

The process of collaboration for software development: Case study
from Irish and Indian centres of multinationals.

Dublin Business School/Liverpool John Moore's University



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Abstract

The primary objective of this dissertation study is to understand the process of collaboration for software development in global or distributed software development (DSD). The context of this study is of Irish and Indian sites of multinationals. A brief discussion about co-located Vs distributed teams has been included.

This study explores how collaboration process occurs within and between DSD centres and how various collaboration processes such as communication, coordination and control help in successful collaboration. It is also intended to study various communication mediums and tools used in effective interaction between distributed teams.

This study also try to find out the role of management and teams in establishing, practicing and nurturing collaboration between distributed teams. The cultural effects on collaboration process in respect of distributed teams also studied. Finally potential benefits of collaboration in software development studied.

Chapter 1

Introduction

1. Introduction

Software Industries contribution to Irish Economy is invaluable. Many multinational companies have setup software development centres in Ireland. Software exports from Ireland were 30.2 Billion Euros during 2011 (irishexporters, 2012) out of total exports of 189 billion Euros, which is 16% of total exports. Even higher export growth has been projected for 2012-2013. Software exports play a pivotal role in Ireland's economic wellbeing and also in the creation of high paying jobs. Similarly Indian economy also benefited from software industry and exports revenue generated by it as explained in the following paragraph.

The Computer Software Industry has become a significant contributor to India's economic development. It continues to march forward. Last year i.e. FY 2011-12, the revenues from Hardware and Software relating to IT for the first time exceeded \$100 billion and constituted about 7½% of India's GDP. Computer software exports are now around \$70 billion and constitute the largest exports from any sector of this country. The IT sector offers direct employment to about 2.8 million professionals (Kanodia L. S., 2012).

Multinationals like IBM, Microsoft, Oracle, SAP, Apple, Google, Xilinx, Fidelity, MasterCard and Allianz have made huge investments in software development centres in Ireland. Irish subsidiaries of these multinationals in turn have opened captive development centres in India. Successful collaboration between Irish and Indian captive centre is paramount. Therefore the purpose of this research is to understand how efficiently Irish and Indian centres collaborate in order to deliver software for their parent company in terms of cost, quality and timeliness. This research outcome benefits the participant companies in particular and the I.T industry in general. And also this research might be beneficial to academics as a stepping stone for further research.

Over the past decade, research and practitioner reports have revealed globally distributed software development's unique nuances, complexities, and challenges. These range from

economic, technical, organizational, and cultural issues to those arising from different time zones, languages, and geographical locations (Damian D et. al. 2009, p. 18). According to Agerfalk (2005, p 47–61) Software development is broadly defined as “*Any development life cycle activity*”. This thus extends beyond pure developmental activity and includes, for example, deployment and maintenance. There are multiple terms used to describe the activity. Sarker et al (2003, p. 1) coined the term ‘global software development’ to refer to “*software development that is geographically, remotely or globally distributed with the aim of rationalising the development process and products*”.

Today, more software projects are run in geographically distributed environments, and global software development is becoming a norm in the software industry. Overcoming time and distance, many organizations have distributed software development across geographies to capitalize on global resource pools, attractive cost structures, and round-the-clock development to achieve cycle-time acceleration and cater to local markets (Damian D et. al. 2009, p. 17-18).

This phenomenon is called off-shoring, which is internal to the organisation and different from outsourcing though the final outcome is software products which are intended to be used for the purpose of running the business efficiently. According to Carmel and Tija (2005), “*off-shoring is the process of completing tasks at lower costs economies*”. As stated by Venkatraman (2004, p. 14-16), it is “*the practice among U.S and European companies of migrating business processes overseas to India, the Philippines, Ireland, China and elsewhere to lower costs without significantly sacrificing quality*”.

Collaboration is critically important when it comes to developing software at multiple offshore sites of an organisation. Geographical distance makes collaboration processes much more complicated. Software engineering is essentially collaborative for any but the smallest and simplest project (Marlowe J, T et al, 2011). According to Kukulska-Hume (2004), collaboration is a “***philosophy of interaction*** in which there is an underlying premise of consensus building”. As Friend and Cook (2000) state “*the process of collaboration can be termed as an interaction between coequal parties*”

1.1 Research Area:

The research area is collaboration process for software development between Irish and Indian sites belong to multinational companies. In relation to collaboration processes and different types of tools will be explored. And finally pros and cons of software development will be understood.

1.2 Research Objectives:

Saunders, Lewis and Thornhill (2009, p. 34-35) defines research objectives as clear, specific statements that identify what the researcher wishes to accomplish as a result of doing the research. Objectives are more generally acceptable to the research community as an evidence of the researcher's clear sense of purpose and direction. The following objectives have been focused upon in this research exercise:

- To find out and explain collaboration process for software development between Irish and Indian sites/centres belong to multinational companies.
- And also to explore communication, coordination and control processes in collaboration.
- To find out different types of communication and collaboration tools used for successful collaboration between sites.
- To find out the role of management and teams in promoting collaboration
- Pros and cons of collaboration for software development in the above context.
- And finally to explore how culture differences hinder/enhance the collaboration.

1.3 Research Question:

Aim of this research is to collect sufficient information through in-depth interviews about collaboration processes of multinationals those operate in Ireland and India. As a result of interest in distributed software development (DSD) the researcher is inspired by the collaboration process in DSD and hence undertaken this study.

The primary research question that motivates the researcher towards this study was:

How do collaboration process works in distributed software development in the context of Irish and Indian software development centres of multinationals.

1.4 Researcher suitability:

This researcher has huge working experience in the IT field, and has been in the IT field for the last 20 Years. Researcher previously worked for an IT Offshore company. Having been completed, all previous modules in the last three semesters of MBA course, which along with work experience, has helped to gain the required knowledge to do this research. Researcher enthusiasm and good knowledge in Teams collaboration in the context of Global Software Development will help in the successful completion of this dissertation.

1.5 Recipient of the research:

The principal recipient of this research will be Dublin Business School and Liverpool John Moores University. This research's outcomes will benefit academia as a stepping stone for understanding collaboration process in a better way and in further research endeavours. And also this research finding's benefits Information Technology (IT) Industry in establishing and nurturing collaboration process for developing better software products.

1.6 Importance of the topic:

Few academic papers have been written on the collaboration process between Irish software centres and their Indian counterparts. According to secondary search done by the researcher, there is little evidence of academic research done on collaboration process in recent years (since 2008) in Ireland, on the above situation. Along with the globalisation of economies and proliferation of computer technologies, developing software for commercial and internal consumption has become a very important aspect of every business. Many organisations spend a significant amount of their budget towards IT/IS departments. These companies try to take advantage of the availability of technically competent and cheap labour in many countries, they operate software development centres across the globe, involving multiple software development teams and termed as Global Software Development (GSD). This phenomenon has created complications in effective team management. Noll, J et al (2010) stated that "*The growth of GSD means that many software engineers will have to collaborate over geographic,*

*temporal, cultural and linguistic distance, collectively termed as **global distances***". In this scenario it is absolutely necessary to form collaboration among participating teams.

According to the above objectives the researcher is intended is to find out how collaboration process starts and how it evolves, what processes are part of collaboration, what communication and collaboration tools are being used, and what role management plays in promoting collaboration, and how culture hinders/enhances collaboration process and finally what role collaboration plays in successful delivery of software to its parent company when two geographically dispersed offshore centres engages in software development.

Chapter 2

Literature Review

2. Literature Review:

2.1 Introduction:

Saunders, Lewis and Thornhill (2009, p. 61) state that “*Reviewing the literature critically will provide the foundation on which research is built*”. A literature review is much more than just describing what others have published, but a critical analysis and discussion by comparing and contrasting of various theories and approaches. The purpose of literature review may also to demonstrate primary and secondary research skills of the researcher.

Kumar (2005, p. 30), describes a literature review as “*time consuming, daunting and frustrating, but it is also rewarding*”.

Collaboration is achieved through proper communication, coordination and control as primary processes, which are defined below. Following paragraphs also explain various aspects of GSD such as geographical distance, temporal distance and socio cultural distances and their effects on collaboration in global software development.

2.2 Co-Located versus Distributed software development

Software development teams must communicate as and when they need to. Co-located teams have the luxury of informal and face-to-face communications. This helps in exchanging information quickly and efficiently and for better understanding of problems. DeMarco et al. states that “*Software development team members must communicate whenever necessary to make the team efficient*”. Co-location allows for an immediate response to a request for information or clarification and also encourages unplanned informal communication which is deemed to be an important success factor for software development teams (Herbsleb 2007, pp. 188-198). Teasley et al. (2000, pp. 339-346) stated that, teams showed a doubling of productivity once they were co-located in so-called war-rooms. Among other things, teams had easy access to each other for both coordination of their work and for learning, and the work artefacts they posted on the walls remained visible to all.

On the other hand, distributed software development (DSD) consists of geographically dispersed teams developing software as a single unit. This process can be termed as

Global software development (GSD) when teams are distributed in different continents. In some academic circles the name given for this phenomenon is virtual software development (VSD). Many teams operating in a DSD environment do not have the luxury of informal or face-to-face communication and so must rely on technology to communicate. Confirming the same Jiménez et al. (2009, p. 1) stated that “*Traditional face-to-face meetings are, therefore, no longer common, and interaction between members requires the use of technology to facilitate communication and coordination*”. These teams also face geographical, temporal and cultural related difficulties in relation to communication. Though technology elevates some of these issues by using proper communication tools such as emails, videoconferencing, collaboration tools etc., but software development is not as efficient as in co-located teams. In the following section the researcher will further explore the collaboration practices among teams distributed globally.

2.3 Collaboration

According to Oxford dictionary, collaborate is defined as “*The action of working with someone to produce something*”. The term collaboration is used in different context and has a variety of meanings to different people. Collaboration is helpful for employees working at different sites to fully involve in sharing their experiences, knowledge etc. Shrage (1990), explains collaboration as a shared process.

“Collaboration is the process of shared creation: two or more individuals with complementary skills interacting to create a shared understanding that none had previously possessed or could have come to on their own. Collaboration creates a shared meaning about a process, a product, or an event. In this sense, there is nothing routine about it. Something is there that wasn’t there before. Collaboration can occur by mail, over the phone lines, and in person. But the true medium of collaboration is other people. Real innovation comes from the social matrix... [and] is a relationship with a dynamic fundamentally different from ordinary communication”. Shrage (1990, p. 40-41)

Similar to the above John-Steiner et al (1998) define the collaboration process, it can be a joint effort of teams and people involved in the process of software development.

“The principles in a true collaboration represent complementary domains of expertise. As collaborators, not only do they plan, decide, and act jointly; they also think together, combining independent conceptual schemes to create original frameworks. Also, in a true collaboration, there is a commitment to shared resources, power, and talent: no individual’s point of view dominates, authority for decisions and actions resides in the group, and work products reflect a blending of all participants’ contributions”. John-Steiner, Weber, and Minnis 1998, p. 776).

2.4 The Collaboration in Software Development

In recent years with the growing size and complexity of software products, coordination of work, artefacts and people has become a challenge. As network technologies matured, many opportunities have been created for distributed or global software development. This allowed developers to be able to work from anywhere in the world, while still being connected together. But managing communication, coordination and collaboration issues is a big challenge. Organisations involved in distributed software development should know the importance and usefulness of collaboration for their own good.

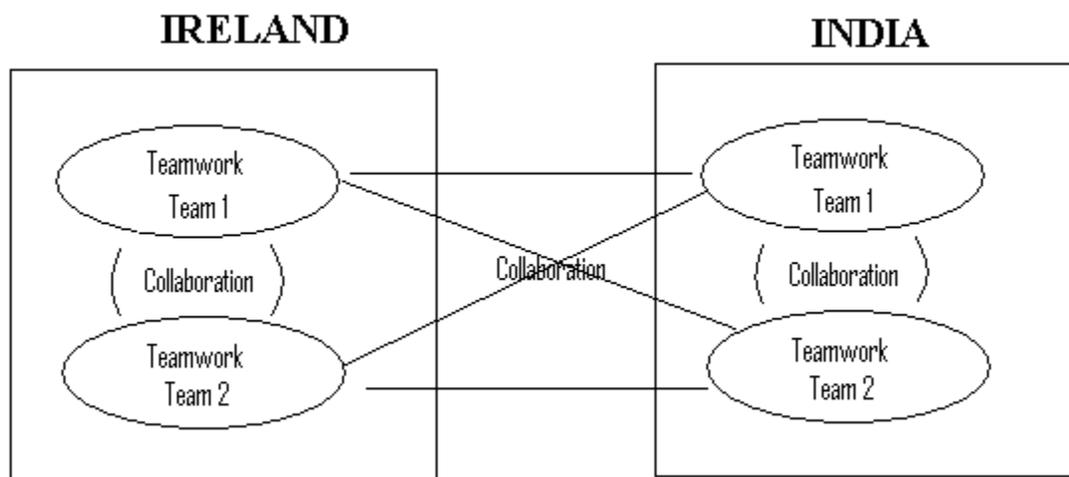
Collaborative software development is becoming particularly important in the practice of software delivery. A high level of collaboration is critical because the software development process remains fundamentally difficult. The difficulty is due, in part, to shifting requirements and other real-time changes. It is also due to the complexity of the products and services being delivered (IBM, 2006).

According to Magdaleno, A. (2010, p. 331-332), *“collaboration and discipline can be the driver to tailor software development processes to meet projects and organisation needs”*. Without much discipline, there is a chance for differences to crop up within the participating teams, which is the start of failure for collaboration and the project as a whole. But developing collaboration process in a distributed development environment is not an easy task for the management. As stated by O'Mahony, S et al., (2008, p. 422-459), *“Organizational theorists have found that collaborations can be difficult when the interests, goals, and practices of participants differ”*. This is a major cause for concern

for organisations which have globally distributed software development teams, if not checked properly.

In the context of global software development teamwork alone is not sufficient, but collaboration is required to bring people with varied skills together for successful execution of complex software projects. Paris et. al. (2000) defined teams and teamwork as “*Teams are more than collections of individuals and teamwork is more than the aggregate of their individual behaviours*”. Collaboration is already defined in the foregoing paragraphs. Following picture explains the nature of relationship between local teams and also between distributed teams in respect of teamwork and collaboration.

Figure 1: Teamwork and Collaboration



Existence or non-existence of collaboration between these groups of people plays a major role in either the success or failure of a project. When multiple teams are involved in a collaborative effort to deliver a project they share available resources, expertise with each other and explore complementary skills. This collaborative nature within the people involved in software development is a positive sign towards achieving the overall goal of a project. Also improved collaboration is expected to fuel innovative ideas, increased quality and reduce project time scales. Many multinationals attach significant importance to find out and recruit future employees who are either interested in or have already experienced collaborative efforts.

As distributed teams are located farther from each other, distance can have a direct effect on the team collaboration. A study by Spinellis D (2006, p. 73-79) to examine the extent of global development and its effect on productivity, quality and developer cooperation, found that global development allows round-the-clock work, while maintaining some differences between the types of work performed at different regions. However, the effects of multiple distributed developers on the quality of code and productivity are negligible. The intensity of collaboration process varies based on the software systems development method being used in software development processes as explained in following paragraph. In contrast to the above findings Herbsleb et al (2003, p.1-2), restate on the basis of research done by others that “*cross-site communication and coordination issues cause a substantial loss of development speed*”. They further explained that the difficulties of knowing who to contact about what, of initiating contact, and of communicating effectively across sites, led to a number of serious coordination problems. And the most frequent consequence of cross-site problems was delay in the resolution of work issues.

There are many different types of software development methodologies, for example widely practiced methodologies are Waterfall and Agile methods. Waterfall method is a systematic, highly formal and procedural system development method. Whereas Agile method becoming popular in developing systems which are light and build-as-needed. Moniruzzaman, A et al (2013) states that “*Though traditional software development methodologies, such as life cycle-based structured and object oriented approaches, continue to dominate the systems development few decades and much research has done in traditional methodologies, Agile software development brings its own set of novel challenges that must be addressed to satisfy the customer...*”. Agile methodology benefits global software development (GSD) by increasing speed of product delivery by accelerating software development process.

2.5 Distributed software development and underlying processes

Software development is “truly a human process of interpretation, interaction and reality construction” (Ronkko 2007). An organisation unit such as a Team, cannot function

coherently without the process of coordination (Malone and Crowston 1994) and control (Carmel and Agarwal 2001). In contrast to this, Espinosa and Carmel (2004) stated that Coordination is “the management of dependencies among task activities to achieve a goal”. This process often requires intense and on-going communication (Carmel and Agarwal 2001). As the foregoing explains, technology aided communication is the backbone of every interaction being taken place between globally dispersed teams. On the other hand Control through proper organisation structure and project management ensures that, software products are developed on time, within allocated budget and of desired quality. The following paragraphs further define and explain Communication, Coordination and Control in relation to distributed software development.

2.5.1 Communication

The foundation for collaboration among teams is communication. According to the Oxford Dictionary, the definition of communication is “*the imparting or exchanging of information by speaking, writing or using some other medium*”. Carmel and Agarwal (2001, p. 22-29) define communication as “*The exchange of complete and unambiguous information – that is, the sender and receiver can reach a common understanding*”. In comparison to this, Agerfalk et al. (2005) states that “*The communication process concerns the transfer of knowledge and information between actors, and the tools used to facilitate such interaction*”.

Communication is an essential process within all software development activities (Curtis et al. 1998, pp. 1278, Perry et al. 1994). The processes of coordination and control within DSD are dependent upon the process of communication (DeLone et al. 2005). Kraut and Streeter (1995) observed in a survey of 65 projects within one large development company that, as the size and complexity of the software increases, the need for supporting informal communication increases dramatically. This shows that communication is used or even required in the face of added complexity. In effect, communication allows for the people involved in developing the software to coordinate their efforts.

According to Thissen et al (2007, p. 28-35), “*The collaboration mechanisms used consisted of simple conference calls, email through webcasts and collaboration websites*” this implies that technology is the medium for communication between teams. In comparison to this Karolak (1998) stated that “*Common communication methods in GSD teams are e-mail, telephone, telephone conferencing, instant messaging and mailing lists, each technology offering a different degree of timeliness and content richness*”. So, it can be concluded from the above statements that, technology plays pivotal role in rich interactions between globally distributed teams. Distributed teams are used to interact and exchange information through mean of synchronous and asynchronous communications tools.

Reliance on asynchronous communication (emails etc.,) increases when team members are not able to communicate in a synchronous manner (such as face-to-face, by telephone or by instant messaging). Since asynchronous communication relies on technologies such e-mail and fax (Kiel 2003, Boland and Fitzgerald 2004), it is possible to maintain a written communication history (Carmel and Agarwal 2001, Damian and Zowghi 2002). It provides for increased traceability and accountability, and Management can rely on this information for traceability and accountability, in that it facilitates finding out who said what to whom, and when it was said (Agerfalk 2004).

2.5.2 Coordination

Coordination is “*the organization of the different elements of a complex body or activity so as to enable them to work together effectively*” (Oxford University Press 2013). Carmel and Agarwal (2001) stated that coordination is “*the act of integrating each task with each organisational unit, so the unit contributes to the overall objective*”. Espinosa and Carmel (2004) also described that coordination as being an act upon sub-units involved in achieving the overall goal; “*The management of dependencies among task activities to achieve a goal*”. This is consistent with coordination as defined by coordination theory (Malone and Crowston 1994). Kraut and Streeter (1995) view coordination as the activity played out by the sub-units themselves: “*In software development, [coordination] means that different people working on a common project*

agree to a common definition of what they are building, share information, and mesh their activities”.

2.5.3 Control

Control is “*the power to influence or direct people’s behaviour or the course of events*” (Oxford University Press 2013). Control also can be defined in relation to software development as “*the process of adhering to goals, policies, standards, or quality levels*” (Carmel and Agarwal 2001). They further stated that control can be formal (such as budgets and explicit guidelines) and informal (such as peer pressure). In DSD control process concerns the management and reporting mechanisms put in place to make sure a development activity is progressing smoothly. Control thus relates to project management activity and is one of the important aspects in project management. With the modern communication technologies, GSD can enable an organisation to build project teams using skilled people from different sites all over the world. Project management can be made effective by re-allocating people’s tasks for short periods of time, independent of how the project is globally distributed (Ebert and De Neve 2001). This flexibility helps alleviate issues with isolated expertise.

2.6 The Management structure of Global Software Development

In a typical Global Software Development process management structure consists of teams of people working together from various geographical locations and also managers at each site managing those people. Management structure in GSD differs from company to company and it is very fluid. Some companies have managers controlling teams at both Irish and Indian sites separately, whereas yet other companies employ a different structure, in which Irish managers control Indian managers. A team is an organisational unit in itself, and it bring with it organisational benefits such as the synergy of ideas and innovation, improved problem solving, and the sharing of expertise and experience (Carmel 1999, p. 50). As such, the structure of being a team is important to maximise the effectiveness of the people working to coordinate to solve a software problem.

2.7 Role of teams in collaboration

In Software development, projects are executed by organisation units called Teams. Each team consists of multi talent members who have the required technical and business

knowledge to execute the project as an act of developing software. Fenandez-Sanz and Misra (2012, p 167) stated that “*Software development mainly a social activity where teams of developers should work as a coordinated unit to fulfil the needs of customers*”.

When a group of geographically separated programmers are involved in developing complex software products, it is necessary to make sure that this group of people collaborate in such a way that, high quality products are delivered. Team members, who may be located or distributed around the world in GSD, might meet and communicate face-to-face, over the phone or online but they need to interact and collaborate towards a common goal (Fenandez-Sanz and Misra 2012, p. 167). Whether it is a co-located or distributed software development project managers must recognise and give paramount importance to collaborative efforts.

2.8 Role of management in promoting collaboration

Managers and management plays a bigger role in the collaboration process of an organisation. As Zhang et al (2007, p. 3) describes it is essential for project managers to acquire timely and comprehensive awareness of the project status through frequent ad-hoc communication to assure the project health. Project managers have to make an extra effort to get project information from external individuals, which makes communication efficient, error prone and out-of-date.

It is essential for both development teams and operations teams to collaborate under the guidance of management to build computer systems which fit stated requirements. In their research Tessem and Iden (2008, p. 105-108) sate that “well performed cooperation between the development team and the operations team was crucial for successful deployment and operations of a new or extensively revised software system”. It is the responsibility of the senior managers to promote and engage themselves in collaboration with their peers on the other side of world (offshore site managers).

2.9 Factors effecting collaboration process

Collaborative software development is a two way process between involved organisations and teams which plays a major role in the overall success of a project. The level of

collaboration between teams and individuals in a globally distributed software development centre defines the quality of the products it produced. If the level of collaboration between teams and individual is high, the quality of products produced will be high. The collaboration process implies constant and intensive interaction between individuals and groups. There are many factors such as communication, cultural and geographical differences which might affect a collaboration process. This is explored in detail in the next section.

2.9.1 Lack of informal and face-to-face communication

Lack of face-to-face communication is one of factors that might affect collaboration in distributed software development. According to Herbsleb, J.D. (2007, pp 188-198), informal communication is a natural process of co-located development; it happens in hallways, over meals and before and after formal meetings. When people discuss complicated technical issues, face-to-face and informal communication improves the visibility of what other people are working on, and the level of urgency of issues that may arise. As such, informal face-to-face communication is a natural flow of communication that helps throughout the software development process. But when teams are separated by geographic distance informal and face-to-face communication is not possible. So, communication and coordination are not easy tasks to achieve in distributed software development.

Both geographic and temporal distances between teams reduce the opportunities for informal face-to-face communication to take place, as both distances result in people not being located at the same place at the same time (Grinter et al. 1999, Kiel 2003, Casey and Richardson 2004). Geographic and Temporal distances also affect collaboration process between distributed teams due to lack of informal face-to-face communication. As a result product quality also suffers.

2.9.2 Reduced hours of collaboration due to temporal differences

A disadvantage of being separated by temporal distance is that the number of overlapping hours during a workday is reduced between sites (Battin et al. 2001, Kiel 2003, Casey and Richardson 2004). For example, a team located in both the eastern U.S and in Ireland

can have a total of three overlapping hours during a workday. As another example teams in both Ireland and India can have three and half to four and half hours overlapping hours depending on whether it is winter or summer time. However some Indian outsourcing companies for example Infosys, TCS, Wipro and Tech Mahindra employ shift systems (employee work in two shifts) to cater to European and US timings, effectively maximising overlapping hours between distributed teams.

2.9.3 Cost and benefits of Travel

According to Herbsleb et al. (2005), travel is important in order to start to overcome cultural differences, develop trust, and enhance all other means of communication. They further add that, as one project manager puts it, “drink a few beers together – it makes a big difference.” So, it is necessary in GSD that, travel by team members to other sites allows for them to get to know their colleagues, for them to exchange ideas, and to break down cultural and linguistic barriers (Ebert and De Neve 2001, Kiel 2003).

In spite of the above benefits travel can be very expensive and time-consuming, with the travel time perhaps taking much longer than simply the flight time alone (Battin et al. 2001, Herbsleb et al. 2005). If there are no direct flights between two sites located in different continents, that also increases travel time and cost. It is also important to note that accommodation, food and other local travel expenses also have to be taken into account to arrive at the total cost of travel.

2.9.4 Socio-Cultural differences

Cultural differences plays significant role in distributed software development and also causes significant hurdles in collaboration. This is also true if co-located teams also have significant number of foreign nationals. Culture, at its most basic level, is a set of “shared symbols, norms, and values’ in a social collectivity such as a country” Walsham (2002). Socio-cultural distance is a directional measure of an actors understanding of another actor’s values and normative practices (Agerfalk et al. 2005). According to Carmel and Agarwal (2001), the distance is ‘difference’ between the actors involved in terms of national and organisational culture. This distance is not unique to DSD. Co-located teams

may be comprised of team members coming from different national and organisational backgrounds. There are two types of cultures, national and organisational.

National culture, or local culture, encompasses an ethnic group's norms, values, spoken language, and styles of communication (Carmel and Agarwal 2001). As an example, norms for acceptable working hours can differ between countries (Robey et al. 2000). On the other hand Organisation culture encompasses the organisational unit's norms and values, and this unit may range from a small external contractor to an enterprise-wide culture of a multi-national organisation (Carmel and Agarwal 2001). Herbsleb et al. (2005) termed this as "corporate culture". Two actors coming from separate organisational cultures may have different views on authority, project management practices and dress code, for example (Krishna et al. 2004).

For Collaboration to be effective between teams in DSD National and organisational cultural issues have to be treated seriously and taken on board by the management. Employees involved in software development should be trained in cross cultural issues, to make sure that, culture should not become a barrier to team collaboration. For example Indians tend to agree quickly to a proposal to please their colleagues or superiors, but this should not be taken as granted by Irish employees. There should be careful assessment to make sure that a proposal can be possible delivered as agreed by Indian team. Hence the above gaps in the literature in regard to cultural differences in distributed software development should be explored.

2.9.5 Communication issues

Herbsleb et al (1999, p. 85-95) stress the importance of communication and stated that "*distributed development may imply the necessity of stable plans, processes, and specifications*". On the other hand, the inherently unpredictable aspects of projects require communication channels that can be invoked spontaneously. Therefore it is necessary to explore communication related gaps in the literature.

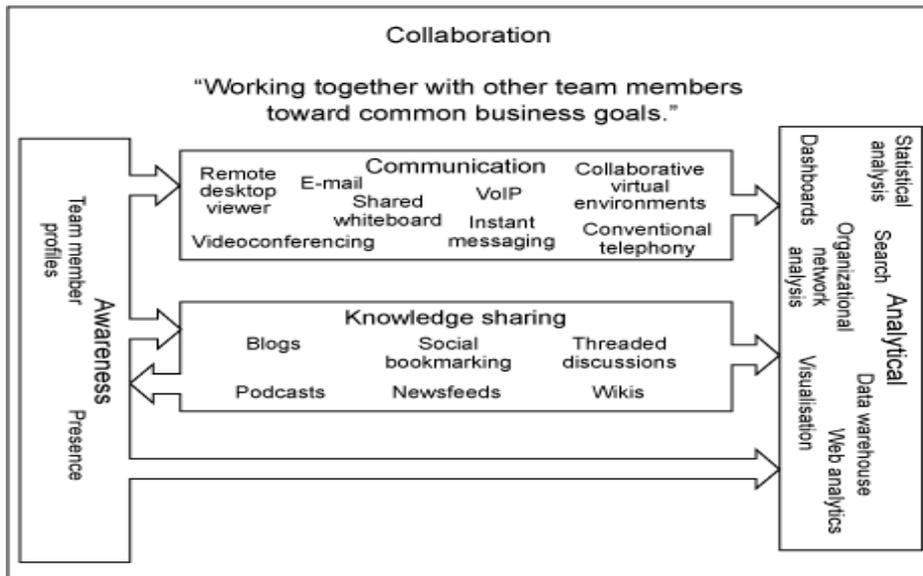
Casey and Richardson (2006, p. 66-72), suggest that "*virtual teams have to work within the confines of the factors which distance introduces, thus not always allowing effective*

coordination, visibility, communication and cooperation to take place”. Their research in Ireland has found several factors that have become part of everyday development for those involved in global or distributed software development, and that need to be explicitly addressed by management in order to avoid serious problems. Those factors are, use of communication tools, project management, process engineering, technical ability, knowledge transfer and motivational issues.

2.10 Collaboration tools

Technology plays a major role in establishing communication and coordination between globally distributed teams in the form of collaborative tools. Collaborative Software tools are frequently used for establishing communication and coordination between globally distributed teams, but it is important to note that tools are just a means to achieve collaboration, but not a solution in themselves. The necessity of using collaboration tools for interaction is very high due to distances between teams. There are varieties of tools available to establish communication channels between software development teams. Major tools are configuration management, Instant messaging, Annotations, Application Protocol Interface (APIs) and Processes.

Figure 2. The roles of various tools in the collaboration process



Source: <http://www.ibm.com/developerworks/rational/library/09/informalcollaborationtoolsforglobalsoftwaredevelopmentteams/>

Grinter (1995, p. 168-177) found that developers used the configuration management tool routinely to reduce the complexities of coordinating their development efforts. However she further states that, configuration tools provide limited coordination, because their role is to support a model of work. Instant messaging has been in use in software development for quite a long time. Isaacs et al. (2002, p. 11-20) highlights how the primary use of workplace instant messaging was for complex work discussions. Another communication mechanism that has been embraced by software developers for collaboration is annotations. In their empirical study, Storey et al. (2000, p. 251-260), found that task annotations embedded within the source code play a major role in how software developers manage personal and team tasks.

Another common tool used in communication is Videoconferencing. According to Lanubile, F., (2009, p. 175) “videoconferencing is generally considered the first choice of communication medium to conduct requirements workshops between remote stakeholders”.

To support collaboration in software development, Pandey et al (2003, p. 56-63), proposed a new framework of Tightly Coupled Engineering Team (TCET) process to facilitate collaboration in a team and thereby improving productivity and software quality. They applied this concept in a twenty-one months long software project for the development of a test automation software suite. The evaluation was done according to function points per work month and using interviews. It had been found in this research that, the process contributed to increased productivity and software quality, and also found an increase in the intra team training, ownership, and knowledge flow within the team. Though the success of this framework is debatable, it is proved through the above application that it works in certain conditions.

2.11 The collaboration process in MNC’s based in Ireland and India.

The researcher by going through available research journals on the above topic found that, there is an absence in the research done in the context of collaboration process in MNC’s based in Ireland and India. So, this gap in the literature has to be explored in this research.

Therefore the aim of this study is to understand the collaboration process between multinational software development centres based in Ireland and in India in the context of global software development. This research is to find out how intra-organisational and inter-organisational collaboration happens both at organisation and team levels. And also to explore what type of collaboration tools exist, and to find out and recommend better processes of collaboration for the benefit of both practitioners and academic researchers.

2.12 Benefits of collaboration in software development

In intense problem solving situations collaboration between globally dispersed teams result in better understanding and analysis of issues and ultimately help in finding suitable solutions quickly. Collaboration also encourages shared practices among teams across dispersed sites. Collaboration also improves quality of time spent when overlapping hours between globally dispersed teams reduced by temporal differences. Software products quality much improved if collaboration efforts are made between globally dispersed teams.

2.13 Innovation through collaboration

Ebert and De Neve (2001, p. 10), states that “Organisations can take advantage of increased innovation and shared best practice that arises from the collaboration of team members who come from different national and organisational backgrounds”. Thus collaboration processes help to cultivate innovation among global team members.

Increased autonomy given to remote teams also enhances innovation among team members.

2.14 Literature - framing the context

Since start of 1990, Ireland became a global hub for US and European multinationals to operate the software development centres (SDC), due to the availability of educated & skilled work force, tax benefits and proximity of huge European market for marketing developed products. Over time, Ireland’s cost competitiveness eroded due to an increase in capital and salary costs.

“Costs are a headline element of national competitiveness. During the last decade, fuelled by cheap credit and high levels of consumption, Ireland’s cost competitiveness was severely eroded”, (Forfas, 2013, p. 8). “Irish labour costs grew more quickly than the euro area average for much of the 2000s, a clear erosion of Ireland’s cost competitiveness”, (Forfas, 2013, p. 10).

Positively for Ireland, IT workforce has learned by managing huge software projects, which in turn resulted in increased and continued trust in Ireland by multinationals for offshoring software projects. India’s economy liberalised in 1992. Since then India started to emerge as a prominent software outsourcing destination, mainly due to its cost competitiveness and also availability of a huge educated and talented work force.

Some multinationals outsource work to their subsidiaries in Ireland, those subsidiaries in turn open their own captive development centres in India and send some work to those Indian captive centres. The primary centre in Ireland, which is tasked with setting up captive centres in India, is also responsible for managing those centres. The above phenomenon has been described as two stage offshoring. Holmstrom Olsson et al (2008, p. 257-279).

Some other multinational open SDC’s both in Ireland and India and establish links between those two centres to jointly execute software projects. Proper collaboration between Irish and Indian centres will ensure goals are met, and objectives are achieved. This research is to find out how team goals, organisation objectives and overall corporate strategy can be fulfilled through efficient collaboration between Indian and Irish sites.

2.15 Summary of Gaps

Collaboration as a process in software development in the context of Irish and Indian centres has not been explored previously. It is useful to find out how the collaboration process starts in an organisation, is it deliberately planned by the management or does it occur accidentally or do organisation structure, policy, procedures help in its formation. It is also useful to find out the way the collaboration process evolves and any impediments in its progress. In some organisations there may not be any focus on collaboration

process, but still teams and management work together. Other interesting areas to explore are how automation tools help in achieving efficient collaboration between employees. According to Colazo, J.A (2010, p. 735-758), the relationship between collaboration structure and team member turnover is one of the areas future research should focus on. There are gaps in the literature in terms of various factors effecting the collaboration, usage of tools and involvement of management in the collaboration process as given in the above sections. These are some of the gaps found in the literature review and the researcher is very much interested to find answers.

Chapter 3

Research Methodology

3. Research Methodology and Methods

3.1 Introduction

This chapter on Research methodology and methods deals with how this research study was planned and implemented. As a first step, basics of philosophy in relation to the research study are set out. Second, the research methodology and method employed by the study are examined in contrast with other possible research methods. Third, the research design decisions required for employing an interpretive qualitative multiple-case study are laid out. Finally, an account of how the research was implemented is given, including an introduction to at least two companies involved. All of the activities described in this chapter have been carried out with the fundamental goal of satisfying the research objective from Chapter 1 (Introduction), and to address the resultant research questions.

This research is mainly focused on highlighting the process of collaboration between software development centres of multinational companies based in both Ireland and India. In some organisations collaboration processes such as communication, coordination and control are pre-planned to effectively and efficiently manage distributed teams and to maximise productivity. But in some organisation, there is no prior planning on collaboration, and it might occur naturally and intermittently. A significant amount of literature is available in the public domain about distributed software development and processes involved in it such as collaboration, coordination and control. However, the existing literature on this subject is largely anecdotal. Positively a large amount of research journals on the dissertation topic are also available through various university digital libraries, and that includes Dublin Business School affiliated libraries.

This chapter explains in detail about strategies that are employed to answer the research questions, proposed sampling method and the reasons for selecting such a method, what types of data collection tools are proposed to be used and why, and finally to discuss about suitable data analysis methods.

3.2 Research Methodology

Methodology is defined as the way the knowledge is gained, how theories are generated and tested, and the relationship between theoretical perspectives and research problem (Blaikie, 1993). It refers to the procedural framework within which the research is conducted (Remenyi et al. 2005). It is important to select a suitable research methodology according to the nature of the research topic. Therefore selecting a correct research methodology has to assist the researcher in answering the research question/s by collecting the relevant information about the research topic. Though there are many ways through which a research can be conducted and the quality of the research is largely dependent on the method selected which suits the research type.

Since the purpose of this research is to find out how collaboration process works between two software development centres of multinationals companies one based in Ireland and the other in India, it is necessary to do a thorough research through structured interviews as needed. The research nature is such that, in conducting this research, it is decided to adopt interpretivism and subjectivist philosophy within an inductive approach using qualitative data through interviews which is mono choice and time horizon would be cross sectional.

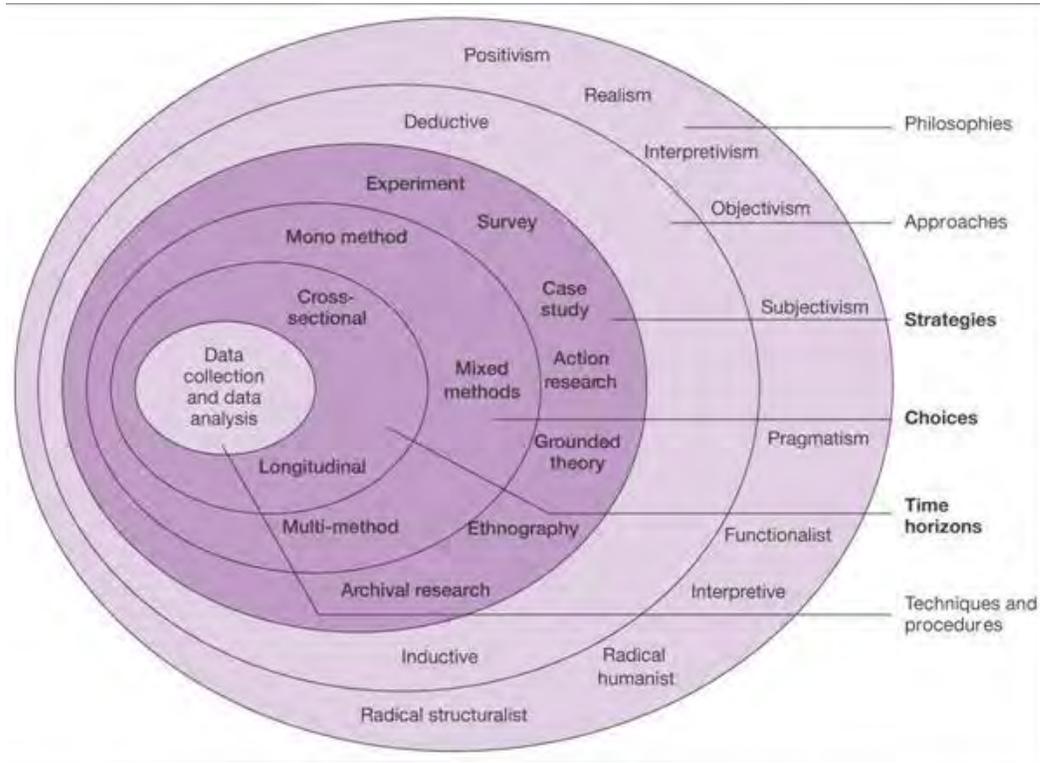
In the following sections the researcher attempts to explain the reasons of each choice by using Saunders “research onion”. Saunders, Lewis and Thornhill (2009, p. 108) coined the term research onion to compare various layers of research processes as layers in an Onion.

These are:

- Research philosophy
- Research approach
- Research Strategy
- Time horizons
- Data collection methods

Below figure explains what is a research ‘onion’ and what it constitutes.

Figure I: The research ‘onion’



Source: Saunders, Lewis and Thornhill (2009, p.108)

3.3 Research Philosophy

Saunders, Lewis and Thornhill (2009, p. 107) state that “*Research philosophy is an overarching term that relates to the development of knowledge and the nature of that knowledge*”. They examined three ways of thinking about research philosophy: epistemology, ontology, and axiology. Blaikie (2000) describes epistemology as ‘the theory or science of the method or grounds of knowledge’. There are three key paradigms exists in epistemology, those of positivist (classical), interpretivist (classical) and realist (contemporary).

3.4 Positivism

Remenyi et al. (1998) adds that the researcher in positivist approach assumes to be an independent of and neither affects nor is affected by subject of the research. Williman

(2006) defines positivism as an application of the natural sciences of the study of social reality. Positivism assumes the only authentic knowledge based on the actual sense experience. Such knowledge can come from affirmation of theories through scientific method.

Saunders, Lewis and Thornhill (2009) state that:

“Interpretivism is an epistemology that advocates that it is necessary for the researcher to understand differences between humans in our role as social actors. This emphasizes the difference between conducting research among people rather than objects such as trucks and computers”.

Based on the above philosophical statement appropriate approach for conducting this research is case study through interviews, so providing a better understanding of the collaboration process and highlight its importance. The rationale for choosing this method might be that the researcher assumption of case study through interviews as the best way to enquire into people involved, their relationship and the way communication happens between them. It is also possible to understand the existence and level of collaboration process between the teams and individuals working at two geographically dispersed locations. Globally dispersed teams heavily rely on various communication tools, through which efficient and effective communication is possible.

According to Blaikie (1993) the root definition of ontology is ‘the science or study of being’. On the ontological grounds, it is important to study what is really going on in the process of collaboration, what exists, what it looks like, what units make it up and how these units interact with each other.

3.5 Interpretive study

According to Fitzgerald and Howcroft (1998) “interpretivism is a soft approach in research paradigms” and fundamentally assumed that most of our knowledge is gained through social construction such as a language, consciousness, shared meanings, documents, tools and other artefacts (Walsham 1995). The understanding of human

thought and action in social and organisational contexts is of primary interest in interpretive research (Klein and Myers 1999).

This dissertation study described is an interpretive one. Foregoing statement indicates that the researcher took an interpretive approach towards understanding the phenomenon, therefore defining how the subject was approached, and how data were obtained and interpreted. The phenomenon was approached as a social one that is interpreted in the minds of participants; the phenomenon could not be understood without understanding how participants make sense of the world. All types of research whether it is a qualitative or quantitative is based on some underlying assumptions about what constitutes ‘valid’ research and which research methods are appropriate (Mayers 1997). Therefore interviewing and later interpreting those interview transcripts to develop theory is a major task in this dissertation. Both co-located and distributed software teams are social groups, studying these groups of people in Ireland and India is a complicated task.

The most fundamental set of assumptions held by a professional community, that allows its members to share similar perceptions and engage in commonly shared practices, which, according to Hirschheim and Klein (1989), is called a “paradigm”.

As Chua (1986, p. 604) puts it:

“Given this mutually interactive coupling between knowledge and the human, physical world, the production of knowledge is circumscribed by man-made rules or beliefs which define the domains of knowledge, empirical phenomena, and the relationship between the two. Collectively, these three sets of beliefs delineated way of seeing and researching the world.”

While Chua’s domain was accounting, his points were still very much valid for information systems research (cf. Orlikowski and Baroudi 1991). A paradigm is made up mainly of two different types of assumptions:

1. Assumptions about the world (ontological)
2. Assumptions about knowledge (epistemological)

Ontological beliefs relate to the nature of the phenomenon itself – whether the world is assumed to be objective (independent of humans), or subjective (having existence only through humans creating and recreating it) (Orlikowski and Baroudi 1991). *Epistemological* assumptions dictate what is an acceptable truth by specifying the criteria and process of assessing truth claims (Chua 1986). For example, an epistemological assumption may allow for a theory to be considered true if empirical research cannot falsify it. In relation to this, methodological assumptions dictate what types of research approaches are valid for collecting evidence. Finally, a research paradigm also constitutes the beliefs about the relationship between knowledge and empirical world (Chua 1986, Orlikowski and Baroudi 1991); that is, the role of theory in the empirical world, and how the values and intentions of the researcher relate to the phenomenon.

Orlikowski and Baroudi (1991), following a classification by Chua (1986), suggest three categories of research epistemologies found in information systems research: *positivist*, *interpretive* and *critical*. Again, a research epistemology refers to the assumptions about knowledge and how it can be obtained (Hirschheim 1992). As such, research studies classified as positivist will draw on a different set of beliefs and assumptions to that of interpretive studies. The following section discusses the underlying assumptions of this interpretive study, given its interpretive stance.

3.6 Research Approach or Choice

The second layer in the research onion is research approach which identifies two main choices as inductive and deductive. Saunders, Lewis and Thornhill. (2009, p. 124) state that “*deduction owes more to positivism and induction owes more to interpretivism*”. Selection of the research choice is based on the researcher interest and also area being investigated. Some of research topics are not suitable for inductive and some are not for deductive. The next two chapters explain inductive and deductive approaches.

3.6.1 Inductive approach

Inductive approach will be used in this research because this is a suitable method and also flexible structure than deductive approach. In inductive approach, data is collected and

then theory is developed as a result of data analysis. Hence a small number of samples are required. This is concerned with the context of events.

Regarding this approach, Saunders, Lewis and Thornhill (2009) state that:

“Research using induction is likely to be particularly concerned with the context in which such events were taking place. Therefore, the study of a small sample of subjects might be more appropriate than a large number as with the deductive approach. As can be seen in Chapter 10, researchers in this tradition are more likely to work with qualitative data and to use a variety of methods to collect these data in order to establish different views of phenomena”. (Saunders, Lewis and Thornhill, 2009, p. 126).

As explained above this research approach will be inductive, in which collecting and analysing data to build theory is the primary work. Induction method allows researcher to have first-hand understanding of the organisation and people being researched than possible through questionnaires or surveys. A face to face interview with a manager in the target organisation opens up more avenues for deeper understanding of the process. And also talking with team leaders and team members is the way to obtain more data on the collaboration process between distributed teams.

3.6.2 Deductive approach

Saunders, Lewis and Thornhill (2009, p. 124) state that the deductive research approaches involve developing a theory that is subjected to a rigorous test. Bryman and bell (2007) maintains that deductive theory represents the commonest view of the nature of the relationship between theory and research. Robson (2002) list five sequential stages in the research process:

- Deducting hypothesis from the theory
- Expressing the hypothesis in operational terms
- Testing the operational hypothesis
- Examining the outcome of the enquiry

- Modifying theory in the light of findings

This research approach is not suitable for this research, so, no further discussion is needed.

3.7 Research Strategy – Case Study

The third layer in the research onion is the research strategy. Based on the scope of the topic it had been decided that conducting case studies both in Ireland and India is suitable for this search. Eisenhardt (1989, p. 532) define that ‘the case study is a research strategy which focuses on understanding the dynamics present within single settings’. According to Siggelkow (2007, p. 21) case study helps in sharpen existing theory by pointing to gaps and beginning to fill them. A case study research method was deemed to be the most suitable strategy of approaching this interpretive qualitative empirical study for several reasons. First, case study research is suitable for investigation of social and organisational phenomena. It was deemed to be a good fit for the investigation of the social and organisational phenomena. It was deemed to be a good fit for the investigation of the social and organisational phenomenon of GSD. Studies focusing on society and culture, whether a group, a program, or an organisation, typically espouse some form of case study as an overall strategy (Marshall and Rossman 1999, p. 61). Second, case study research can lead to valuable thick description that can help to further our understanding of the phenomenon (Yin 2003). Thirdly, the approach can be executed without spending extended periods of time at the case site (as opposed to months or years typically spent in ethnographical studies). The approach allows the researcher to elicit interpretive qualitative data from participants while not participating directly in the phenomenon.

As part of this research, it is planned to conduct interviews in two companies in Ireland and their counterparts in India.

3.8 Research Choice - Qualitative

The research choice is mono method describing that, only qualitative data collection is used by conducting interviews as explained above, since constructing questionnaires or surveys is much difficult, due to number of samples involved. The main focus of this research is to find out collaboration process for software development between Irish and

Indian centres of multinationals. For this reason it is important to study the collaboration process at various levels of the organisation, such as management, team and political level by keeping in mind that the process of qualitative research method was the best option to go for. Quantifying the information through other methods and resources in a meaningful way is like doing injustice to the qualitative method which is more capable of providing meaningful analysis. I have gathered the information through interviews within the organisations.

Format of the interview will be in-depth. Through predetermined questions detailed answer will be collected. Therefore, interviews will be open to any additional questions depending on the responses. All interviews will be recorded for future data analysis.

Golafshani (2003, pp.600) suggested that *“qualitative analysis results in a different type of knowledge than does quantitative inquiry because one party argues from the underlying philosophical nature of each paradigm, enjoying detailed interviewing and the other focuses on the apparent compatibility of the research methods”* and on the other hand *“quantitative researchers attempt to disassociate themselves as much as possible from the research process, qualitative researchers have come to embrace their involvement and role within the research”* (Winter (2000) as cited in Golafshani (2003, pp. 600). Both of the research methods tries to present reliable information as much as possible and both these methods are dependent upon person who is responsible for undertaking the research.

3.9 Time Horizon

There are two main types of time horizons are identified, that of the cross-sectional (i.e. snap shot) and longitudinal. (Saunders, Lewis and Thornhill. 2009; Bryman and Bell, 2007).

3.9.1 Cross-sectional

Cross sectional method is usually carried out once and essentially represents a snapshot of particular event at a particular point in time (Saunders, Lewis and Thornhill, 2009, p.

155). This research has to be finished in four months, therefore suitable time horizon method will be cross sectional. Hence studying collaboration process would be done in over a short period of time.

3.9.2 Longitudinal

In contrast to the above longitudinal studies are developed over a period of time, and therefore the main strength of this type of research is that it has capacity to study change and development (Saunders, Lewis and Thornhill, 2009, p. 155). This research method is not suitable for this research and so further discussion is not necessary.

3.10 Data Collection Methods

Data collection will be done through interviews since chosen research method is qualitative.

‘An interview is a purposeful discussion between two or more people’

Kahn and Cannell (1975) as quoted by (Saunders, Lewis and Thornhill 2009, p. 318)

It is planned to conduct in-depth interviews in two multinationals based in Ireland and their counterparts in India, to be able to collect sufficient primary data for research. Mack, N et al (2005, p. 29) described in-depth interviews as ‘a technique designed to elicit a vivid picture of the participant’s perspective on the research topic’. They further explained some of the characteristics of an in-depth interview as ‘In-depth interviews are usually conducted fact-to-face and involve one interviewer and one participant’.

Regarding in-depth interviews, Boyce and Neale (2006) sustain:

“In-depth interviewing is a qualitative research technique that involves conducting intensive individual interviews with a small number of respondents to explore their perspectives on a particular idea, program, or situation. The primary advantage of in-depth interviews is that they provide much more detailed information than what is available through other data collection methods, such as surveys [...] They also may provide a more relaxed atmosphere in which to

collect information—people may feel more comfortable having a conversation with you about their program as opposed to filling out a survey” (Boyce and Neale 2006, p. 2-3).

The primary intention is to explore the importance of collaboration process in global software development belongs to multinationals. Prior to approaching companies for approval and booking appoints for interviews, familiarisation on the target company will be done through company websites. In addition to this known sponsor approach will be utilised to get potential people for conducting interviews.

3.10.1 Data Collection

The information collected for the dissertation is through two main sources: Primary data and the secondary data. Secondary data might include referring both qualitative data and quantitative data.

3.10.2 Collection of Secondary data

Secondary data is collected for the purpose of developing a theoretical framework supported with qualitative data which is the essence of this dissertation. For the evaluation of secondary data Saunders et al. (2009. p. 272) has suggested that precautions are required in a similar way as the data is collected by primary resources. Study of previous researches (by way of reading journals, reading articles published in renowned newspapers, magazines and some of the websites presented in the dissertation) enabled to get the better understanding of the factors that motivates collaboration process. The data collected from various sources has led to the formation of problems. This secondary data is used to build the theoretical framework which is used further for the analysis of empirical study to form a model which may help in finding various aspects of collaboration process.

Collection of secondary data was mainly from Dublin Business School’s digital database library (EBSCO, Emerald & Dawsonera) and individual membership of ACM direct

online library, and also various libraries of UCD, DUC and Trinity College. Key words that were used for the collection of secondary data were “Collaboration”, “Software Development”, “Multinational”, “Distribute Software Development”, “Global Software Development”.

The above key words have given vast majority of secondary data which build the framework for the research model. According to Saunders et al. (2009, p. 272) the data which is collected through secondary resources is relevant only if;

1. It helps in building the research objectives and in the formation of relevant research questions.
2. The cost involvement is there and if the data is available easily from different databases.

Saunders, Lewis and Thornhill (2009, p. 272) state that “time spent on evaluating any potential secondary data source is time well spent as rejecting unsuitable data earlier can save much waster time earlier”. During the secondary data collection for literature review it is seen at numerous occasions that the data which was looking relevant at first place was not appropriate when examined fully.

3.10.3 Collection of Primary data

Primary data may be defined as the data which is collected from primary sources i.e. Data collection through primary sources is divided into two categories (Saunders, Lewis and Thornhill, 2009):

- Collection of Primary data through observation
- Collection of Primary data through semi-structured interviews and in-depth interviews.

For this dissertation, qualitative research method is used as mentioned above. Three methods as described in (Saunders, Lewis and Thornhill, 2009, p. 320-321) were looked at for getting primary data.

- Structured interviews – Structured interviews uses standard set of questions which are same for all the interviewees and the response is recorded for analysis purposes.
- Semi-Structured interviews. These types of interviews are non-standardised. The questions depend upon the organisation and the respondent and the themes vary from interview to interview. Questions also depend upon the availability of the respondents and the organisations they work in.
- Unstructured interviews – “Unstructured interviews are informal” (Saunders et al., 2009, pp. 321). For unstructured interviews there is no standardised list of questions for interviews.

The data for this dissertation is collected through the structured interviews and telephonic conversation with the potential respondents. Structured questions were used and posed by keeping the organization and the respondents in mind. The reason behind conducting structured interviews/ unstructured interviews was that to make interviewees more comfortable with the process as in some cases the interviewees were reluctant to provide information.

Below are some important interview questions which are needed for proper data collection.

3.10.4 Important interview questions in relation to the objectives

1. How does the collaboration process occur in a distributed software development environment?

The objective of this question is to find out how collaboration occurs in a distributed software development. Is it a naturally occurring process or is prior planning and involvement needed?

2. What processes exist in relation to collaboration?

The main purpose of this question is to analyse what types of processes and procedures exist in relation to collaboration, such as Communication, Coordination and Control.

3. What kind of communication mediums exists between Irish and Indian sites?

This question will provide answers to various types of communication/collaboration tools.

4. What role does Management and Team plays in collaboration?

This question should address management and team roles in promoting and establishing collaboration.

5. How much collaboration process benefits software development?

This question address advantages and disadvantages of

6. How do cultural differences hinder/enhance collaboration process between global teams?

The above question is intended to find out pros & cons of cultural differences.

3.10.5 The interview process

As mentioned above structured interview process was chosen which is explained above and the detailed attention was given while choosing the respondents for interview process. Respondents were chosen because of their expertise in academic as well as industrial sector. Another reason behind choosing the particular respondents was due to their views on mergers and acquisitions which help in providing better understanding and new insights in this process.

(Saunders, Lewis and Thornhill, 2009) has discussed the interview process by way of five steps:

Step 1: The method requires type of research to be undertaken i.e. qualitative research or quantitative research.

Step 2: Aspects to be considered for conducting structured interviews.

Step 3: Confidence level required for opening the interview.

Step 4: Use of appropriate method for conducting interviews.

Step 5: Device used for recording the interviews for further analysis.

Questions that are prepared for conducting the interviews were prepared by keeping in mind the interviewees, their background, their expertise level and their area of significance.

3.10.6 Interview preparation

For the interview preparation it is important that the questions which are prepared for the interview process must be relevant to the research topic and should cover all areas which will give proper insight into the collaboration process. The interview question used in this dissertation will help in finding out answers for various questions such as, existence of collaboration processes, and communication mediums being used, and how collaboration process occurs in an organisation, the role of management, teams and individuals and how cultural differences play a role in the success or failure of collaboration.

3.10.7 Selection of Respondents

Selection of respondents is always regarded as one of the most difficult task in hand. While looking at the secondary data it was seen that there were very few people who possess the knowledge of collaboration process in software development. It is appropriate to select both people managing offshore development centres and people with knowledge in collaboration processes in the organisation (i.e. managers). And also Team Leaders and Team Members can give valuable information about Teamwork and collaboration processes in their organisation.

3.10.8 The Interviews and issues

Digital recorder was used for recording the information wherever it was possible to get the approval from respondent so as to make them feel comfortable with the process and if they have any concerns it can be acknowledged beforehand. But whenever it became difficult to convince respondents to record the interview procedures, there was no other option rather than taking quick notes of important words and phrases. Accordingly every effort was made to not to miss important words or phrases. Some interviews were taken place remotely over phone due to physical interviews were not possible as distance involved was great and also reaching respondent was not possible.

Unfortunately some companies rejected to participate in the dissertation research, though a proper approach was made to convince them. It became difficult at one point to convince some gatekeepers (HR Personnel) and lost an opportunity to interview potential interviewees. And also due to lack of time and travel issues researcher was not able to conduct interviews with Indian counterparts of an Irish company. Other issues like Indian centre being new and also Indian centre being small and so, collaboration process is not as intense as it should be.

3.11 Sampling – Non-probability technique

“Sampling is the process of selecting a sufficient number of the right elements from the population...”. (Uma Sekaran et al, 2010)

According to Saunders, Lewis and Thornhill (2009, p. 233) there are two groups of sampling techniques, probability and non-probability sampling. Since, there are some limitations for this research such as lack of time and budget which might prevent data collect from total population; it is necessary to select a sub-set of population. Step one in the sample selection is to define a sub-set of population that will be in the sample.

As planned for this research, two to three companies are sufficient to conduct interviews. It is necessary to conduct interviews both in Ireland and their respective counterpart site in India. It is also planned to interview at least one manager in each company in Ireland and their counterpart manager in India. If possible try to interview few team members and team leaders to obtain any extra information needed to assist in this research. In case where approval for interviewing Indian counterpart is not available, then detailed and sufficient information must be collected from the Irish manager.

3.12 Research Ethics

According to Bryman and Bell (2011, p. 122) *“Ethical issues cannot be ignored, in that they relate directly to the integrity of a piece of research and of the disciplines that are Involved”*.

It is necessary to follow good ethical practices while doing research in any multinational company. Whatever information obtained by conducting interviews will be solely used for the purpose of dissertation, any laps in this respect would potentially undermine trust

on the researcher. Any and all multinational policies would be followed and respected. All participants will be informed about the purpose of this research, and supplied with interview information. This will allow the participants to decide whether to participate in the interview or not.

Transgression of ethical principal is a serious issue. In this regard Diener and Crandall (1978) as cited by Bryman and Bell (2011, p. 128) broken down them into areas:

- whether there is harm to participants;
- whether there is a lack of informed consent;
- whether there is an invasion of privacy;
- whether deception is involved

Privacy of participants has to be respected. It is noted that, participants has the right to refuse answering any question that they consider inappropriate or that they cannot answer according to the company's policies. In accordance with Bryman and Bell (2011, p. 136) "The right to privacy is a tenet that many of us hold dear, and transgressions of that right in the name of research are not regarded as acceptable".

Participants will be given every opportunity to ensure that participation is voluntary, that participants could withdraw at any time and confidentiality will be protected. It is the responsibility of the researcher to not to reveal any confidential details of the companies.

3.12 Research limitation in obtaining primary data

Limitations might arise based on the experience of the researcher in conducting interviews. So, actual preparation of data collection instruments and practice in conducting interviews and learning to ask questions is time consuming. Since interviews also needed to be conducted at Indian sites of multinationals a lot time and money required to travel to India. It is expected that, there might some difficulties in convincing certain employees to participate in the interviews, due to the nature of the interviews are in-depth.

Personal bias can interfere with the process of interviews. As an example, more time will be spent in interviewing managers at an Irish site, and less time at an Indian site. And also less relevance might be given for either Indian or Irish sites while collecting primary data. Bias might happen while interpreting and analysing data based on interests of the researcher. According to Cooper and Schindler (2003) ‘the interviewer may introduce bias by their approach of guiding the interview, of word emphasis, tone of voice, body language, and question rephrasing’.

3.13 Research Plan

3.13.1 Practical Efforts

It is assumed that a lot of practical efforts will be need in obtaining primary data. Efforts needed to contact multinational companies in Ireland and in India and convince gatekeepers to agree for accessing IT managers. Time management is the major issue since this research should be completed within 3 months. It is necessary to take time off from busy work schedule, to conduct interviews. As it can be expected that IT managers in multinationals also are busy with their own work schedules, coordinating interview schedules also might need a significant effort.

3.13.2 Time Allocation

Activity -	Start Date -	Finish Date -
Searching for secondary data (Note: Some work already done towards proposal)	25 th May 2013	16 th Jun 2013
Reading secondary data (Note: Some work already done towards proposal)	25 th May 2013	16 th Jun 2013
Creating data collection instruments	10 th Jun 2013	16 th Jun 2013
Administrating data collection instruments	17 th Jun 2013	14 th Jul 2013
Analysing primary data	15 th Jul 2013	21 st Jul 2013
Writing the early drafts	22 nd Jul 2013	29 th Jul 2013
Analysing comments on drafts by supervisor	30 th Jul 2013	4 th Aug 2013
Revisions of drafts	5 th Aug 2013	11 th Aug 2013
Printing and binding	12 th Aug 2013	16 th Aug 2013

Chapter 4

Data Analysis and Findings

4. Data Analysis and Findings

This chapter outlines the Data analysis and reports on significant findings. Data Analysis considers the data collected from both sources i.e. primary and secondary data sources. The secondary data source, i.e. literature review, is already illustrated in chapter 2. This secondary research data is referred in conjunction with the primary sources of data collected to report on the research findings.

The research method applied to gather primary data in this research was Qualitative research method (In-depth interviews).

4.1 Qualitative research method

The qualitative research method employed for this research was structured interviews. The researcher carried out three interviews in Ireland at three different companies and one set of interviews in India in a company. Two of the interviews (Company A and B) conducted in Ireland were face-to-face and third interview (Company C) was a done by sending question and getting answers through email. Unfortunately recording was not allowed for interviews taken place at the Indian site of Company A, this is due to manager at Indian site had confidentiality concerns and getting approval for allowing recording to be done would be time consuming and not guaranteed. However important words and phrases were noted down and requested the manager to send answers for research each questions through email, which he was obliged and sent replies.

Hinds (2000) warn about the problem of ‘biases’ during interviews and suggest that the interviewer should accurately record the interview response of what the interviewee said and not what the interviewer thinks should have been said. Therefore bias during interview process might encourage the interviewer to ask inappropriate, irrelevant questions, which end in collecting inaccurate data. The purpose of these interviews was to understand perspectives of various employee groups (Managers, Team Leads and team members) on collaboration process. Questions were tailored in such a way that, wider information can be collected on collaboration process on six major areas (as given in the

objectives) through six questions and related sub-questions. This is explored in detail in the next section. For each question respondents answers will be shown and at the end of each question, a detailed analysis is given.

4.2 Interview questions, responses and data analysis

1. How much experience do you have in Software Industry?

Respondent Mr. A1)	22 Years	Sr. Manager -I.T Development
Respondent Mr. A2)	12 Years	Engagement Manager
Respondent Mr. B)	25 Years	Sr. Manager –FPGA Design Team
Respondent Mrs. C)	14 Years	Business Leader

2. History of offshore relationship and involvement

Respondent A) Ireland

There is team based in Dublin and a team based in India. The relationship is over 5 years old. India centre started to find extra resources to complement the existing teams in Ireland. Initially the team was small, and grew by business demand. As business grows more and more projects have to be delivered. The main complexity of the offshore relationship is resource growth. When you add so many new people to the team either in India or in Ireland, it is difficult for the new people to come up to the speed with the system. The challenge is to bring the people off the curve quickly. It is much easier for the people in Dublin (HO) to get a sense of who does what and how to interact and reasons for why they are doing this project. There is a challenge to try to communicate the same to the teams geographically separated. We try to communicate as much as we can and as often as we can.

Respondent A) India

Engagement with Dublin (HQ) site started in 2008, we started with 2 people and now the team size is 21. We are now compliments with HQ's development, support and testing teams. The main reasons for starting India centre was to have a good control over development process and flexibility in availability of resources due to high literacy, data

protection and good facilities. We are the extended work bench for development, testing and support activities that closely work with HQ team.

There has been a strong and healthy relationship between India centre and HQ. Senior Manager's at both sites governs the relationship from high-level, and HQ IT manger and engagement manager at India centre work closely on day to day operations. Development leads at both sides own projects and deliveries. There are weekly and monthly meetings, personal visits, quarterly satisfaction surveys and intra company transfers.

Respondent B)

Indian site involved in developing low level software. Beginning from 2013 company decided to expand software team into India. Reasons to expand into India was first it is a corporate decision and second Indian expertise in software development and third cost is only 50% of Ireland. Regarding complexity, everything is driven out of HO, employees are being added as business grows.

Respondent C)

Our team is primarily located in Dublin, with a small staff in St. Louis, Missouri (US). Recent workload pressure meant we had to look beyond our current of full time staff and introduce a model closer to the "follow the sun approach" while adding cost savings in our staffing model. It also allows us to ramp up quickly when the workload peaks and ramp down easier when the work drops off.

We primarily work with off-shore in Malaysia but recently to assist with a faster on-boarding we decided to move to India (with the same company). I am the co-ordinator of the relationship for the Dublin office. I currently have 4 people temporarily assigned to a project in Hyderabad, India. We have 15 people on our Malaysian staff.

This is a temporary team as it will disband end of September 2013. In Malaysia we went from a team of 3 to a team of 15 in about one year. The team are now supporting several projects/functions

The team is managed from a project perspective as if they were sitting in our office. Each member requires the same skills as our on-shore employees and their involvement in the project is as equals. We have a lead in Dublin and a lead for each project in Malaysia, their primary function is to provide on the ground support, project manage the work and provide updates on any issues. We have an overall co-ordinator in Malaysia who provides leadership and guidance to the entire team. He also manages holiday requests, training and personnel issues.

Data analysis: Organisations participated in the research opened their captive development centres in Indian due to various reasons such as 1) Decisions driven by business growth, 2) To have a good control over the development process, 3) To have flexibility in availability of resources, 4) Corporate decision and to utilise Indian expertise in Software development since it is cost effective, 5) To cope with fluctuating work load necessitates availability of extra workers, 6) “follow the sun approach” approach in developing software 24x7. There are complexities such as rapid resource growth, which needs to be managed properly.

3. Co-located Vs Distributed Software Development

Respondent A)

If you are co-located and geographically close it can be easy to manage. However Irrespective of where the teams are located, they need to be communicated. In this industry (IT) it is the fact of life that, sooner you get used the idea and sooner you get to managing it and sooner you get used the right way of doing it. Apart from physical separation, challenges are to keeping people in the loop, giving them the reason why the things are being done, giving them sense of urgency of the issues. The challenge is to try to communicate as much as you can and trying everyone feels like one team rather than two separate teams.

Respondent B)

What matters is not being located geographically close, but locating close to the customer. Being distributed is depend on who is your final customer is and what support

you need, if you are isolated then that is a problem. Talent can still be tapped though people are not located close by. If you are supported, distance really does not matter.

Respondent C)

We have had a good experience and have seen good results with our DD model. We are able to release fixes to testing, have them tested when we are offline and pick up any issues start of our day. We have better testing / development coverage when Production issues occur as we have more dev/testing hours available to us to resolve/test issues.

Having a DD team has meant we have to be much tighter in terms of process, communication and handover. We need to ensure that team gets full disclosure on all information and that this is readily understood.

It is easier to have the team in one location where we can work closely together, however the benefits we get from having staff in another location/time-zone offset the additional effort of not being co-located.

Data analysis: Either co-located or distributed software development, communication is the key to successful collaboration. The Teams who doesn't communicate and/or isolated face collaboration problems and it is the same with the teams who talk less frequently with their peers. So, the conclusion is that, communication is the key aspect in overall collaboration to happen, either the teams are co-located or distributed.

4. Views on collaboration process

Respondent A) Ireland

We do collaborate in software development. We have definite check points to engage in the process of collaboration and there are also recommendations to talk to people on offline basis to get their help. Informally collaboration is expected to happen, senior member of the team to do more of it. You must talk about future technical designs, future demos, test plans, and there are opportunities to do (collaboration) at fixed points.

Collaboration process helps in DSD: I think it helps, you don't have other choice. It is mandatory. Helping is an understatement you have to have it, based on geographical location. It has to be structured and planned out to communicate.

Respondent A) India

We very much collaborate in software development. Collaboration in IT means, working together to achieve the business goals irrespective of the geographical and cultural differences by collectively contributing towards the goals with shared vision and values. There is collaboration since it is one single organisation.

Respondent B)

The world is moved on to complete collaboration. Collaborating means interaction between teams. You collaborate locally and globally with peers and with management. Collaboration means networking, understanding the products, understanding the roadmap and collaborating technically. This is all about knowledge, making right choices, keeping in touch, be aware of the roadmap, the direction and the industry. Collaboration absolutely helps in distributed software development. If you don't collaborate you don't understand what the rest of the world is doing, you go and end up re-inventing the wheel. Collaboration stops you from re-inventing the wheel and make sure you are making the right choices.

Respondent C)

Our team functions as “one” on a project, each team member has a voice and that voice must be listened to. This is the entire DD team. Everyone should feel comfortable and at ease to share opinions and ideas. The team can reach out, without problem, to other teams for support as this is an ethos that extends across the company.

Collaboration process helps in DSD: Absolutely, I firmly believe that our approach to collaboration has had a huge impact to the effectiveness and results of our team. Working as one team allows everyone to feel equal regardless of their location or employee status. Collaboration is key in software development - we use an agile methodology so all team players are involved in elaborations, design, development and testing. This increases understanding of the application & improves the quality of our deliverables.

Data analysis: Respondents firmly believed that, they engage in collaboration process all the time. Senior managers are the people who supposed to practice collaboration more

and encourage their subordinates to do the same. Collaboration in IT is the way to achieve company goals. It has been said that, the world moved towards complete collaboration both locally and globally. Some respondents recognise that, there is a danger of not knowing what the world is doing if you don't collaborate and do what the other have already been doing as a consequence end up in re-inventing the wheel.

Teams in Ireland and India work together as one team in a project. Respondents recognised that collaboration help in software development process and there is no other choice rather than practicing it. Collaboration benefits the team efficiency, and everyone feels equal irrespective of their work location. The overall theme was pro collaboration between distributed teams and there is a tremendous interest to practice and encourage collaboration.

5. How does collaboration process occurs in a distributed software development environment? Is it a deliberate process or prior planning is needed.

Respondent A) Ireland

Prior planning is needed based on just time zone difference. Lot of conversation can occur here at some ones desk can be spontaneous, whereas communicating equivalent message to a team remotely based has to be structured and planned out. There is a level of planning to it, more so than you would think but that is the function of geographical location. You keep people as much informed as possible. Definitely need more context.

Respondent A) India

Constant interaction and weekly scrums, code by both parties monthly knowledge sharing meeting, team level meeting. To deliver maximum you need to collaborate.

Respondent B)

For me all types of interaction that goes on in terms of collaboration between development teams, it is all of those things. It is very structured, we would have weekly status meetings, requirements documents review, we would review issues together, we

would have approval sessions and would have delivery mechanisms, in terms of dedicated collaboration, absolutely that happens. We have regular communication and a lot of collaboration. Regarding fine processes, we have ISO certification process 2001 and 2008 procedure, so that we don't break it. Then that is at the development level, beyond that all sorts of other monthly briefings with other peers and other groups involved in it. ISO have procedure like your status meetings and approval procedures. ISO don't distinguish between where the teams are located.

Respondent C)

The collaboration process is planned and happens daily – it can be on the phone, via Lync or by video conference. It is both scheduled and unscheduled. Team discussions are scheduled and unscheduled collaborations happen as needed.

Data analysis: The collaboration process is a structured and planned process it needs to be communicated between distant teams, but can be spontaneous if teams are co-located. This can happen through phone, videoconferencing and weekly scrum/status meetings, monthly project meetings. Respondent answered the above question positively. They all agreed that, collaboration process occurs in a distributed development environment all the time, between groups of people or between individuals. It might vary in its shape and form, but overall intention is the same in all companies. It is also noticed that procedures and implementation style might differ.

6. What processes exists in relation to collaboration?

Respondent A) Ireland

Communication, coordination and control: We have defined processes and defined milestones where we have check in. A typical team will have communication, coordination and control issues on daily basis. With distributed teams small measures won't work, we should have a very clear project management policy, which is well defined and communicated, so, everyone knows when and what to deliver. Within this embed certain checkpoints so that once your technical design is done you need to go back to your broader audience of the team here or in India and get their buying to it. And then

there should be certain bigger check points in which everyone has to be involved in the release of a product.

We have series of gates to pass such as formal process and intermediate milestones to check locally or across the teams and definite gates where you have to get everyone on board. We have twice weekly meetings, in which we discuss about all of the on-going projects. And individuals talk with each other as needed as they work on the project.

Communication with Team leads and managers: If it is day to day project based activity, it is team leads who own it so I directly communicate with them through email or through phone. If there are broader cross project issues, I reach out to my peers (manager) and talk with him directly. If an individual whom I know can answer for my question, I straight away approach them.

Respondent B)

Communication: I have my peers in India. I communicate with them through daily email, instant messaging and telephone calls. And also have weekly status meeting, project meetings etc.

Coordination: There are no challenges in coordination, we have ISO process so there won't be any challenges. We just have normal deadlines to meet.

Control: We do everything through ISO Process. We run projects, Project tasks, milestones, delivery schedules and independencies. We meant to monitor them. We have metrics to monitor them. Whether in India or here it is the same thing.

ISO Standards: ISO don't guarantee collaboration, but it is means of doing it, mechanism of doing it and audited against it. More generally collaboration is Ad hoc, which is really up to the individuals to collaborate, report out monthly status, report out planning of the group and the direction of the group that is all Ad hoc.

Respondent C)

Communication: We use various forms of communication, daily SCRUM's, video conferences, telephone, email and Lync. The team have direct contact with whoever they need but each day we do check-in/stand up meetings. Each team member attends this – we deal directly with the team, we do not use an intermediary. I also meet weekly with the on and off shore co-ordinators to cover any project related issues that may exist. These usually get worked through the project leads but if they are not resolved they come to me for resolution

Do you face challenges in communication: No, at times the language can be a barrier but this is often short lived and the team have developed a good working relationship and are happy to let each other know if they are unclear with what has been shared. Our business partners are located in New York and St. Louis so the time difference with Malaysia does not allow this.

Data analysis: Respondents all agreed that communication, coordination and control are the main processes in the collaboration and issues could occur related to these processes. Distributed teams require clear project management policy and checkpoints to achieve milestones. ISO process may not guarantee the success of collaboration, but it is the means to achieve it. Communication challenges such as language barriers are possible to overcome through good working relationship among team members. These replies sufficiently answer the above question. Controlling teams and their activities can be done through close monitoring. Each work is run as a project, so it is possible to check achievements in comparison to schedules and milestones.

7. What role does Management and Team plays in collaboration?

Respondent A)

Collaboration Vs Teamwork: Teamwork alone is not sufficient in distributed software development. We learn the lesson hard way by assuming some knows what they need to do. Even from the team coordination point of view leaving the team on their own is dangerous in co-located setup, even dangerous when teams are separated geographically

from HQ. We have to ensure that collaboration rather than teamwork between geographically separated teams. Except in situation where specialised knowledge existing, there is no other option than allowing them to work on their own. If the knowledge is spread across two (geographically separated) teams then I would expect you have to have integration between those two teams. It is the function of the knowledge life, but by default you have to force collaboration.

Protocols in communication: There are no restrictions on communications anybody can talk with any one. But it is different in practice there is a hierarchical view to reaching out. It is a barrier between teams which supposed to be broken-down. There is an encouragement from management to pick up the phone to talk to managers and colleagues. Individuals should not to worry about whether they are disturbing others instead just pick up the phone and communicate. There is no barrier but people don't do it often which they should be doing it.

Travel: I travel twice a year and also my manager. We try to get other leads to travel to Indian site and vice versa. It is a function of management to try and get the budget for the travel. I agree that, there are obvious benefits to travel every time I travel to Indian site I get better I get better relationship. I strongly recommend people do travel to their offshore sites.

Dealing with time differences: We try to organise ourselves around time zones. Other way to deal with time differences is flexible working hours by starting early in Ireland so, that we can reach out to Indian team, if something urgently. Inversely if there any software releases, we work late at Dublin office up to 4 or 5am to make sure that, particular functionality working fine. There are pros and cons to it, if you are smart about it you can use your clock well, but obviously there are logistical constraints to it in terms of how you reach out to people. We don't face different challenges here than any other company faces in distributed software development.

Opinions of offshore teams: We take offshore team ideas and opinions on board. It depends on your pedigree in terms of your experience, your knowledge in the area and the ability to stand over on the statements you make. Independent of where the team is located if you have a knowledge expert in that area, you are going to refer to their opinion whether the team is here or in India. We definitely take feedback on board and management is open to consider expert opinion from offshore teams. The door is open always for offshore team.

Disagreements and conflicts: Any team will have disagreements in terms of approaches, people, timelines, risks that we see. If a manager asked to do something, it doesn't matter where you are located, you have to do it. At team level you have to battle it out in terms of opinions, in terms of knowledge and there are arguments made on both sides which are equally valued. Sometimes managers have to make call on those, which is managers responsibility.

Disagreements are very much at professional level, people raise concerns, we listening to those concerns we look at the pros and cons of addressing them and action that way. Culturally you have deal with the outcome differently. We can be a little bit blunt with the teams based in the western culture, whereas dealing with teams in Asia it can be seen as upfront with somebody, you are better off going to the hierarchy to get that message. In western culture one can simply say that I cannot do it, but in Asian culture it is people taken personally.

Respondent A) India

Opinions of offshore teams: Yes. Innovation is encouraged from ACIS. And there are forum and platforms to share the same. Offshore team members won certain awards as such. Indian team member's opinions are valued.

Disagreements and conflicts: Usually, project estimates are discussed between teams and then agreed on the schedule based on the business priority and team's capacity. Conflicts between teams are resolved by weighing merit of each group.

Respondent B)

We collaborate (Management) at our level and Engineers collaborate at their level. Collaboration process is paramount for everything.

Collaboration Vs Teamwork: Collaboration is needed. You can have teams together but if they do not talk they get disconnected. Keep connected, and motivated.

Protocols in communication: We have an open policy in communications between peers.

Travel: Travel is allowed and budgeted. Indian teams members visit us once in 6 months and vice versa. There are obvious benefits in travel, such as familiarisation with new people.

Dealing with time differences: It is a challenge but it can be overcome. It can be taken as an advantage, because it can be prepared, we work late and they start working (India) early. It is not an issue. Advantage is on the both sides, today I need to prepare something for India team, which I can prepare this evening before I can go home, and they know what to do in the next morning. It removed a need for instance response.

Opinions of offshore teams: Offshore teams are treated equal and their opinions and ideas are respected. Indian team is at parallel with other teams in terms of quality, expertise and no concern on that.

Disagreements: We might have disagreements. For us it is all about following processes, end of the day it is about learning.

Conflict resolution: I have put a strong and capable manager in India, he will deal with it. Disagreements between Indian manager and myself would be dealt by my senior manager. Issues which cannot be resolved between us are escalated if necessary to the senior management. It is up to both sides to resolve those issues and that is what management is there to do. We have to collaborate to resolve issues.

Respondent C)

We don't travel to India.

Dealing with time differences: We outlined the work assigned in advance to allow for better understanding. During our training period we conducted training in our morning time, their afternoon. Then on the following day they could revisit what was covered and ask any outstanding questions at the start of the next sessions. On projects as issues are uncovered the team will attempt to resolve themselves, if this is not achievable then we can experience down time on projects, however we always have other tasks that the team can work on in such events.

Opinions of offshore teams: Yes, and as mentioned in a previous answer this was very much encouraged.

Disagreements: Not so much as disagreed but would voice their concern when timelines were too aggressive.

Conflict resolution: The situation has never arose.

Data analysis: Respondent expressed their views on the role of teams and management in collaboration process. Though teamwork is important in a local setup but while a group of people work towards achieving a common goal in a distributed software development process, collaboration is crucial. Regarding communication protocol's it has been recognised by all participants that, there shouldn't be any restriction on communications between distributed team members and an open policy is better way to achieve collaboration.

Indian team members are being treated equally in both responsibilities and rewards. Teams in India can express their opinions which are treated respectfully. Disagreements and conflicts are amicably resolved while considering various options. Each situation is treated on its merit. Travel has been recognised as a valuable method in familiarising Indian and Irish team members to each other. If an Irish team member travels to India it might result in familiarising himself to the Indian team, experiencing the environment they work in, their expectations and their culture and food habits can also be understood first hand.

8. What kind of communication mediums/Tools exists between Irish and Indian sites?

Respondent A) Ireland

We use a tool called WebEx which allows you to display contents of a desktop on a remote computer and vice versa. WebEx is our main collaboration tool. We don't have a web chat tool.

Respondent A) India

We use WebEx, Teleconference, OCS interactive tool (MSO communicator), Global Intranet, Allianz social network and Wiki.

Respondent B)

Communication Mediums/Tools: We use Phone, Email, Instant messaging, Videoconferencing, Personal visiting and face to face meetings. Personal visits are beneficial to the company. We don't use collaboration tools we use VPN and also WebEx.

Respondent C)

Communication Mediums/Tools: Telephone, MS outlook and lync. With Malaysia we have video conferencing.

Data analysis: There is a common practice in the types and usage of communication tools. The most common communication tools in use are conventional phone calls, Emails, Instant messaging, Videoconferencing and WebEx. It has been noticed that none of the responding companies use collaboration tools, there is a lack of understanding the benefits collaboration tools provide.

9. How do cultural differences hinder/enhance collaboration process between global teams?

Respondent A)

We agree that cultural differences issues play major role in team development and collaboration. There is company culture and there are local cultures, and they can be very different. So, you have to operate within the company culture and you don't have choice about it, whether you work here or you work in India. But individually, regions of cultures, you have factor that into any conversation. By breaking down the barriers, by travelling by talking frequently by engaging regularly, by building relationship with somebody probably the primary factors which help to avoid conflict situations.

You can build the relationship with somebody, it is very important for the team based in India then they knows that, there is no ulterior motives to it. When we have relationship and trust built, then there is less reluctance to take risk on board. Culture is the huge component in offshore relationship.

Evaluation of offshore team work in respect of cost, quality and timelines: Quality is number one, timeline is number two and cost is number three. Cost is the fixed negotiation which you go through it, once agreed you live with it. Quality is what happens with every single delivery. We evaluate quality by number of defects the software has and look at end to end component of the product. Beyond the code there are other aspects such as documentation, knowledge transfer. That how we measure quality of the software delivered. Regarding timelines, rather than be late and get it right, than on time and get it wrong. That holds true irrespective of where the team is.

Respondent A) India

As part of employee induction program all are well trained on cultural issues. We exchange gifts and magazines etc. to promote good employee relationship.

Respondent B)

Indian culture tends to be agreement oriented, which is not right always. I don't have a plan in resolving cultural issues between Indian and Irish teams, but a philosophy i.e. human are all the same, beyond cultural difficulties and see what is driving them and find out the root cause. Once we can find the root cause, we can deal with it.

Evaluation of offshore team work: For us it is all about ISO, we have got contract, estimates, schedule and we evaluate against what originally planned, we have lot dedicated metrics and milestones, if they meet them they meet and otherwise they don't. Short term consequences would be to put them in training and give them advice whoever had caused them. Longer term consequence less investment in the Indian site. Business is the same for both Indian and Irish sites.

Respondent C)

I do not believe cultural issues play a role but cultural differences can often play a role.

Evaluation of offshore team work: It is judged on a number of factors but mostly – are we getting the same level & quality of work from our off-shore team as we would get with on-shore team. Cost saving is obviously a consideration for us, but this is balanced with questions such as – is it the right thing for the project? Do the team need to be co-located? Do we need more hours of coverage to get the project completed?

Data analysis: Culture has been recognised as an important element in the success of team collaboration. Respondents felt that, efforts are being constantly made to reduce the cultural barrier and at the same time to increase the cooperation between distributed teams. Employees in an organisation operate under company culture, which no one can escape from following whether they are in Ireland or in India. Indian culture has been recognised as agreement oriented and may not be right always, because it might cause over expectations and then loss of confidence.

Chapter 5

Conclusion and Recommendations

5. Conclusion and Recommendations

This chapter contains the conclusion and the recommendations regarding the findings of this study. The purpose of this study is to summarise the theoretical implications that are deduced from the combination of literature review and qualitative findings in relation to the research questions.

5.1 Conclusion

Multinational companies which have bases in Ireland and India involve in developing software products/applications for their internal consumption. Effective collaboration between Irish and Indian sites ensures that, software products developed are of high quality. There is a strong belief that software applications can significantly improve existing standards, procedures and processes, thereby increasing efficiency and effectiveness of the organisation. This suggests that software products such as WebEx, Skype and collaboration tools should enable organisation to work smarter and not harder.

The objective of this research was to gain a better understanding of collaboration process between Irish and Indian sites of MNC's and examine its influence on developing high quality products within budget and on time. Through this dissertation document an effort is made to present a better understanding of collaboration processes in distributed software development.

5.1.1 Collaboration process and its occurrence in DSD

Teams and individuals either co-located or distributed, but when it comes to successful collaboration, communication is the key. It has been found through interviews with respondents that, communication happens all the time between distributed teams and there is no other alternative to this. According to Lanubile, F., (2009, p.174) “*Software development is an intense collaborative process where success depends on the ability to create, share and integrate information*”. For collaboration to occur there should be a planned process at higher levels which will facilitate constant interaction between distributed teams and individuals through various communication mediums/tools. Communicating with remote teams should be structured and planned in advance. Rich

communication helps in sharing and integrating information. It is a well-known fact that, following ISO processes and procedures would help in standardising the formal and informal communications. It is very important to make sure that the occurrence of collaboration must be a planned process rather than an unstructured unplanned process.

5.1.2 Collaboration processes

Organisations have to plan various aspects of collaboration such as communication, coordination and control in a structured manner and implement them strictly to foster collaboration between teams and individuals separated by geography. A better coordination in project and team activities help in reducing errors, misunderstandings and so improve productivity of software developers. Management must have an overall control to have a better visibility on team activities. All of the organisations participated in the research are rigorously trying to promote collaboration by implementing various processes needed to achieve effective collaboration. However there are weaknesses in collaboration process in some participated organisations such as deficiencies in using collaboration tools.

5.1.3 Communication mediums and or tools in collaboration process

Organisations use different types of communication mediums such as email systems, videoconferencing, Instant and chat tools, WebEx and tools specific to collaboration such as IBM Rational solution for Collaborative Lifecycle Management. Using better tools reduce barriers in communication and enhance productivity among teams. Organisation participated in the research are using some of the above said tools. Some organisations still lack the key collaboration tools. Both synchronous and asynchronous mediums help in boosting distributed team interactions with each having their own advantages and disadvantages. However choosing a proper medium for proper occasion is an important aspect in collaboration. Collaboration tools available in the open market are convenient and helpful in promoting teamwork and collaboration.

5.1.4 Management role in collaboration

Managerial role in facilitating and encouraging collaboration practices is pivotal. It is the responsibility of the managers to oversee how people are being connected, how they are being coordinated and how to control their activities. It has found during interviews that, sincere efforts are being made to facilitate and encourage communication between teams. Collaboration is defined as four practices related to agreeing, allocating, and planning goals, objectives, and tasks among distributed teams (Noll J. et al. 2010, p. 67). Therefore manager also plays an important role in collaboration by facilitating, coordinating and controlling teams and individuals who are engaged in distributed software development. It should be the primary goal of the management to remove any barriers that would potentially stop or reduce communication between teams at dispersed locations. Dispersed teams have to be motivated and encouraged to engage in constant communication, their activities have to be coordinated and controlled effectively.

5.1.5 Collaboration benefits for Distributed Software development (DSD)

Collaboration benefits distributed software development in many ways. For example it enhances developer productivity by sharing and exchanging information among peers and ultimate results in delivering better products. There is an opportunity for the participating teams to understand what the other side is looking for, through collaborating effort, and supply that information by using communication mediums. Knowledge transfer is the other benefit which can be explored for overall success of the project. Interviews conducted with managers and teams members at various companies as part of this research proves that, benefits are abound when distributed teams collaborate.

5.1.6 The role of cultural differences on collaboration process

Cultural distance and or differences between sites might hinder proper collaboration, if not addressed properly. Many of the organisation participated in this research have understood various implications that might arise when not culturally involved. They

expressed their willingness to participate to address cultural issues and take on board culture as an important aspect in team collaboration.

5.1.6 Limitation of the research

This study has found many interesting facts in respect to the process of collaboration between Irish and Indian sites. However it is necessary to talk about few limitations of the conducted study.

This study is mainly focused on Irish software development centres of multinational companies and their counterpart captive development centres at India and so limited by this context. Though some multinational companies have captive centres at multiple geographical locations apart from Irish centre, this situation is not explored due to focused nature of this study (Irish and Indian context). Other limitation could be the level of bias that might influence decisions made during interview process. For example preference given to some participants or not showing adequate interest in interpreting some data collected. But researcher was committed and tried to be impartial while taking notes of interviews and also at the time of interpreting those interview.

The researcher had been taking every possible precaution in taking down the responses precisely and accurately through the interview process. With regard to these many limitations of this study there could be a limitation in extending the literature in relation to collaboration process in distributed software development.

5.2 Recommendations

This dissertation study is based on limited population of samples, and outcome of interview conducted with them. Researcher believes that, population size of two companies is not sufficient and a large amount of data can't be generated through these interviews. So, conducting interviews at more than two companies to generate sufficient data is recommended. Researcher has interviewed managers from three companies in Ireland as a result more than required amount of data has been generated.

The generated data has been analysed to arrive to study conclusions as given in the foregoing paragraph. All of those companies involved in this study has been practicing and participating in the collaboration process up to some extent. Although there are some deficiencies in either using the suitable communication tools or in the plans and procedures, nonetheless there is a genuine progress in collaboration process. It has been found that much of the progress made through efforts which are conducive to the collaboration between distributed teams.

It had been noticed that none of the participating companies use any type of collaboration software tools. So, it is sensible to recommend to these companies to buy and use collaboration tools available in the market, which would surely enhance their collaboration efforts. One of the companies interviewed has been following ISO process and procedures, but aware of the truth that, those ISO processes doesn't guarantee any success in achieving better collaboration, but only a means to achieve it.

Management efforts in nurturing collaboration at both the participants work environments is laudable, however still there is a lot scope to step up the processes. So, it is recommended that senior management has to deeply involve and seriously consider and implement various schemes to encourage employees to communicate, share and transfer information. Therefore it is the responsibility of senior managers to practice and promote collaboration with their peers at India site. Employees of both Irish and Indian teams have been travelling to each other locations to have face to face interaction and to know each other better the frequency of travel that is involved is constrained by available

budget. Therefore it is sensible to have sufficient amount budget allocated towards personnel travel based on cost Vs benefit.

Cultural difference should not become an impediment for smooth operations of the offshore centres. It has been noticed through interviews that, both of the participating companies have serious policies to overcome cultural differences between distributed sites and actively encourage unity in diversity among employees.

Chapter 6

Reflection on Learning

6. Reflection on Learning

Develop a passion for learning. If you do, you will never cease to grow.

(Anthony J.D'Angelo)

“I hear and I forget, I see and I remember, I do and I understand.” Confucius

Kolb (1984) believe that *“the learning process must be re-imbued with texture and feeling of human experiences shared and interpreted through dialogue with one another”*.

For example a person can learn from his past mistakes by practicing to overcome those mistakes and eventually can become better in the future.

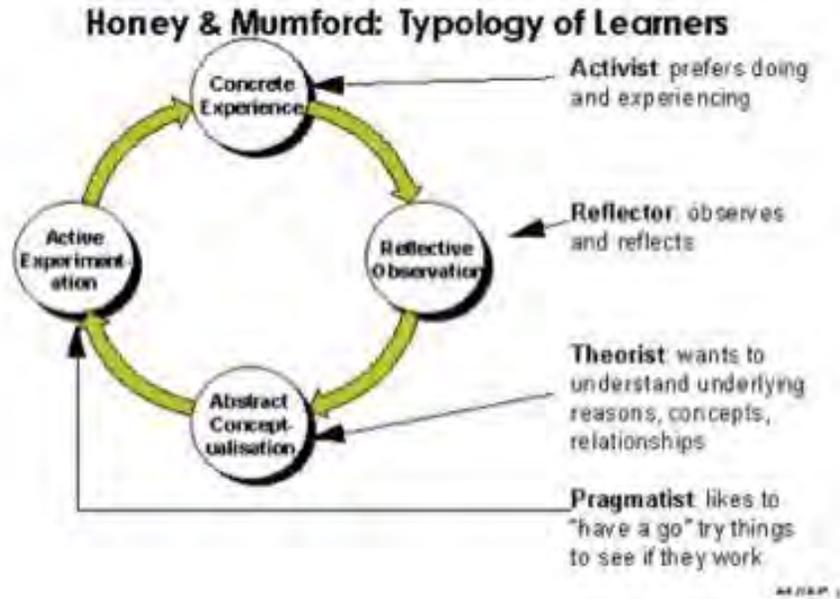
This chapter primarily focuses on learning experience in relation to this dissertation process. Further this chapter also explains the process of having an experience, reviewing the experience, concluding from the experience and planning how to use the learning gained during that experience. As a start various learning styles are discussed which can employed to achieve the above outcome. Fielding (1994, p. 393-419) states that *“An understanding of learning styles is a necessary component in the ground work of an emancipator pedagogy”*.

6.1 Learning Styles

Each person is different in his/her learning style and so, my own learning style. Some people change their learning style over time due to circumstances and/or other influences. Learning style significantly influences a person's knowledge acquisition and utilisation. Learning is a process whereby knowledge is created through the transformation of experience (Kolb, A.D. 1984, p. 38).

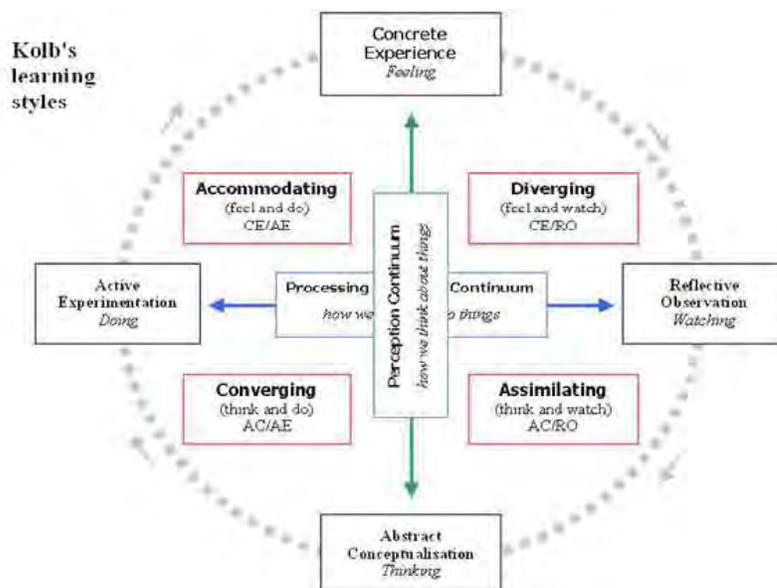
According to David Kolb (1984) the four combinations of perceiving and processing determine the four learning styles. He further explains that the learning cycle involves four processes that must be present for learning to occur. Peter Honey and Allan Mumford developed their own version of learning styles based upon working done by David Kolb.

6.1.1 Honey and Mumford: Learning cycle



6.1.2 Four learning cycles of David Kolb's

The most widely used learning theory is Kolb's experiential learning cycle. In this model Kolb tries to explain learning approaches in cyclical fashion. Every individual has to go through this cycle to acquire knowledge. Below section explains each approach in detail.



6.1.2 Divergers (concrete experience/reflective observer)

Divergers take experiences and think deeply about them, thus diverging from a single experience to multiple possibilities in terms of what this might mean. They like to ask ‘why’, and will start from detail to constructively work up to the big picture. They enjoy participating and working with others but they like a calm ship and fret over conflicts. They are generally influenced by other people and like to receive constructive feedback. They like to learn via logical instruction or handle-one exploration with conversation that lead to discovery.

6.1.3 Assimilators (reflective observer /abstract conceptualizer)

Assimilators have the most cognitive approach, preferring to think than to act. They ask ‘what is there I can know?’ and like organized and structured understanding. They prefer lectures for learning, with demonstrations where possible, and will respect the knowledge of experts. They will also learn through conversations that takes a logical and thoughtful approach. They often have a strong control need and prefer the clean and simple predictability of internal models to external messiness. The best way to teach an assimilator is with lectures that start from high-level concepts and work down to the detail. Give them regarding material, especially academic stuff and they will gobble it down. Do not teach through play with them as they like to stay serious.

6.1.4 Convergers (abstract conceptualization/active experimenter)

Convergers think about things and then try out their ideas to see if they work in practice. They like to ask ‘how’ about a situation, understanding how things work in practice. They like facts and will seek to make things efficient by making small and careful changes. They prefer to work by themselves, thinking carefully and acting independently. They learn through interaction and computer-based learning is more effective with them than other methods.

6.1.5 Accommodators (active experimenter/concrete experience)

Accommodators have the most hands-on approach, with a strong preference for doing rather than thinking. They like to ask ‘what if?’ and ‘why not?’ to support their action-first approach. They do not like routine and will take creative risks to see what happens. They like to explore complexity by direct interaction and learn better by themselves than with other people. As might be expected, they like more hands-on and practical learning and less of lectures.

6.2 Self-assessment

After studying attributes of the above learning styles I realize that my learning style is that of an activist (Accommodators). Some of the major events in my life confirmed this notion.

I did my BSc in Biology and Chemistry from Sri Venkateswara University, Andhra Pradesh, India. This program has enhanced my technical knowledge and problem solving skills. I later migrated to Bangalore in search of a job. In those days Bangalore was booming in the Information Technology (IT) sector and also was being called as an IT capital of India. So, I decided to go back to College to study computer programming to get a chance to step into more lucrative field of IT, which I did promptly. This is to confirm that I have many activist tendencies. Though basic education was in natural sciences, but I ended up working in the Information Technology field, since it was easy to get a decent job in the IT in those days.

I started my career as a Junior Programmer working on computer package like Dbase and writing code in Cobol etc., programming languages. While working as a Programmer for a cement manufacturer, I had learned to think logically and critically by exploring company business documents. I also learned how to analyse problems thoroughly, finding out suitable solutions. Documentation is one of the required skills, which I developed over time. Within 3 years, I had been promoted as a Senior Programmer. I had been continuously looking out for changes in the IT field and upgraded myself accordingly.

After working for 6 Years in the I.T field in Bangalore, I had been given an opportunity by an Irish IT company to migrate to Ireland in 1997, which I embraced with much enthusiasm, since I am an activist. Since then, I have been working in Ireland for various companies and gained tremendous experience in the field of IT as a technology specialist. My career progression was very slow in Ireland due to my concentration on technology alone, which I hope would change after successful completion of my MBA course. This again proves my inclination towards exploration and risk taking.

6.4 My Dissertation experience

This section discusses the process involved in selecting the above dissertation topic, finding relevant academic resources related to the topic, formulation of dissertation in terms of usefulness of sources selected.

6.4.1 Efforts made in selecting dissertation topics

Researcher went through potential dissertation topics which are of interest to him. Areas selected were IT, Project Management and Retail industry related. However finally selected the most interesting, current and important topic (in relation to researcher's area of work and also in respect to Ireland and India IT Industry) from all of them i.e. collaboration process for software development. Following is the description of efforts made in consulting various DBS and other library sources, internet and print sources to obtain required information in relation to this dissertation topic.

6.4.2 Efforts in finding academic sources

Consulted Dublin Business School's digital database library sources (EBSCO, Emerald & Dawsonera) and subscribed to individual membership of ACM direct online library, and also various libraries of UCD, DUC and Trinity College. Key words that were used for the collection of secondary data were "Collaboration", "Communication", "Coordination", "Control", "Software Development", "Multinational", "Distribute Software Development", "Global Software Development".

My academic writing skill prior to my Dissertation was reasonably good, but improved over time while preparing for my dissertation. I have been studying some books on dissertation writing skills such as ‘How to write essays and dissertation: a guide for English literature students’ and ‘Academic writing for graduate students: essential tasks and skills’. My writing skills have been improved since I started studying these books. I also have studied a book called ‘Secrets for a successful dissertation’ to improve my chances in getting a good grade in dissertation.

While I was involved in my dissertation research, I was not able spend enough quality time with my family, which was very tough on me and my family. I was very conscious and mindful all along my dissertation research process that, doing everything right to get a good grade in my MBA course is highly important. I tried to be self-disciplined and stick to my strict study and research schedules, but was not 100% successful due sad personal circumstances. This summer (2013) was extraordinary and tough on me, I have lost both my father-in-law (Passed away on 5th June) and my father (Passed away on 14th July). These sad events had caused tremendous personal trauma, and contributed to some delays in my dissertation research process. However, support from my wife and children helped me in finishing my dissertation successfully.

6.3 My MBA experience

This following paragraph’s discusses experience gained in studying the MBA (Business Management) course and how it has added value to my knowledge and how this knowledge has been acquired and how it has provided my learning with personal development information and transferrable skills which can be applied in today’s business environment. This section would also reflect on various new competencies developed throughout the completion of the course.

6.3.1 Learning and Skills development in MBA–Business Management course

The MBA in Business Management course has given me knowledge to apply in real work environment and gave a great value addition to my learning base. I fully recognised that, doing MBA alone will not help me in achieving my goals. It is imperative for me to

analyse my strengths and weaknesses, plan and act on overcoming my weaknesses and also use my strengths to my advantage. During my MBA course, I have learned a lot about management in the fields of, business strategy, financial, operations, marketing and human resources management. My cognitive, learning, teamwork and decision making skills have been improving since I started studying MBA course. I have recognised four important skills sets I need to improve on such as Interpersonal, Communication and Presentation, Leadership and Management, and Critical research and investigation skills.

The most important lesson I have learned from my MBA program is that, though I have weaknesses, it is still possible to achieve what I dreamt of doing (earning MBA) with perseverance, rigour and hard work. I also have been learning to overcome my weaknesses with a proper strategy, utilising my strengths to my advantage, and find ways to turn threats into opportunities, and grabbing opportunities as and when they arise.

What I have been noticing since the start of MBA program is that, my self-confidence and willingness to learn have been tremendously increased. My academic writing skills are now much more improved since I joined MBA, and hope that by the time I finish my dissertation I could be in a position to write better business and technical journals. If I look back at my professional career, I can certainly feel that, there is a lack of proper plan and focus on my career growth into management field. Through I was convinced and satisfied with the growth in the technical side of my profession, it will be a great loss for me, if I would not concentrate on developing myself as a manager.

I believe that my evolution from technology specialist to management specialist will depend much on how rigorously I pursue my goals. This course helped me in gaining deep business knowledge and various perspectives on business management by reading a few hundred journals, articles, research papers and books throughout my MBA course.

6.4 Future applications of learning and skills development

I strongly believe that, this MBA course has added value to my knowledge and learning base. I acquired a number of new skills and also developed those I already not so good at. It is important for me to apply this new skills and knowledge in my daily work in order to

gain competitive advantage in climbing the career ladder. I sincerely hope that my new skills and knowledge might help in pursuing further studies to achieve Doctorate in Business Administration.

Having paid careful attention to many seasoned professionals during my MBA course, I realised that, developing those skills in which I am lacking-in is the most important task. Understanding the IT industry landscape and effectively communicating with the industry with new knowledge acquired through MBA course are some of my immediate goals.

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Appendix I – Interview Questions–Irish & Indian Managers

1. Please tell me about your background and how you came to be in this position.
2. What is your role in the company?
3. What is the history of this offshore relationship and your involvement in it?
4. What were the reasons to start captive development centre in India?
5. What kind of work was given to Indian site?
6. How did the relationship grow in terms of size and complexity?
7. How do you manage current relationship? Who is involved on each side?
8. What do you think about co-located Vs Distributed development and which is better in terms of cost, quality, timeliness and convenience

Collaboration

9. Do you collaborate in software development? If so, what does it mean to you?
10. Do you think collaboration process helps in distributed software development?

Collaboration Process

11. *How much collaboration process benefits software development?*
12. *How does collaboration process occurs in a distributed software development environment? Is it a deliberate process or planned*
13. How is it planned in your company – deliberately planned or naturally occurring
14. What kind of planning is involved
15. *What processes exists in DSD in relation to collaboration? Such as Communication, coordination and control, do you focus on them?*

Communication

16. In your day-to-day work, whom do you typically communicate – offshore team?
17. Do you face any challenges in your current way of communicating?
18. Can offshore developers talk directly with your business users?
19. What are the protocols to establish communication within onshore teams?
20. *What kind of communication mediums exists between Irish and Indian sites?*
21. Do you use any collaboration tools?
22. Coordination issues in DSD
23. Control issues in DSD
24. *What role does Management and Teams plays in collaboration?*

25. Is collaboration is needed in DSD or Teamwork is alone sufficient?
26. Do you travel to India to meet your colleagues?
27. How do you deal with temporal (time) differences?
28. Was there a time when onshore developers shared their own opinions about the software development process, business or functional requirements?
29. Were there situations in which you and onshore staff disagreed about the project schedules?
30. How do you resolve conflicts between your teams and India teams?
31. ***How do cultural differences hinder/enhance collaboration process between global teams?***
32. Do you face cultural issues that you feel play a role on the project?
33. How do you address cultural issues?
34. How do you evaluate work of your teams in India in terms of Cost, Quality and Timeliness? And which one is important to you
35. Any other comments?
36. Who else do you think I should talk to at Indian centre?

Appendix II – Interview Questions – For Indian employees

1. Please tell me about your background and how you came to be in this position.
2. What is your role in the company?
3. Tell me about the history and nature of this project?
4. Whom do you typically communicate with in Ireland (colleagues and users)?
5. Do you ever travel to Ireland to meet your colleagues? If so how frequently?
6. What kind of relationship do you have with your onshore colleagues?
7. How do you communicate with onshore teams?
8. What are the protocols to establish communication within onshore teams?
9. What do you think about collaborate in software development? If so, what does it mean to you?
10. How do you think collaboration helps in software development?
11. Do you use any collaboration tools?
12. If so, what are they and do they help in establishing collaboration?
13. What happens if you and onshore team disagree on the functionality of the system, development process and schedules?
14. Would you consider the situation in which your team can follow directions from onshore team an ideal one?
15. Any other comments?

Append III – Information sheet for interviewee

Purpose of the Study: As part of the requirements for MBA (Business Management) at Dublin Business School in association with Liverpool John Moor University, I have to carry out a research study. The study is concerned with the collaboration process between multinational software development centres based in Ireland and in India in the context of global software development

What will the study involve? The study will involve conducting in-depth interviews with employees both at Irish sites and Indian sites, to gather relevant information.

Why have you been asked to take part? You have been asked because you are specifically and generally suitable to provide data for my study.

Do you have to take part? Participation is voluntary. A consent form is provided which the participant needs to be signed. Participant can withdraw from the interview before or during the interview process. Please note that participant also has right to ask me to withdraw any qualitative data provide, within two weeks of participation.

Will your participation in the study be kept confidential? Yes. I can assure you that your identity will be kept anonymous in the dissertation. Any extracts from what you say that are quoted in the dissertation will be entirely anonymous.

What will happen to the information which you give? The data will be kept confidential for the duration of the study. On completion of the dissertation, they will be retained until MBA results are announced and destroyed thereafter.

What will happen to the results? The results will be presented in the dissertation. They will be seen by my supervisor, a second marker and the external examiner. The dissertation may be read by future students on the course. The study may be published in a research journal.

What are the possible disadvantages of taking part? I don't envisage any negative consequences for you in taking part. It is possible that talking about your experience in this way may cause some distress.

What if there is a problem? I will discuss with you how you found the experience and how you are feeling.

Who has reviewed this study? Approval must be given by my course lecturer and supervisor.

Any further queries? If you need any further information, you can contact me: Krishna Sambaturu, 0874144336, ksambaturu@yahoo.com

If you agree to take part in the study, please sign supplied consent form.

Appendix IV: Consent Form to be filled by interviewee

I.....agree to participate in Krishna Sambaturu's research study.

The purpose and nature of the study has been explained to me in writing.

I am participating voluntarily.

I give permission for my interview with [*name*] to be tape-recorded

I understand that I can withdraw from the study, without repercussions, at any time, whether before it starts or while I am participating.

I understand that I can withdraw permission to use the data within two weeks of the interview, in which case the material will be deleted.

I understand that anonymity will be ensured in the write-up by disguising my identity.

I understand that disguised extracts from my interview may be quoted in the thesis and any subsequent publications if I give permission below:

(Please tick one box:)

I agree to quotation/publication of extracts from my interview

I do not agree to quotation/publication of extracts from my interview

Signed _____

Date _____

Appendix V: Confidentiality Agreement – For case Company X.

**Dublin Business School
Company Security Clearance and Confidentiality**

Name: Krishna Mohan Sambaturu (Student No.1669799)
Course: MBA – Business Management

Dissertation Title: **The process of collaboration for Software Development: Case study
from Indian and Irish centres of multinationals.**

**Company Security Clearance
Please initial as appropriate**

1. We agree that the student(s) may undertake a dissertation of the nature indicated above and that he/she/they will be given access to appropriate information sources within our Organisation
2. We agree that copies of the finished project will be made available for assessment by staff of Dublin Business School, Liverpool John Moores University and External examiners.
3. We request that the completed dissertation be treated as confidential and not used for any other purposes other than assessment

Company Name: _____

Person Name: _____

Signed: _____

Position: _____

Date: _____

Date _____