 2 as shown in Fig. 3. Based on all case studies, Agile method in which customer involvement is consider best, due to involvement of the customers [14].
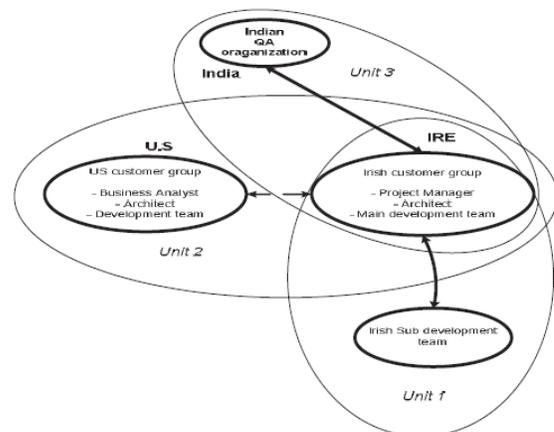
Fig. 3. The project organization and customer communication environment of the case project from the work of Korkala *et al.*

F. Communication Patterns in Geographically Distributed Software Development and Engineers' Contributions to the Development Effort

Unusual patterns of communication and coordination can be critical for the success of software project development. All roles of the customers in agile development is pre-defined. If all of the customers not present in the meetings then some of group of customers must be present in meetings. So base on different cases the result which they obtain is narrowed and limited view to the phenomenon observed. Even all of the information from different sources cannot be accessed, as many of the data utilized and analyzed by different researchers. So the Data triangulation which is introduced by stake used to check the validity of the results. This study shows that how communication patterns in the "Geographically distributed software development" (GDSD) evolve time to time [15].

G. Building Social Ties for Global Teamwork

The commitment of social ties and learning sharing to effective cooperation in distributed information system improvement groups has been investigated. Authors presume that in addition to technical solutions, human-related issues as social ties and learning sharing were revealed as keys to effective joint effort [16]. Specifically, the significance of compatibility and transitive memory was evident in the studied project. Besides, authoritative instruments that make and keep up social ties between scattered colleagues were reported for in detail. Authors recommend that future investigations ought to lead an overview over the information system industry in which the causal connections between these three primary ideas will be additionally examined as shown in Fig. 4.
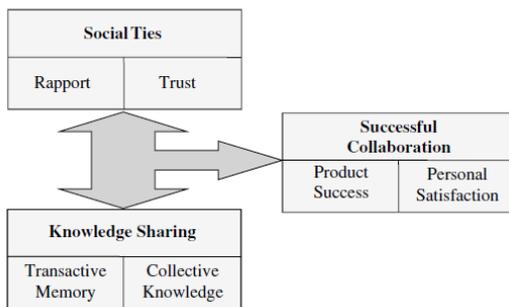
Fig. 4. Main concepts and their categories from the work of Oshri *et al.*

H. Exploring Collaboration Patterns among Global Software Development Teams

Figuring out how to work in worldwide software development student groups is challenging and in some cases even troublesome. Colleagues need to learn the most effective method to configuration, actualize, and approve software systems, as well as they should figure out how to function in socially assorted work groups, manage time, express thoughts, and speak with other peoples. Students should figure out how to utilize collective innovations for example, teleconferencing, video conferencing, email, voice mail, and groupware applications to speak with colleagues who might be found in different urban areas and even nations. The investigation

detailed in this paper looks at correspondence practices in worldwide programming improvement student groups. The creators of this paper describe the kinds of correspondence practices that happen when students groups are engaged with a software development project. Utilizing content and bunch investigations techniques, Authors recognized particular examples of cooperation and analyzed how these designs were related with task, culture, GPA, and performance of collaborative groups. Our outcomes propose that communication patterns among global software students might be identified with task, culture and GPA. It is hoped that these discoveries will prompt the advancement of new procedures for improving communications among global software teams [17].

I. Non-Optimized Temporal Structures as a Failure in Virtual

Global software development is trending day by day and making its worth in the market, but the management is worried about the failure of some projects and they intend to find the root causes for the failure of projects. This study consider the two virtually working teams and compare their effort and the time they take to complete their projects, to fine the success rate of both teams. It is found that the only reasons of the poor performance of one team are [18]:

- Entertainment of the temporal norms of the country

- Social situations of the members

This study defines the only reason behind the project failure is the ineffective communication and absence of meetings among the virtual teams working on the project [6]. "The core reason is that the teams remain in a limbo and cannot maintain momentum due to lack of discussions, feedback and supervision".

J. Culture in Global Software development - a Weakness or Strength

In these paper different cultures is discussed in global software development. As most of the complex issue in global software development is culture difference so Authors discuss how Authors can minimize these cultures issues in global software development. Global software development emphasis the need of knowledge of different culture issues to ensure the project success. Its Project manager and senior executive's responsibility to check existing culture difference and take steps to manage cultural diversity. Most of the strategies which Authors discussed already implemented in various globally distributed software development teams and companies. So mainly, Author discuss about Indian companies in this paper. Authors discussed different strategies which are suitable in Indian culture. So studying different cultures and strategies helps to manage global software development teams more efficiently [19].

K. The Impact of Intercultural Factors on Global Software Development

The main decision Authors can make from the previous foregoing is that there is more work to do. Some project managers have perceived the effect of intercultural factors on their global software development projects. A few analysts

have watched that intercultural factors influence the working relations of software engineers. The need remains for the improvement of tangible processes through which project managers can perceive the potential effect of intercultural factors on all phases of the product life cycle and, correspondingly, develop project and risk management strategies.

L. Critical Factors in Establishing and Maintaining Trust in Software Outsourcing Relationships

In software engineering we see that software outsourcing relationship is a comparatively innovative area of research. There is a growing awareness that understanding the dynamics of building and observance of expectation's between clients and sellers, who frequently need preceding affiliations and usually from different social backgrounds [21].

M. Bridging Gaps between Developers and Testers in Globally distributed Software Development

Authors believe that advances in addressing these issues can result in more efficient and actual methodologies for distributed software development and testing [22]. Results from the entire research/study expose more about retailer's needs that should be observed by full responsibility as well as experienced by clients in order to protect long term associations. Moreover, flexible behavior in terms of changing needs of client definitely comfort the advantage and preserve expectation time to time. Authors plan to conduct further empirical research by interviewing representatives of some clients of the companies' participating in our training. In software outsourcing relationships the conclusions will permit us to increase an understanding of client's expectations [21].

N. Global Software Development: Where are the Benefits?

This study tells us the benefits of GSD that are most important for an organization. GSD play an imperative role for the progress of any organization. But there are major valuable aspects of GSD. But our study is clearly defined that these are not clear. There may be the awareness of the risk that is related to GSD. But do not assume that the overall expenses will reduced as the wages are comparing with the higher management. Pure follow-the-sun software development the progress seems very unusual. Other companies like to make models instead of taking advantage of developers placed in various times. Rapid growth for progress there is seeking of employees. Share of information may be risky so do not share with their colleagues or do not trust on them. Taking advantage of closeness to foreign markets leads to a number of cultural problems which have to be addressed [23].

O. Improving Distributed Software Development in Small and Medium Enterprises

This paper is related to challenges that are related to DSD and how to overcome these challenges. And also define the strategies and methods that are used to overcome the challenges. In these methods and strategies which one is the best form all of them. Every industry has its own rules and regulation and it depends upon them how they distribute the work. Every industry has its own needs. These are the key factor to success. But the application of maturity models (CMMI) which provide a good source through which to carry out variation near DSD [24].

The process should be automated through a tool which provides a proficient communication between members an organization. The use of a right PML and the use of environments such as Spearmint, Rational Method Composer or Eclipse Process Framework Composer for the model definition are essential to the generation of structured process guidelines which will facilitate training of human resources [24].

IV. PROPOSED METHODS AND DEFINING STRATEGIES TO MINIMIZE GSD PROBLEMS

A. From the work of Gabriela N. Aranda1, Aurora Vizcaíno and Mario Piattini

Discussed strategies minimize the problems about time zones in different countries, language understanding problem, types of team and culture difference by training of cultural difference in high and intermediate degree, to minimize the language problem in high and intermediate degree by acquaintance of communication initiator. By knowing the nature of people and culture regarding to their environment can minimize the communication problem. GSDs projects should deal with language difference as people have different mother language, so English language should be used for communication by stakeholders for better understanding the concept of their domain during the requirement gathering and all other phases. Ontological play a vital role of understanding for sharing vocabulary that is common to everyone because some words may have different meanings [25].

B. From the work of Qingfei Min, Zhenhua Liu and Shaobo Ji

Different countries have their own time zones which are different from others, so the time for teams which are at different places all over the world may overlap the time hours. So Verticalness of Global Team effects the management in selection of tool and teams and also effect the communication. Culture of a nation affects the Global Virtual Teams because the people sitting in other countries have their own culture ethics and in Global Software Development they should contact with other people who have different culture and communicate for sharing data and information about the projects which is going to be build. In GVT people interact with those who are very different from other and there will be gap in understanding the domain of the software [26].

1) Task Characteristics

Task characteristics effect the GVTs communication as shown in Fig. 5. Team can easily finish the simple task within short time but if the tasks are complex or a new project totally then it is very important to communicate the members of GVT frequently and it is only done by video conference in which all members can share their ideas to the whole team. If the tasks have further subtasks then it is essential to communicate each member with others members to share the subtasks because every member may have different subtasks of same task, and their communication effects their subtasks allocation. By poor communication subtask may be re-executed.
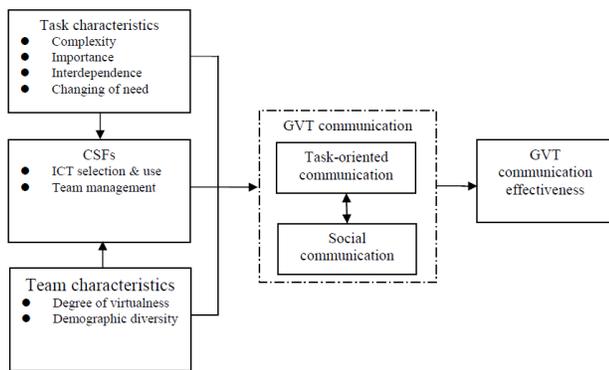
Fig. 5. Revised GVT communication effectiveness model. From the work of Martin Nordio et al.

During development some modules or requirements may be changed from the customer's side. In this situation the customer communicate with developer for specific changing, so the communication channel must be frequent to avoid the communication difficulties and to manage the cost and time of newly requirement. Most important and risky tasks may need more attention from the developer to develop because there is no chance of mistake because mistake may harm time, money or lives etc. In these types of tasks GVTs asked to pay their full attention on that task and for these the communication channel must be strong [27], [28].

Social communication in GVT members have great impact but at the starting of the work members only talk about the working for specific task for which they are connected but after spending some time with each other they become in relationship in social media and may got more chances of work from outside the organization and can help each other in some extend. The people who have relations with other can share work and ideas that become beneficial for both of them in on their initiative. But in the GVTs they have some private data and they can't share their data on social media, social communication is allowed but limited because then spend their working time in social communication. But social communication in spare time may encourage them. Following figure shows that how the task characteristics affect the factors that may influence GVTs communication and member's relationships and how they become beneficial for them [29].

C. From the work of Martin Nordio, H.-Christian Estler, Bertrand Meyer, Julian Tschannen

1) Analysis

As the time zones of all team members' locations are different to each other where teams are working on the specific phase of the development, Authors analyze the total time that teams expends on the projects and the time of their communication that due to geographical distance. Authors estimate the time of all phases and all members averagely regarding to team members size [30].

2) Communication in two-location and three-location Projects

We analyze the time of all members that they have spent on project adding the time that they have spent on their communication due to geographical distance by comparing

and finding their time ratio. Comparing by ratio can decrease the difference in their results points [31].

3) Reply Time of Projects in Different Time Zones

By comparing the time of email reply in Large, Medium and Small time zone ranges. Find that the time reply in large time zone range is maximum as compared to the Medium and Small time zone ranges [32].

D. From the work of "Mikko Korkala, Minna Pikkarainen and Kieran Conboy"

Utilizing the cooperation information from project A, Authors developed month to month communication and coordination systems [35]. Such an example proposes, to the point that a specific gathering of designers are at the focal point of the coordination activities and the trading of data among engineers. The rest of the engineers appear to depend exclusively on associations with the midway situated designers for organizing their assignments. A similar pattern was covered over each of the 39 months secured by the information. The solid center outskirts designs were logically affirmed utilizing Borgatti and Everett's [35] strategies for fitting system examples to a center fringe structure. The normal fit, in view of the consistent model, over each of the "39 months was 0.721 with a minimum fit of 0.568 and a greatest one of 0.858". Another vital finding delineated in Fig. 1 is that the center gathering, made out of specialists from every one of the three areas, appears to go about as doors or guards to other topographical areas for the developers in the periphery. Fig. 2 demonstrates the coordination organize from project B comparing to the primary organization of the overview. The general example of coordination conduct varies essentially from project A. There are couples of people that go about as "bridges" between geological areas. Indeed, those examples stem, Authors contend, from the meaning of formal parts to deal with cross site correspondence that were built up in project B. These two differentiating designs bring up fascinating issues, would one say one is example of coordination superior to the next? Assuming this is the case, which one and under which criteria? Past research has featured the basic part "contacts" people play in the execution of groups and improvement projects [33], [34]. The utilization of "contact" or "Gatekeepers" to deal with the conditions between groups has additionally been proposed as an instrument for encouraging coordination in geographically distributed software development [36]. In any case, a key issue in software development is the recognizable pieces of proof of the important specialized and assignment conditions. On the off chance that gatekeepers are deliberately implanted in the coordination systems, they could conceivably obtain the vital learning to find the imperative conditions and, therefore, give a profitable contact part. In any case, the distinguishing proof of the significant arrangement of conditions may require broad comprehension of the executed software code, learning that is commonly gained by being personally associated with the improvement exertion. The following segment analyzes in the connection between organize position and commitments to the improvement exertion.

In both projects, modification requests (MRs) spoke to a noteworthy segment of the development effort. Thus, the

quantity of MRs settled speaks to a decent measure of an engineer's commitment to the task. The longitudinal idea of the datasets renders customary direct relapse models insufficient for measurable investigation. Consequently, a multi-level model [37], additionally referred to in the writing as mixed regression models, was utilized to look at the impact of correspondence and coordination designs on singular level execution and its development after some time. The detail of a multi-level model incorporates settled and arbitrary impacts that might be connected to different factors for a given stream of longitudinal information. Along these lines, Authors represent the impacts of individual-level elements, qualities of the improvement work that are particular to an advancement aggregate and additionally occasional and other time-related fluctuation in our populaces.

E. From the work of Marcelo Cataldo and James D. Herbsleb

Face to face communication happened just between the two arranged Irish groups [38]. The sub improvement group had an on location client who additionally was bringing organized list of the requirements to the sprint arranging meetings. We have one business support that essentially finances all the work that Authors do. He is giving facilities to various different business and they may have different prerequisites and different needs, so we'd work in a group accord with reference to what Authors would do next. After each sprint, the group additionally displayed the results to the on location client to get criticism about the work that they have done "once They have something accessible, Authors likewise complete a demo for the clients [on-site customer] with the goal that They know that Authors are in good shape" (Developer). This finding shows that the client was engaged with the advancement process and was giving important input to the groups. It was moderately simple for the designers of the Irish sub improvement group to get to important data at whatever point required: "What was simple about the correspondence is I can just stroll down the hall and address some individual" (Developer). Obviously, there was no data covering up depicted in [38] display. In addition face to face communication, also wiki and email were effectively utilized.

Our perceptions support the contention that the agile practices are the best in the conditions where quick communication is empowered. The thought is that quick communication is probably going to cut down the measure of time spent on significant decisions the U.S. client group was associated with the basic leadership just in the start of the project when the objective was to characterize fixed up-front requirement for the overall product. After the first round of requirements definition, the client gather did not take an interest to general cycle arranging exercises or every day gatherings [20]. This led into the circumstance in which the requirements must be refined by the Irish primary group in isolation in light of what they trusted that the client required.

In any case, the regular agile meetings (Sprint arranging, discharge, and every day gatherings) were held inside "So it's a telephone call meeting, one individual in India bringing in also". In those continuous meetings, the reason for existing was to choose the objective and substance of the iteration. Although, the client groups from Units 1 and 3 were associated with the greater part of the coordinated gatherings

helping the advancement groups to settle on quick choices about the objectives and client stories that would be developed during the next iteration. Every one of these gatherings among Ireland and India were held through phone. In addition, wiki and email were effectively utilized for trading data inside the Unit 3. Normally, the act of having an on location client can be viewed as a key component in dynamic client cooperation. In any case, the Irish planner filled in as a client likewise for the Indian QA. Authors didn't discovered significant difficulties, for example, data hiding and absence of customer involvement, in the correspondence between the Indian QA association and the Irish fundamental group. For this situation agile meetings expanded the straightforwardness of the work and empowered data sharing amongst India and Ireland. Videoconferencing was only occasionally used [38]. Videoconferencing was just once in a while utilized. The dotted line between U.S. furthermore, IRE shows that this correspondence relationship has just been dissected in [38], [39].

F. From the work of Julia Kotlarsky and Ilan Oshri

We will present SAP and LeCroy case study results in this section. A study which is based on empirical evidence which shows that social ties and knowledge sharing contributed to successful collaboration in the companies [16]. On the base of the data which Authors analyzed, Authors claim that in globally distributed software development, teams, knowledge sharing and social ties improved collaboration [16]. To prove this argument three level of evidence will be discussed in this section. On first level all statements which made by the interviewees associated with the concepts which Authors are investigated. On second level, frequency of these statements are checked and on third level all number of instances present in which all social ties, collaborative tools and knowledge sharing were linked to successful collaboration. LeCroy and SAP evidence analysis suggested that there were two phase who supported the build-up of social ties: 1) before face to face; 2) after face to face. Empirical evidence analysis suggested that there were some tools which applied on the projects [16]. SAP interviews consider prior to face to face meeting foe building social ties. LeCroy mangers also consider initial activity before the face to face meeting for built the social relationship. Non-hierarchical communication is also important for social relationship. So far all of the evidence which is important for social aspects in globally distributed teams has been presented.

G. From the work of Fatma Cemile Serce, Ferda-Nur Alpaslan, Kathleen Swigger and Robert Brazile

1) Overview of communication behaviors in groups
Over all the twenty worldwide programming development learning ventures groups, an aggregate of 1985 correspondence episodes were investigated. In the event that the conduct was definitely not display in a correspondence episode, it was doled out a score of 0; on the other hand, if a correspondence behavior(s) was available in a posting, at that point it was appointed the code or then again codes for that conduct. As an unwavering quality check, a second coder examined similar talks. Between rater unwavering quality between coders for the association's practices was adequate [38], [39].

H. From the work of Mark Grechanik, James A. Jones, Alessandro Orso and Andr´e van der Hoek

Conventional programming cost models depend on the supposition that everybody engaged with a product venture is headed to make it fruitful also concurs on the objectives and strategies to make progress. Nonetheless, distinctive group members see a definitive achievement of the venture diversely in light of their own objectives. This is particularly valid in settings that include performing artists from various associations, as it is regularly the case in conveyed improvement. Authors trust that new refined financial models are required to examine programming ventures as no cooperative amusements to reveal concealed reasons for disappointments of programming undertakings and propose approaches to settle them [40]. A watchful examination of these financial variables of new programming advancement models will be basic for the achievement of profoundly disseminated advancement rehearses.

I. From the work of Miguel Jiménez, Aurora Vizcaíno and Mario Piattini

We recommend an approach to DSD in SME environments, by taking the limited complexity and budget of these organizations which usually results to applying basic methodologies, giving precise responsiveness to their organizational configuration. Not all of the activities proposed by the common standards "(ISO/IEC 12207 [41])" are always suitable for these environments, which also apply lower levels of maturity in association to larger companies.

1) Communication

This theory is established on the idea of taking out communication through structured models that will display the candidates in the organization of information to increase communication by decreasing the number of essential communications. This method should be used in all formal communication between concentrated members, improving the overall knowledge of the status of the project and keeping the information produced in a mutual source, thus helping avoid identical discussions. Developers may also need to communicate to other remote developers who are working on different parts of the software. It is not always possible to know which person is to contact so it is beneficial to take out communications through the local sub-director who need to accomplish the overall communications for that site and for that project. For locating members the distribution of organizational charts [42] which identify the location of members must also be taken into considerations and the use of ideas [43] is also recommended. Moreover, it is also essential to temporary informal communication, which will concluded the use of direct messaging e-mail's and programs. The tools used are Asynchronous communication tools based on recommendations and traditional E-mails Synchronous traditional tools (video-conferences and chats).

V. MOTIVATION

The major concern of this research is to do a review of different existing Literature to identify the main factors that introduces the problem in GSD and then focus on the specifically the factors effecting the geographically distance and communication challenges in GSD and we will compare the guidelines and solutions to solve the issues causing problems.

VI. CONCLUSION

Global software development (GSD) is a phenomenon that is receiving significant interest from all over the companies in the world. In GSD, stakeholders from different national and organizational cultures are involved in developing software. However, GSD is technically and organizationally complex and presents a variety of challenges to be managed by the software development team. The number of organizations distributing their software development processes globally keeps increasing and this change is having a deep impact on the way products are considered, designed, constructed, tested and supplied to customers GSD takes several forms. Geographical Distance creates many challenges in communication, coordination, organization, project planning and follow up, and work allocation. Communication technology and tools have carried GSD in focus. I section three and four all systems are discussed in detail with respect to the geographical distance and communication challenges. In this paper we will do the detailed study on geographical distances and communication challenges in GSD their inter dependencies and also the proposed solutions and guidelines to address these challenges that are very critical in success of GSD projects.

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