The Impact of Fear on the Operation of Virtual Teams

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Abstract

Distributed software development has become the norm for the software industry today. As a result many organizations are leveraging the expertise of their existing staff by establishing virtual teams. Here we outline the results from three independent case studies undertaken over a period of eight years. The first study considered the operation of virtual teams whose members were situated in two locations in the same country. The second investigated why U.S. and Irish team members who worked very successfully while collocated, experienced serious problems when operating in virtual teams. The third focused on virtual testing teams with members based in Ireland and Malaysia. The Irish staff had extensive experience of having projects offshored to them and were now responsible for offshoring part of their work. The results from each case study highlighted the importance and impact fear played and the consequences this had for the success of the respective strategies.

1. Introduction

In the Information Technology (IT) industry today software development can be truly considered a globally sourced commodity [1]. The rationale articulated for the sustained popularity of this trend includes the advent of the Internet and the availability and utilization of effective and inexpensive global communication tools [2]. In addition one of the main commercial advantages and drivers outlined for the selection of this strategy is that organizations are gaining competitive advantage from the globalization of software development [3, 4] This is mainly ascribed to labor arbitrage, which allows reduced development costs [5, 6]. This is facilitated by the availability in large numbers of well educated and technically competent software engineers in low cost centers in Eastern Europe, India, Latin America and the Far East [7-9]. The logic underpinning this strategy is, that these cost savings and the temporal difference between locations facilitate competitive pricing and reduce time to market thus enabling companies to compete more effectively [10, 11]. As a result organizations can therefore gain, maintain, or increase their market share in the dynamic and ever changing global economy, in which businesses operate today [1, 12].

As many organizations who have implemented a globally distributed software development strategy have discovered, due to the level of complexity involved in software development, outsourcing to other organizations or offshoring to remote divisions is not a straightforward task [5, 13, 14]. Some of the difficulties encountered include understanding requirements and the testing of systems [8] as well as communication, cultural and coordination problems [15, 16]. The primary focus of the research undertaken in the area of Global Software Development (GSD) to date has been on establishing, operating and monitoring outsourced or offshored projects and teams. While these are relevant areas, a key factor to emerge from our research which we present here is the impact that implementing a GSD strategy can have on the managers and engineers whose work is actually outsourced or offshored. Of particular importance is the considerable impact this
can have on the overall success of implementing an effective distributed software development strategy.

The focus of our research has been the operation of virtual software teams with members based in the United States, Ireland, and Malaysia. The results presented here are those which emerged from three independent case studies which were undertaken over an eight year period. Our selection of the operation of virtual teams as the basis for each investigation included their vulnerability to the full impact of all the factors which have a direct bearing on geographically distributed software development. Virtual teams were therefore considered the most relevant subjects to study when researching national and globally distributed software development. In this context our findings can be considered relevant to the wider area of GSD which includes other types of offshoring and outsourcing and not solely virtual team operation [17].

The three case studies we present here are classified under the GSD strategy headings outlined by Hayes [12]:

1. Local offsite software development
   Virtual team members were both part of the same organization and were dispersed between two locations one hundred and fifty miles apart in Ireland.

2. Offshore / nearshore software development
   Virtual team members were located in the United States and Ireland. The project was a partnership between a US based financial organization and the Irish division of a US multinational organization. The sites were geographically distant, but they were considered linguistically and culturally nearshore [18].

3. Offshore software testing
   Virtual team members were geographically, linguistically and culturally distant, with members in Ireland and Malaysia. Both sites were part of the same US multinational organization. The Irish division had been the recipient of offshored projects from their US based parent for the previous twenty years and they were now responsible for offshoring part of their work to Malaysia.

2. Research Methodologies

In both the local offsite and offshore / nearshore virtual team case studies the action research five-phase cyclical process based approach as defined by Susman and Evered [19] and Baskerville [20] were employed. Action research entails the analysis of the direct intervention of the researcher [21]. This methodology was selected as the most appropriate for both case studies as one of the authors held the position of software quality manager with the organization in which the local offsite case study was undertaken. There were similar circumstances in the second case study where one of the authors held a management role with the Irish based division of the US multinational. The objective in both case studies was to leverage the research opportunities which this provided while maintaining the required level of objectivity of both researchers.

The third case study (offshore testing) required a different approach and research methodology. When this study was undertaken both authors were fulltime researchers and were offered the opportunity to undertake extensive on site research. The objective was therefore to maximize the opportunities which this level of access provided.

The requirement for a qualitative, structured, but inductive approach resulted in the selection of a Yin [22] based embedded case study which incorporated a Strauss and Corbin grounded theory [23] based inductive approach to data gathering and analysis.

2.1 Action Research

Action research is a variant of quasi-experiment research. The primary difference between action research and other forms of research is the collaborative nature of the relationship between the ‘client’ (the organization where the research is undertaken) and the researcher. Agreement between both is required at each milestone of the project. “Contracting in action research is generally described as psychological, as motives, goals and the locus of control, as well as business arrangements, are carefully discussed and agreed” [21]. The necessary collaboration ensures acceptance of the definition of the problems and solutions proposed.

Action research consists of a five-phase cyclical process based approach as defined by Susman and Evered [24] and outlined in [25, 26]. The five-phases are executed within the boundaries of the client system infrastructure and are as follows:

- Diagnosing
- Action Planning
- Action Taking
- Evaluation
- Specify Learning

The first task when implementing this approach is the establishment of the client-system infrastructure.
This is the collaborative agreement reached between the ‘client’ and the researcher which defines the boundaries of the research area. The diagnosing phase is where the primary issues, problems and reasons for change are collaboratively defined. In the action planning phase the activities required to bring about that change are collaboratively planned. This is followed by the action taking phase where the planned actions are carried out. A collaborative evaluation is undertaken and the effectiveness of the actions employed and their outcomes are considered and appraised. This includes preparation for additional iterations of the action research cycle if and when it is deemed necessary. This is followed by the specifying learning phase, where the lessons learned from the activities as a whole are directed to the ‘client’. The ‘client’ may utilize this information to amend their organizational norms to reflect this knowledge, or to assist with further improvements. It is also utilized by the researcher as part of the research program where it is used to evaluate and validate the research carried out.

The implementation of participatory action research [26, 27] was of particular value. The bounded results based iterative approach afforded by the implementation of the action research strategy provided effective results for both the first and second independent case studies.

2.2 Yin Based Case Study

A Yin based case study is normally considered a positivist qualitative research approach [28]. Therefore its choice as a suitable selection for the third case study was only made when it was evident that it could be legitimately implemented utilising an exploratory and inductive data gathering and analysis strategy.

All empirical studies have an implicit or explicit research design. Yin (1994) defines research design as “an action plan for getting from here to there”. The term here is defined as the initial research questions and there as the conclusions reached. Central to the design of an efficient research plan is the need to put structures in place to ensure that the research remains focused on its fundamental goals and objectives. The focus of this case study was that it should be carried out in an ideographic manner, which embarked on an exploratory journey of discovery that remained bounded in its relevant context while not being constrained by it.

When developing a research design for undertaking case study based research Yin [22] identifies five relevant components that should be addressed:

- The study’s questions.
- Its propositions, if any.
- The unit(s) of analysis.
- The logic linking the data to the propositions and
- The criteria for interpreting the findings.

These were utilised as the basis for our research design. Of particular relevance was the identification of the propositions.

Each proposition is defined as a mechanism for directing the researcher’s attention to specific areas that should be focused on within the scope of the study. This approach allows the researcher to develop theories prior to undertaking the research as to what the possible outcomes of the investigation might be. Given the exploratory nature of the approach implemented in the third case study it was clear propositions were not applicable. Yin does recognize that when undertaking exploratory case study based research there is a legitimate reason for not having propositions and states:

“At the same time some studies may have a legitimate reason for not having any propositions... in which a topic is a subject of ‘exploration’”.

We needed to consider what would determine the success of this investigation. As a result the purpose and overall objectives of the research needed to be focused on and success determined by the achievement of these objectives [22]. This approach was not pre-emptive as to what our findings might be. Rather it was broad enough to consider what could constitute success.

Similarly, the logic linking the data to the propositions and the criteria for interpreting the findings, are related. Both components are linked to the data analysis stage of the case study. As a result of the exploratory nature of the strategy implemented in this investigation, the findings had to emerge from the data. Rather then linking the emergent data to the propositions there was a requirement to link the data to the overall purpose and objectives of the research.

The research design was utilised as the basis for the development of a simple case study protocol. The protocol provided an overview of the research objectives. It identified the sources of data and briefly outlined the procedure for gathering information. It detailed the research questions as defined in the research design and also outlined the proposed analysis method. Yin (1994) states that a research
protocol increases the reliability of case study based investigation and should be used as a guide to undertaking this type of research. This was presented and agreed with the management of the organisation where this research was undertaken.

2.3 Data Gathering and Analysis – Grounded Theory

To cater for the exploratory aspects of this investigation grounded theory was selected as the most appropriate strategy for data collection and analysis. Grounded theory has evolved into two separate approaches to theory building, which have been defined as the simplistic inductive and sophisticated models [29]. Each approach reflects the divergent views of the originators Barney Glaser and Anselm Strauss, while both remain based on their joint work [30]. Strauss’ evolved approach to grounded theory initially appeared in Strauss and Corbin [31]. Glaser’s disagreement with and hostile response to this work is presented in [32] where he outlines his views and the differences between the two methods.

Glaser championed what is termed the simplistic grounded theory approach, which is to undertake research with as little predetermined ideas as possible [29]. Glaser (1992) states “the dictum in grounded theory research is: There is a need not to review any of the literature in the substantive area under study”. Glaser goes on to state, “Qualitative research cannot produce a grounded theory. It produces a forced, preconceived, full conceptual description”. Glaser’s view is that the approach to grounded theory outlined by Strauss and Corbin [31] as the “preconceived forcing of data” [32].

In Strauss and Corbin’s sophisticated grounded theory model it is recognised that the researcher can bring a considerable background in professional and disciplinary literature to a research project [23]. This acknowledges the role of pre-existing theory (background knowledge and the literature) to ‘sensitising’ the researcher to address specific questions and issues. It is very important to stress that this is not hypothesis formulation and testing. Ezzy [29] highlights this point by quoting [33] “Consistent with the logic of grounded theory, this study did not begin with any explicit hypothesis testing. Instead we began with broad sensitizing questions.”

There is a distinct difference between sensitising and theorising questions. Of equal importance in implementing a grounded theory based strategy pre-existing knowledge of the literature and the subject must not be allowed to constrain what is identified [23, 29].

The primary goal in implementing a grounded theory based strategy was to approach this investigation with as open a mind as possible. The researchers had prior professional experience in virtual team operation and knowledge of the literature. This research was required to facilitate the generation of theories grounded in the data produced. Therefore it was necessary to develop and implement the key characteristics of a sophisticated grounded theorist as outlined by [23]:

- The ability to step back and critically analyze situations.
- The ability to recognize the tendency toward bias.
- The ability to think abstractly.
- The ability to be flexible and open to helpful criticism.
- Sensitivity to the work and actions of respondents.
- A sense of absorption and devotion to the work process.

Data analysis in grounded theory terms is characterized by microanalysis which is a line-by-line review of data. This is undertaken with the objective of identifying initial concepts and defining their properties and dimensions. It is also utilized to identify relationships between these concepts.

A key element of microanalysis is coding. Coding is defined as the process by which data is fractured, conceptualized and integrated to form theory [23]. The objective is to define, through questioning and theoretical comparison, the concepts and categories within the data and to determine their properties and dimensions. The overall goal is to gain a better understanding of the data through a combination of open and axial coding.

Open coding is used to uncover, name and develop concepts and categories within the data. This process is termed conceptualizing. A concept is defined as significant phenomena in the data, which has been identified and labeled as such. It could be an activity, event, happening, experience, attitude, reactions and/or outlook. Each has recognizable characteristics and dimensions, which allow it to be abstractly defined and coded as. In this manner data is broken down into discrete categories based on similarities and differences.

Axial coding is a method to add depth and structure to the categories that have been identified in the data. This can provide insight into the structures that created the circumstances which facilitate the
existence of such categories. It allows the identification of activities and interactions that are related to and / or a result of the phenomena identified. The objective is to reassemble the data in a meaningful way to gain a better understanding of the phenomena and their internal and external relationships. Open coding and axial coding are not necessarily sequential events. Rather, they can be iterative activities which require numerous re-evaluations of the data as the analysis continues.

The practice of writing memos is a key element in the open and axial iterative coding process. In the context of Grounded Theory a memo is defined as:

“The researcher’s record of analysis, thoughts interpretations and directions for further data collection” [23].

In the context of the third case study the results which emerged from the analysis of the data were triangulated with the existing research in the areas of virtual team operation, GSD, Software Process Improvement (SPI), project management practice and relevant aspects of organizational theory.

3. Findings from the Case Studies

Over a period of eight years the three case studies on which this research was based were independently undertaken. The only thread that linked the motivation for each study was a desire to discover what was actually going on and what factors, both positive and negative, impacted on the distributed software development strategy which was being researched. In each case once this had been achieved the objective was to determine how that information could be leveraged to improve the operation of the respective virtual teams.

One case study was an Irish based software company and the other two were divisions of US multinational organizations with software development operations in Ireland. Ireland has developed over the last twenty years from a country with a relatively small software development industry [34] to what has been described in 2003 as one of the big three locations for global software development [35]. Ireland due to its sustained economic success and increasing costs is no longer perceived as a location for low cost software development. While it continues to maintain its level of multinational investment [36] and economic growth, the focus has shifted to research and development and more technical and high-end value related software activities. As a result software development is now being outsourced from both indigenous Irish companies and multinational organizations based in Ireland to more cost effective development locations.

This development has provided us with the opportunity in the third case study to carry out research in the situation where work had previously been offshored to an organization in Ireland who were now offshoring part of their work to Malaysia. A very pertinent question when undertaking this aspect of the research was whether the experience of having been the recipients of these types of projects, would provide any specific insight or effective approaches when the same managers and staff were responsible for offshoring part of their work?

3.1 Local Offsite Development

The objective of the first case study was to investigate the operation and consequent failure of a local offsite [12] virtual software development team strategy. This strategy had been implemented subsequent to the takeover by a large Irish owned software organization Irish Computing Solutions (a pseudonym) of a small software company based in Dublin (the capital). The company, which had been acquired, had a proven track record in a niche software market in the financial and telecommunication sectors. Having experienced some initial problems after the acquisition these issues were promptly identified and addressed. As a result the operation was successfully managed for two years and integrated into Irish Computing Solutions. At that juncture it was decided that a new strategy would be implemented which was to expand and develop the organization’s market share by the establishment of local offsite virtual development teams. Irish Computing Solutions had a software development center located one hundred and fifty miles from Dublin which had lower labor cost than the capital. The objective was to leverage both locations and capitalize on the cost advantage which this strategy offered.

A group of twelve offsite engineers were selected and they were provided with basic training in the technology and process required. Two virtual teams were established and consisted of two sets of six offsite engineers who were partnered with three experienced onsite engineers. Considerable effort was put into providing the communication infrastructure, process and support for both virtual teams. A key objective of this approach was that the onsite engineers would
mentor the inexperienced offsite staff and provide effective knowledge transfer. In reality this did not take place. The experience of the offsite engineers can best be summed up in the following quote: “The onsite engineers won’t tell us anything they won’t even return our calls”. This took place even though a number of different management strategies were implemented to facilitate communication and cooperation between team members at both locations. Given these circumstances within a period of six months the strategy had to be abandoned due to its total failure.

During the initial iteration of the action research cycle a number of key factors, which ultimately led to the failure of the local offsite strategy were identified. These included communication, cooperation, knowledge transfer and motivational problems, but the extent and seriousness of these issues was not obvious. As stated measures were taken to try to address these issues, but they had very limited success. It emerged later that during this phase of the research project there was reluctance on the part of the offsite engineers to provide full information about what was actually going on and how they were being treated. This only came to light when the project was abandoned and further iterations of the action research cycle were undertaken.

At that stage it was noted the cost advantage the offsite engineers offered had been frequently highlighted by management. This was in contrast to the often mentioned requirement for the onsite engineers to be more productive and value adding to justify their higher salaries. As an onsite engineer stated “Do you think we are just going to tell those guys [the offsite engineers] everything so they can fire us?” In these circumstances it was not surprising to discover a significant finding was the level of fear the implementation of this strategy had generated. In particular the negative impact this had on the motivation of the onsite engineers who were directly responsible for sending the work offsite and supporting the effort.

It also became clear this directly impacted on the other factors identified. The failure of management to recognize this fact had a direct impact on the operation of the virtual teams and ultimately contributed to the overall failure of the strategy. It is relevant to note the full extent of the level of non-cooperation and the severity of the communication problems between the offsite and onsite engineers did not clearly emerge until the later iterations of the action research cycle. The organization documented these findings and utilized them to help implement other distributed development projects.

3.2 Offshore / Nearshore development

The second case study focused on what was termed offshore / nearshore software development [12]. The concept of offshore / nearshore was derived from the fact that the research centered on a partnership between a US based financial organization Stock Exchange Trading Inc. and an Irish division of a US multinational company Software Future Technologies (both pseudonyms). This resulted in the establishment of virtual teams to develop and maintain bespoke financial software. Ireland though geographically offshore, is often considered near shore, because of its linguistic and cultural similarities to the US [12, 35].

Stock Exchange Trading Inc. was the senior partner in this relationship and had an on going requirement for the development and maintenance of bespoke financial software. Previously all their software development and maintenance activities were carried out in-house in the US. As a result of continued expansion the organization identified an increasing demand for software development and maintenance. They also came to the conclusion that their in-house Information Technology (IT) strategy had become too expensive.

The solution was to find an efficient alternative, which would leverage the experience of their existing IT department while maintaining the level of quality and support required at a cost effective price. Stock Exchange Trading Inc. had previously successfully outsourced their Y2K legacy renovation to an Irish based division of Software Future Technologies. The possibility of expanding this relationship was identified and explored. After extensive negotiations a four-year contract was agreed. The terms of which outlined that both companies would partner and establish virtual teams to undertake the development and maintenance of all Stock Exchange Trading’s software applications.

After the initial selection of the Irish based team members, orientation and training was provided. Within a short period there was an unexpected demand, which required seventy percent of the Irish team members to spend six to twelve months working onsite in the US in Stock Exchange Trading Inc. This was an unplanned emergency strategy and arose from the need for the development of complicated bespoke software within a short timeframe following the
winning of a large contract. As the virtual teams were just being established the infrastructure for their operation was not yet in place. Moving as many Irish team members as possible to work on site with their US based team counterparts on a temporary basis was the solution arrived at in these circumstances.

This proved to be a very effective strategy and both groups operated successfully while collocated within what were to eventually become their virtual teams. As an Irish software engineer stated “We all worked so well together when we were on the same team in the US”. Once the urgent projects were completed the Irish team members returned to Ireland. At that stage the full virtual teams were established and work commenced. Initially everything seemed to be going well, but soon serious problems were encountered. The severity of these problems directly impacted productivity and resulted in increased project overruns in time and costs. Within a short period of time this threatened the partnership between both organizations and urgent action had to be taken [37, 38].

An extensive investigation commenced and during the initial iterations of the action research cycle it became clear that people who had worked very successfully together while collocated were now actively obstructing and blaming each other for all the problems that arose. This was a totally unexpected outcome given the level of harmony achieved in the earlier collocated projects. Research has identified distance as being a major factor impacting GSD [7]. Our findings would concur with this view. The results from the initial investigation highlighted communication, cultural and process related problems as major contributing factors. What it did not explain was why these problems should have only arisen when the virtual team members were remotely located.

We undertook further iterations of the action research cycle and motivation and the level of fear experienced by Stock Exchange Trading’s virtual team members were identified as a major contributing factor to the problems experienced. It emerged that while the majority of the teams were collocated in the US the American team members did not comprehend the full implications of the virtual team strategy. Once the virtual teams were established the possible impact on their day-to-day work, promotion and future employment prospects became clear. Management reinforced these negative aspects by utilizing the strategy to justify maintaining salaries at their existing levels. They also stressed the additional cost of US based staff and the need for them to be value adding to justify the extra expense. As an American software engineer stated: “We are so sick of hearing how little those Irish guys cost. We really have to wonder have we a future in this business”.

The outcome of this approach was unmotivated individuals who feared the loss of their jobs. This manifested itself in a lack of cooperation, alienation and on occasions outright obstruction when and where the opportunity arose. This was met with a similar negative reaction from the Irish team members who did not understand why they were the recipients of such hostile treatment from people who they had previously successfully worked with. Fear and the impact it had on motivating those located in the organization from which the work was outsourced was identified as a major contributing factor to the problems experienced. The substantial negative contribution this made to the other factors the research identified was also recognized.

Once this important issue was realized steps were taken to make it clear that there was no threat to the future of the US based IT staff as a result of working with their Irish virtual team colleagues. Indeed the partnership provided long term job security as it facilitated software maintenance and development at a competitive price and to the required level of quality by leveraging the advantages offered by both locations. In reality the only threat to job security was presented by the failure of the virtual team strategy. If that happened the only viable alternative was to outsource the whole operation to Eastern Europe, the Far East or Latin America. The recognition of this along with the introduction of a comprehensive communication policy, cultural training, upskilling and inclusive approach to process improvement led to the establishment of a productive working environment between locations [37].

This facilitated the successful completion of the contract. The iterative nature of the action research cycle was of particular benefit in identifying and addressing the relevant issues which this research highlighted. While it was agreed by both parties that the virtual team strategy had eventually operated successfully, the contract was not renewed with the Irish based division of Software Future Technologies. In the renegotiations cost proved to be the deciding factor. As outlined earlier Ireland is no longer a low cost location therefore the Irish based organization was unable to compete on price and the contract went to India. It is relevant to note that Stock Exchange Trading Inc. continued to successfully utilize the modified virtual team strategy which this research
made a substantial contribution in developing, with its new outsourcing partner.

3.3 Offshore Software Testing

The third case study focused on offshore virtual team software testing and was undertaken in the Irish division of Computing World International (a pseudonym) a large US multinational operating in Ireland for over twenty years. The Irish based operation had been very successful over that period and had expanded considerably. A large percentage of the work undertaken was in offshored projects from their US parent, therefore, the Irish staff and management were very familiar with having projects offshored to them.

Two years prior to undertaking this research the organization’s corporate strategy changed. At that time they initiated a policy of establishing virtual testing teams with members based in Ireland and Malaysia. The objective of undertaking this strategy was to leverage the technical ability of the Irish based staff with the competitive salary levels of their Malaysian engineers. When this research commenced four virtual testing teams were in operation within the Irish based division. Some teams were established for over a year and a half while others had only been in operation for a number of months. An additional and relevant aspect of this case study was to determine if the experience of the recipients of numerous offshore projects would provide any insight or effective approaches when the same individuals were responsible for offshoring part of their work.

This study centered on two embedded units of analysis. One was a virtual testing team with members located in Ireland and Malaysia which had been in operation for a period of eighteen months. The second was a virtual team with a similar makeup, but had been established for just over six months. Each team specialized in testing specific software for different technologies. As outlined in the methodology section the implementation of a Yin [22] based case study approach allowed the preparations to be undertaken and structures put in place to maximize the opportunity which the high level of onsite access provided. While an inductive sophisticated grounded theory [23] based data collection and analysis process facilitated the identification and emergence of the relevant factors and issues which directly impacted on the activities of the management and staff of both virtual teams.

3.3.1 Data gathering and analysis

As outlined in the methodology section the opportunity to undertake participant observational research was a key aspect of this study. To leverage this opportunity one of the authors spent a period of five months on site in the organization, on a full time basis. In this context the data gathering process incorporated document review, direct observation, interviews, focus groups and questionnaire completion. This was carried out in accordance with sophisticated grounded theory principles. As the data was generated it was analyzed which incorporated microanalysis and open and axial coding and memo writing. These activities resulted in the identification of one hundred and twenty eight initial concepts which with further refinement were incorporated into forty nine intermediate categories. The intermediate categories were further evaluated which resulted in the identification of four key factors which included three high level categories and a central category. The four key factors were broad enough to incorporate the intermediate categories. A graphical representation of the data gathering and analysis process implemented in this case study is presented in figure 1.

![Overview of the Data Gathering and Analysis Process](image)

The three high level categories identified were:
- Project Management
- Communication
- Culture

The central category to emerge from this research was fear. The importance and impact fear had on the operation of the virtual software testing teams...
emerged at an early stage of this investigation. As the study continued this was explored and further evaluated by continued observational research where fear and its negative influence became more clearly discernable. These findings were further reinforced by the analysis of the data from the interviews, questionnaires and focus groups. The identification of fear and its selection as the central category was based on the evidence of the significant impact it had on the operation of the virtual software testing teams. Instances of its effects were numerous and of a substantial and serious nature. While it had significant independent repercussions for the operation of both teams, it also impacted directly on important aspects of the other three high-level categories identified by this investigation [16, 39]

3.3.2 Fear

It emerged from our research that the Irish based team members did not want to directly communicate or have any direct personal contact with their remote colleagues. Even though they had numerous communication tools available they refused to use them and relied excessively on the use of e-mail. As a project manager stated: “I tell them pick up the telephone and call their Malaysian colleagues, they just won’t do it.” They were also expected to mentor and provide training to their remote colleagues. This was despite the limited opportunity for synchronous communication between locations and the fact that the Irish based team members were reluctant to share their knowledge. As an Irish based engineer candidly stated: “I am not going to tell them [their Malaysian colleagues] everything and let them take my job. I am going to hold information back.” This was a significant and serious statement and could have had serious repercussions for the individual involved, but it articulated a commonly held view which our research highlighted.

This all took place in the context of the Irish based management regularly reinforcing the fact that Malaysian engineers were two fifths the cost of a comparable engineer located in Ireland. As they were often heard to say to their staff: “An engineer is two fifths the cost in Malaysia compared to here [Ireland]. Therefore, you must be more value adding”. This practice was being utilized as a method for motivating staff and as a mechanism for trying to increase productivity. The reality was it was totally counterproductive and had the opposite effect.

Corporate management only made the situation worse on their visits to the Irish operation by reinforcing this message. An Irish based engineer stated: “They [corporate management] have always said the Irish operation was a centre of excellence. ‘The work you are doing here is brilliant’. The last two people that have been over have not said that. They said ‘Who knows? I can’t tell you, if it is going to be cheaper to do things elsewhere then that is something we are always going to have to look at.’” The message was clear to the Irish based staff. Up to the implementation of the virtual team strategy the future of the Irish operation was secure. After its implementation its future was uncertain.

While a number of project management related issues needed to be addressed [16], it was clear, that fear was a major problem and it was an issue that the local project managers felt powerless to tackle. As one project manager stated “I am not too sure as an organization we do a very good job of doing that [addressing the fears of jobs being offshored] ... sometimes you need it at the higher level to address those types of concerns.” What was of interest to note in this context was the Irish management continued to reinforce what can be termed the cost and productivity mantras.

The outcome of this situation was that the Irish based staff were genuinely fearful for the future of their jobs. Cost was an issue which they felt they had no control over and that they were powerless to address. In 2004, when the on site aspect of the research was undertaken Ireland was the second most expensive country in the European Union for consumer goods and services [40]. As a team member stated which summed up the views of a large number of the Irish based staff: “The Euro now is killing us”. This sense of helplessness manifested itself in a large number of Irish based staff who were fearful, demotivated, uncommunicative and when and where possible they did not want to cooperate with their Malaysian colleagues.

The results produced by our research indicated that previous experience of having work offshored to the Irish based management and staff had no positive bearing on how they offshored their work in these circumstances. In fact they reacted in exactly the same manner as those who were responsible for offshoring work to them. The only tangible benefit that could be identified from the experience was that it allowed some of those interviewed to understand why their US based colleagues who were responsible for offshoring projects to them had been so rude and unhelpful in the past. As an Irish engineer stated: “but I just think maybe they [his US based
colleagues] have lost a lot of jobs. I can now understand why they would feel so badly treated.”

Given the circumstances of the situation outlined it was not surprising the long term results from the implementation of the virtual team strategy were very poor. The productivity levels achieved were low and delivery dates were only met after considerable amounts of overtime were worked. The projects ran over budget and the quality of the products tested and released had very high density levels of post delivery faults. As a result in one case the organization replaced the product completely by recommending the purchase of a third party application to their customers. Eventually the virtual team strategy was abandoned and the organization reverted to collocated team testing. The outcome of this investigation was presented and discussed in detail with senior management. The salient points were validated and noted, the objective was that the results from this study would be leveraged by the organization as a whole and utilized to amend their existing and future GSD offshoring and outsourcing strategies.

A totally unexpected outcome to emerge from this study was the results generated proved to be very similar to those identified in the previous two case studies [38]. This was despite the fact that this research was carried out in a very different organization than those previously investigated. The problems which were identified were also much more severe [39]. The authors recognized the reason for this difference in severity was due to the extent of the geographical, temporal, cultural, and linguistic differences of the participants. The factors we identified included motivation, lack of trust, teamness communication, coordination, culture, process and project management related issues [16]. While each of these factors had an important impact in their own right, it was recognized that fear had a substantial negative influence on all of them in a number of different ways. This had serious repercussions for the operation of both teams and ultimately on the success of their respective projects.

It is important to state when the data emerged from this study numerous alternative explanations and factors were considered. These were extensively explored, but the inductive nature of our study clearly highlighted the importance and negative impact fear played.

4. Lessons Learned

All the factors we identified in these three very different case studies were relevant, but the level of fear experienced and the impact this had on the motivation of those individuals whose work was offshored or outsourced proved considerable. This was identified as having a direct impact on the overall success of the implementation of all the distributed strategies researched. While the fear of losing jobs on the part of those offshoring and outsourcing their work has been mentioned in the literature [15, 41], the full implications that fear can have on the operation of globally distributed teams has not been given the level of importance that the results from our research indicates it warrants. Specifically, the ongoing level of negative impact it can have with regard to motivation and the desire to work with, trust, cooperate, communicate and share knowledge with remote colleagues in a GSD setting is of particular relevance. As the second case study highlighted even were people have successfully worked together for up to year in a collocated situation, once a virtual team strategy was fully implemented these problems soon came to the fore.

It is important to state that the objectives of the organizations in the three case studies outlined here were not to downsize and migrate their software development or testing operations to low cost locations. Rather it was to utilize the technical ability and experience of their existing staff and leverage it with the cost effective opportunities that utilizing remote centers and personnel provided. What the organizations held in common was a belief that this strategy could be used as a method of maintaining cost at their current levels for existing staff at the outsourcing and offshoring locations. They also believed it could be used as a motivating factor to increase their existing staff’s productivity. The mantras “Engineers are half (or two fifths) the cost in the other location” and “Existing employees must be more productive and value adding to justify their higher salary levels” were frequently expressed. In each case implicit in these statements from the onsite staff’s prospective was the threat that the whole operation could be offshored, or outsourced given the cost advantage offered. As stated this was not the long-term strategy of any of the organizations researched.

The implications of implementing this approach were the management of these organizations only succeeded in creating a level of fear, which proved counterproductive. In the third case study the company recognized there could be negative
repercussions to the extension of their offshoring strategy. In these circumstances they made an ex gratia payment to their existing Irish based staff as compensation for offshoring part of their work. This had the effect of adding to the fears of their existing employees, as they believed if they were being uncompensated they were going to lose something of value. The organization’s management who continued to employ their cost and productivity mantras reinforced this belief. It was clear from the results of our three case studies instead of motivating staff this strategy had the exact opposite effect.

Our research identified fear had a negative influence on motivation which directly impacted communication, cooperation, trust, team building and knowledge transfer. Motivation is a key constituent of any successful operation as it is the driving force in the achievement of goals and objectives in the team setting. This is particularly pertinent for the successful implementation of a distributed software development or testing strategy. Our research highlighted the negative impact fear had on the motivation of those whose work was being sent offsite, outsourced or offshored. In the three unrelated case studies this resulted in low morale, hostility toward remote colleagues which manifested itself in uncooperative and on occasions obstructive and aggressive behavior.

4.1 Communication

Effective communication is an essential element for successful globally distributed software development and testing [10, 13, 42]. Motivation directly impacts on the level, content, effectiveness and use of communication. Individuals have to be motivated to use the tools provided to communicate. When they are used, the level of communication which takes place as a result must be effective. In the first case study (local offsite) the engineers’ part of whose work was to be sent offsite were only motivated to communicate with their offsite colleagues in a very limited manner. As a result communication was kept to a minimum, telephone calls were not returned, on occasions e-mails were not responded to and queries remained unanswered. When direct communication took place the discourse was curt and on occasions aggressive. This resulted in inexperienced team members in an offsite location who lacked the communication, support and knowledge transfer they so badly needed to carry out their projects successfully. Our research identified fear and its impact on the motivation of those, part of whose work was being sent offsite as a key factor in the overall failure of this strategy.

In the second case study (offshore / nearshore), communication was used as a weapon with which to attack remote colleagues. This was primarily achieved thru the misuse of e-mail. This was initiated by the US based team members using e-mail to highlight any minor problems that arose with colleagues in Ireland [43]. The Irish staff responded by adopting a similar negative approach. As a result minor issues, which presented team members at the other location in a negative light, were regularly copied to middle and senior management by staff at both sites. This resulted in issues that should have been resolved within the respective teams being escalated out of proportion. This directly led to the alienation of staff and middle management at both locations on geographical lines. The result was a breakdown in cross-site relationships and effective communication. This very nearly resulted in the collapse of the offshore / nearshore strategy. It is of particular relevance to note these problems arose despite the fact the individuals involved had worked successfully together for over a year when colocated.

In the third case study (offshore testing) the Irish based team members would normally only contact their remote colleagues using e-mail. They were actively encouraged to use the telephone and instant messenger, but they consistently made excuses and refused to do so. The reasons stated for their refusal were they did not know if they were contacting a man or a woman or what order their remote colleagues first names and correct form of address from both sites were they did not know if they were contacting a man or a woman or what order their remote colleagues first names and correct form of address from both sites were in. These issues arose due to their colleagues being located in Malaysia and the cultural differences between sites, which resulted. The question why this should prevent direct contact was not satisfactorily explained. Even though, this particular question was asked on numerous occasions. When the use of the organization’s intranet was suggested as a location where team member’s pictures, names and correct form of address from both sites could be displayed, the Irish staff rejected this suggestion. Clearly they were not motivated to use the range of effective tools provided. When they did communicate it emerged there was a reluctance to provide information to their remote colleagues due to the level of fear they felt at the possibility of losing their jobs to them.

The use of similar cost and productivity mantras as those outlined in the other case studies were identified as key elements responsible for generating and maintaining the level of fear experienced by the Irish
based team members. The negative impact fear had on motivation was identified as a key factor which directly contributed to the communication problems which were experienced. The reality was as a result staff were motivated not to fully utilize the range of communication tools which were provided. It clearly emerged that fear was a direct barrier to effective communication between sites.

4.2 Trust, Cooperation, Team Building and Knowledge Transfer

It is recognized that essential elements required for successful distributed software development include the establishment of trust, successful team building and effective cooperation and knowledge transfer between sites [44]. This point is articulated in the following statement “Trust is pivotal in a global virtual team to reduce the high level of uncertainty endemic to the global and technologically based environment” [45]. The results from the three case studies we have outlined in this paper clearly demonstrate how fear and its influence on motivation directly impacted negatively on trust, team building cooperation and knowledge transfer.

It is very difficult for individuals and groups to trust and build relationships with people who they fear are ultimately going to take their jobs [46]. Even where good relationships existed as in the second case study (offshore / nearshore) they soon broke down under the pressure of this type of fear. The very structure of distributed development facilitates the identification of remote colleagues as a common enemy. Our research confirmed that in the three case studies a clear “them and us” culture existed [47]. The reality was personal relationships between sites did not exist or had seriously broken down. Fear and lack of trust negatively impacted on the building of effective cross-site teams. This resulted in clear examples of not wanting to cooperate and share knowledge with remote colleagues.

5. Conclusion

As we have outlined distributed software development is a reality in the software industry today and its popularity continues to increase. Some organizations are utilizing it to downsize by completely outsourcing or offshoring their software development. Others are leveraging the technical knowledge and experience of their existing staff with the cost benefits provided by remote low cost centers.

In this context a popular strategy is the establishment and operation of virtual teams. Our research has highlighted fear and its impact on motivation, trust, teamness, communication and knowledge transfer as having a direct bearing on the success of implementing this approach. We would stress these are not the only factors that are involved. That stated we believe to date fear and its potential negative impact on the operation of globally distributed software development projects has not received the level of attention that this research indicates it warrants.

The first step in tackling this issue is the recognition that this is a factor which needs to be effectively addressed. In this context there is a requirement for senior management to understand the problems and issues associated with implementing a GSD strategy. This includes the need for the risks associated with fear in this context to be appreciated, including the negative impact it can have on the overall success of GSD projects. Team based software development is not only a technical activity. There are important human and social elements which need to be recognized, considered and specifically addressed. Once this recognition has been achieved effective communication is key. This includes the importance of understanding and clearly articulating the advantages of implementing a GSD strategy for all the participants involved. Fear and its implications should be openly discussed and addressed. The use of productivity and cost mantras need to be avoided as this research has highlighted they are totally counter productive. The importance of positive motivation needs to be understood and leveraged by effective and proactive management.

There is a requirement for procedures to be put in place, which facilitate the establishment and operation of cohesive teams. Training on culture and how to effectively communicate with remote colleagues needs to be provided. Where possible the upskilling of existing staff should be undertaken. This is a clear and tangible indication of the outsourcing or offshoring organization’s commitment to their existing staff. This approach was utilized very successfully to help address some of the problems which were identified in the second case study.

Effective infrastructure which includes a comprehensive communication procedure should be implemented and monitored to insure it is utilized. Success needs to be based on joint (or multi) location performance which facilitates the development and achievement of common goals, objectives and rewards.
across sites. It is essential to recognize the fear of jobs being outsourced or offshored can by its very nature undermine motivation, trust, teamness, communication and knowledge transfer. If this is not addressed it has the potential to directly hinder and prevent the successful accomplishment of geographically distributed team base software development.

6. References


