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Loskutova, Tetyana

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The Influence of Cultural Diversity on the Effectiveness of Virtual Software Development Teams

Tetyana Loskutova

A dissertation submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, in fulfillment of the requirements for the degree of Master of Management

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Abstract

A Virtual Software Development Team (VSDT) is a group team of Information Technology (IT) professionals working together to produce a software product and collaborating remotely with the use of information communication technology. In a VSDT, face-to-face contact is seldom required in order for these teams to fulfil their tasks. VSDTs in the software development business offer advantages compared to co-located teams which include the availability of a global talent pool, lower costs and a global presence. However, many aspects of managing these teams are still undiscovered and under-researched. Among them is the influence of cultural diversity on the work, productivity and sustainability of a VSDT.

The purpose of this research was to define the main factors of the influence of cultural diversity on the effectiveness of a VSDT. The research was undertaken from an interpretive perspective. In agreement with this paradigm, the effectiveness factors were limited to the internal effectiveness of a team as perceived by its members. In order to define the factors of cultural diversity, existing theories of cultural diversity in a co-located workplace were used. I have conducted interviews with software developers, support professionals and their managers to probe the relevance of the existing theories in a virtual software development environment and to find other possible factors.

In this research, a specific 'internet nerd' culture was discovered which exists among the members of the virtual (internet) community. The members of this culture comfortably accept virtual work and share a lot of common context. The findings show the importance of frequent communication, emotional sharing and occasional face-to-face contact in bonding the team, building trust and understanding. From the team management perspective, there is evidence that *agile* methodologies can be used successfully in the virtual environment.

The results of this research are beneficial for businesses looking to implement VSDTs, and can be used as a basis for the development of a theory of cultural diversity in a virtual environment.

Declaration

I, Tetyana Loskutova, declare that this dissertation is my own work except as indicated in the references and acknowledgements. It is submitted in fulfilment of the requirements for the degree of Master of Management in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Tetyana Loskutova

Signed at ……

On the …….. day of …… 20

Dedication

The research is dedicated to all brave souls who embrace the impossible as fun, disregard boundaries, and create a new world and new culture with every minute of their lives In addition, to my virtual friends and colleagues, whose support was invaluable in this research.

Acknowledgements

I want to thank all my contributors first of all – without you there would be no research. Grateful thanks to my previous colleagues, who were the inspiration for this topic and who created the wonderful virtual team of which I was proud to be a part.

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Chapter 1. Introduction

This chapter explains the background of this research, and states the research problem and questions associated with it. It provides definitions of terms used in the research and outlines the limitations of this study.

1.1. Research Problem

Virtual software development teams (VSDT) have become an organic part of the modern IT business environment. Virtual Teams (VT) consist of members working completely or partially remotely – an arrangement providing important benefits to both the company (a reduction in costs) and team members (a flexible and convenient work environment). However, virtual teams impose new challenges on businesses, as many fail to implement adequate management systems, which results in poor quality and inconsistent productivity. Another problem arises when considering distributed global teams, where the problems of remote collaboration are amplified by cultural differences between the team members.

Virtual software development teams represent a relatively new and rapidly growing way of conducting global business (Nyström & Asproth, 2013); virtual teams offer more freedom and job satisfaction to the virtual team members, and allows the employer to obtain better employees (Divol & Fleming, 2012). In response to this, research on different aspects of virtual work has become vigorous (Watson-Manheim, Chudoba, & Crowston, 2012). However, there seems to be a lack of information about real-world businesses operating in a VT mode compared to traditional proximate software development teams. Further research is required to identify the risks and opportunities associated with the work in a VSDT, and to find an effective strategy and toolset to help mitigate VT risks (Beise, 2004; Nedelko, 2007). Previous research on cultural diversity in virtual teams has identified that this diversity can be seen both as an impediment or an advantage (Berg, 2012; Watson-Manheim, et al., 2012). However, no models of cultural diversity in virtual teams have been developed so far: it is thus important to identify the factors which influence the work of a virtual team when cultural diversity is concerned, and suggest how to mitigate these differences and help create a common context amongst the members of a multicultural team working remotely (Chauvet, 2009). In order to suggest an effective management strategy for a multicultural VSDT, it is important to understand how differences in culture affect the work within a team, what advantages and

disadvantages the cultural differences bring, and how cultural differences can be influenced by the managers/team leader.

1.2. Research Purpose

The purpose of this study is to explore the effects of cultural diversity on virtual software development team work and productivity. Previous research (Hall & Whyte, 1960; Hofstede, 2001; Trompenaars, 1996) suggests that the issue of cultural diversity has a significant effect on workspace, negotiation, communication, output quality (Furumo, 2005) and the general quality of life and level of job satisfaction of the team members (Furumo, 2005).

Though well-examined and measured for collocated teams, the issue of cultural diversity remains under-researched for virtual teams (Chauvet, 2009). Many authors have acknowledged the influence of cultural diversity on the work of such teams (Berg, 2012; Chhay & Kleiner, 2013; Nunamaker Jr, Reinig, & Briggs, 2009; Watson-Manheim, et al., 2012), its effects on creating trust (Saonee, Manju, Suprateek, & Kirkeby, 2011) (Nunamaker Jr, et al., 2009) and the potential for creating better outputs (Berg, 2012; Chhay & Kleiner, 2013). However, there is no defined model concerning cultural dimensions.

This research is exploratory. It is focused on determining how the cultural dimensions (Hofstede, 2001; Trompenaars, 1996) influence the work of VSDT and what other factors affect the software development process and are perceived as important by the team members. The research is also an attempt to analyse how these factors influence VSDT work, members' lifestyles, and the quality of the team outputs. It has determined the possible directions for future research by identifying cultural factors and dimensions applicable in a VT environment.

1.3. Research Questions

The research was undertaken using qualitative methods. The following questions established the direction for the research:

1. What challenges do software professionals face when working in a culturally diverse virtual team?

2. What kind of management behaviour do software professionals expect will help mitigate the cultural diversity impact on their work?

3. What kinds of relationships are developed among members of a team with different cultural backgrounds?

4. What kind of cultural adjustments can be suggested for VT members?

1.4. Significance of the Study

This research is expected to contribute to the base of knowledge on virtual teams in general, and virtual teams in software development companies in particular. It collected data on real-world functioning virtual teams. The research data and findings may be beneficial both to the business and the academic world.

Cultural problems pose potential problems for VT (Cascio, 2000). This is a concern for businesses that are cautious of implementing virtual work solutions. Research data collected in this research might help businesses learn from the experiences of existing virtual teams, predict challenges and find strategies to resolve issues. Open-ended interview questions provided rich qualitative data, which gave a better understanding of the realities of VT work and which may be useful for Virtual Team managers. Overall, the data from the research is expected to be useful for developing strategies that will increase the productivity and satisfaction levels in existing or new VSDT.

From an academic point of view, this study contributes to the development of a theory of cultural diversity in a virtual work environment. At present, no such theory has yet been developed (Chauvet, 2009). The data collected in this research is expected to make a valuable contribution: though recent research seems to concentrate on real world virtual teams (Ananth, Nazareth, & Ramamurthy, 2011; Benetytė & Jatuliavičienė, 2013; Cummings, 2011; Divol & Fleming, 2012; Nunamaker Jr, et al., 2009; Nyström & Asproth, 2013; Panteli & Tucker, 2009) more often than on laboratory settings (Aiken, Gu, & Wang, 2013; Berg, 2012), the emergence of theoretical research (Berry, 2011; Chhay & Kleiner, 2013; Hosseini et al., 2013; Wang & Haggerty, 2011; Watson-Manheim, et al., 2012) will benefit from a variety of data on virtual teams. The conclusions of this research provide guidance for future research.

1.5. Delimitations of the Study

This study is an interpretive research and was conducted on twenty present or past members of virtual software development teams. Five teams were identified and described as being part of this study; however, the participants shared some experiences of participating in other virtual teams.

This study does not examine the development of the teams. It is merely a snapshot of participants' opinions. Consequently, the business value in terms of long-term success cannot be confirmed.

Being qualitative research, this study is not intended to find an ultimate, objective 'truth' about cultural diversity and its effects; rather, it presents the author's interpretation of the participants' views and opinions.

This study is not intended to find answers to the problems a VSDT can experience; it does not set any experiments in order to undertake research on the participants in their natural setting with minimum exterior effects.

1.6. Definition of Terms

This section contains definitions used in this research.

1.6.1. Virtual Team

'Virtual Team' (VT) is not uniquely defined, and different authors provide their own interpretations of the meaning of VT. For the sake of clarity, the terms 'Virtual' and 'Team' should be explained separately. 'Team' is usually defined as *a group of individuals working together in order to solve a specific problem or in order to accomplish a specific task.* The main distinguishing feature of a team is the level of interaction of the members, i.e. the amount of communication necessary to complete the team's task (Powell, Piccoli, & Ives, 2004). The term 'virtual' usually refers to *a communication style where most of the communication is conducted with the use of Information Communication Technology (ICT) as opposed to physical face-to-face meetings.*

For the purposes of this study, the following definition was adopted:

A Virtual Team is a team of professionals working partially or completely from geographically separated locations and communicating by means of ICT.

1.6.2. Virtual Software Development Team

A Virtual Software Development Team (VSDT) represents a special type of virtual team. For the purposes of this literature review, VSDT definition is limited to:

- *A team of Information Technology (IT) professionals working in a team to produce a software product*
- *Team members working on a full- or part-time basis from geographically separated locations (whether from another country or a different office or home), using IT communication tools to coordinate their activities*

VSDT are often composed of individuals from different cultural backgrounds. In the VT context, this can mean different social groups, different countries, and different educational and work culture backgrounds combined. VTs are often composed for a short interval of time, just long enough to complete a single project or a special task**.**

1.6.3. Cultural Differences

'Culture' is a broad term. In this research, *culture* and *cultural differences* will be used in the more narrow context of *differences in values and practices that people acquire by living in different countries – national level culture* (Hofstede, Hofstede, & Minkov, 2010). According to Hofstede (Hofstede, et al., 2010), cultural values are attributes of the cultural programming that occurs in the very early stages in life and remains largely unchanged throughout one's life. Other levels of culture are acquired later in life. In this research, I do not concentrate on the absolute measures of culture as attributes of a certain individual within a team. It is argued that the differences on all levels of culture are important, therefore not only is the level of *values* important, so too are the higher levels of practices acquired during adult life. This explains why the research considers people living in different countries as having a different culture as opposed to indigenous nationality.

1.6.4. Agile Definitions

The following definitions are necessary to understand the work processes in the interviewed teams, since several of them used *agile* management methodologies.

Agile is an approach to managing a software development lifecycle, arranged as an iterative process where requirements are adjusted to the customer needs and can be updated with every iteration; the agile process helps with customer interaction and time planning (Sharma, Sarkar, & Gupta, 2012).

Waterfall – is a more traditional way of managing a software development process, where all the requirements are gathered upfront, then analysis and design is done based on the initial requirements and the actual programming is done separately afterwards (Balter, 2011).

Iteration – the time intervals used in *agile* development to work on a set of customer requirements known at the time (Sharma, et al., 2012). In the teams interviewed, one- or two-week iterations were used, during which a set of features to be delivered was decided upon. At the end of the iteration, the results were reviewed.

Extreme Programming (XP) – is one of the *agile* methods. It requires maximum interaction with the customer; the development process is split into a number of iterations, customer feedback can change the plan for an iteration; pair programming is used for all development (Sharma, et al., 2012).

Scrum – is another *agile* methodology, which allows incremental requirement-gathering; the work to be done is further split into iterations called **sprints:** sprint requires daily stand-up progress meetings and sprint review at the end of the sprint (Sharma, et al., 2012).

Pair Programming (pairing) – is the writing of code in pairs, where two developers share a screen and a keyboard, assisting each other with work on the same task. Pair programming was introduced in XP (Sharma, et al., 2012), but can be used with other *agile* methodologies as well.

1.7. Assumptions

In agreement with the interpretive paradigm, this research examined the issues of cultural diversity in the ‘natural’ setting of a functioning team. I had to assume that the

participants were willing to share their sincere view of the situation. If that was not the case, their unwillingness (where visible) was analysed and used as additional data for the research.

It was assumed that by examining a limited number of VSDTs, tendencies of behaviour would be discovered which could be useful for other virtual IT environments.

It was assumed that the information provided by the participants was sufficient, and diverse enough to provide information about different factors of cultural diversity.

Chapter 2. Literature Review

This section contains an overview of the current research in the area of virtual teams. The goal of this review is to describe the cultural influence factors that have been identified in the context of work of virtual teams, the approaches that have already been made to research the influence of cultural diversity in virtual communication, and the problems which are currently understood on this topic.

Further in this chapter Bold font will be used to draw attention to the concepts presented on the diagram in Figure 1.

2.1. Conceptual Model

Based on a review of the available literature on the topic of virtual teams and culture in the workspace, a conceptual framework diagram was developed and is presented in Figure 1. The diagram shows the links between the work processes in a Virtual Software Development Team (VSDT) and the cultural influence factors. The following literature review explains how the model was derived and the links made.

It is argued that cultural diversity plays a defining role in all stages of a VT life cycle: team background (**Background** on the diagram), work process (**Process**) and creation of the final product (**Product**). It is not uncommon to form a team for a certain purpose and for the team to stay intact only until the product is developed (Aiken, et al., 2013; Sze-Sze Wong, 2000). In such a case, the initial team composition – **Background** on the diagram - is important, as it might be impractical to change the team members of a short-lived team. Team members come to the team bringing the background of their **National culture** and **Home environment**. The dimensions of national culture were defined for co-located environments (Hofstede, 2001; Trompenaars, 1996) and were used as the starting point of the analysis: **National Culture** in the diagram. However, these dimensions seemed to be insufficient for describing the situation in the virtual team. **Team culture** appears as the result of people working together (Hofstede, et al., 2010). **Professional culture** unites people who can deem themselves as part of a certain professional association(Hofstede, et al., 2010). Different authors argue about the suitability of certain types of personality to become a member of a VT (Furumo, 2005; Robert Jr, Dennis, & Hung, 2009; Wang & Haggerty, 2011); this personality influence is shown on the diagram as

Personality. In this research, questions of individual personality adjustments for the members of a virtual team were raised.

National differences also often mean differences in **language**. It will be shown that both language and cultural differences can be mitigated by learning and creating a common "group culture" (Hofstede, et al., 2010).

Process on the diagram represents the actual team collaboration and product development; it is based on the team's composition and is affected by initial trust establishment: swift trust (Dani, Burns, Backhouse, & Kochhar, 2006; Jarvenpaa & Leidner, 1999; King, 2007; Nandhakumar, 2006; Robert Jr, et al., 2009). At this stage, the role of a manager (**Manager's role** on the diagram) in the coordination and mitigation of multicultural differences becomes defining (Cascio, 2000; Duarte & Snyder, 2000; LeMay, 2000). The manager's functions in a virtual team include more responsibilities (Chhay & Kleiner, 2013). Using alternative decision-making approaches and training employees are suggested as ways to improve virtual team work for managers (Ananth, et al., 2011) and as means of **conflict** mitigation (Panteli & Tucker, 2009). In addition, the issue of the establishment and coordination of communication channels is important (Chhay & Kleiner, 2013; Henttonen, 2005; Nunamaker Jr, et al., 2009), especially between people with different cultural backgrounds (Chauvet, 2009; Dubé & Paré, 2001; Koeszegi, Vetschera, & Kersten, 2004; Lee, 2002). In initiating this communication face to face contact seems to be important (Benbunan-Fich, Hiltz, & Turoff, 2001; Nedelko, 2007; Nyström & Asproth, 2013). The idea of the creation of team identification or **Common Context** (Chinowsky & Rojas, 2003), which can be viewed as team culture, should be tested as a success factor in managing cultural diversity within a virtual team. The successful establishment of out-of-work social communication may be a defining sign of a successful virtual team.

The final product is influenced inter alia by cultural interaction in the **Background** and **Process** layers. The final **Product** is the result of the creative thinking of a multicultural team. This cultural mix can produce the most unexpected and fruitful results affecting User Interface **(UI) design**, **timeframe** and **integrity** of the model as it will be discussed in section 2.5. The free expression of different opinions and views contribute to the result. Some authors emphasise that the disconnected nature of a VT collaboration can result in a greater variety of solutions due to the often asynchronous character of communication, with less chance of team

members taking the opinion of the majority (which can be difficult to establish), and the absence of visual cues, thus promoting deeper thinking and self-reflection on the problem (DeLuca, 2006).

All concepts from the diagram will be discussed in detail in the following sections.

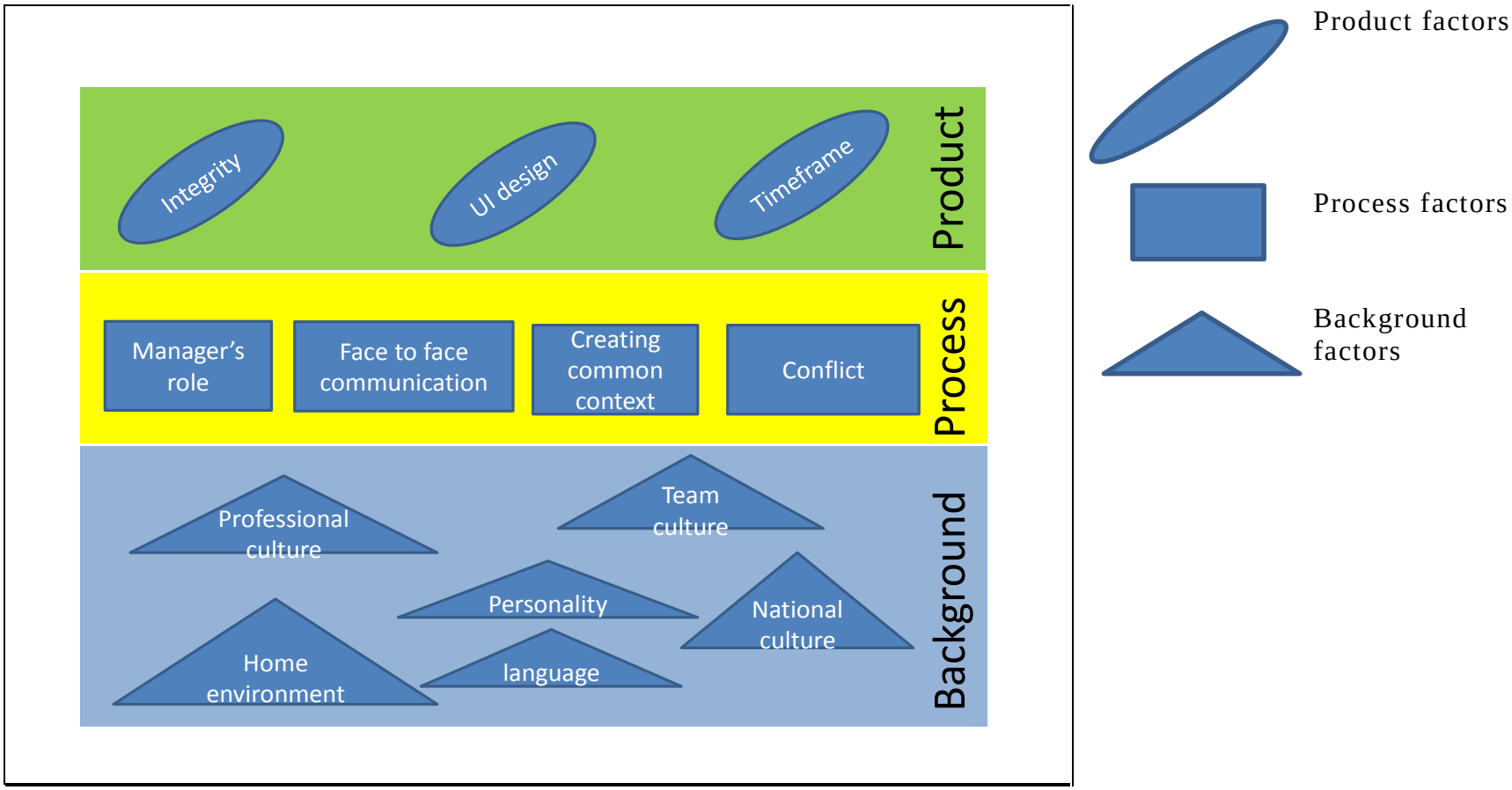


Figure 1. Conceptual Framework Diagram

2.2. Cultural Diversity Factors

Much of the research on cultural diversity has been done in traditional working environments and co-located teams (Hall & Whyte, 1960; Hofstede, 2001; Trompenaars, 1996). A VSDT represents a special environment. It is important to mention that outsource work represents a similar - but not identical - situation, since in an outsource environment the team is comprised of members of the same culture, with the management or client being a representative of another culture (Krishna, Sahay, & Walsham, 2004).

In researching VSDT it is important to note that cultural diversity is frequently encountered. The cases when cultural diversity can be experienced within a VSDT are:

- The team is assembled from people from different countries
- The team includes immigrants
- The members of the team, although citizens of the same country, belong to different national groups or come from diverse economic backgrounds. This is typical of the situation in South Africa

For the purposes of this research, I have examined cultural differences and their influence on the productivity of a team using virtual communication as their primary communication medium. The actual citizenship of team members was not considered; rather, the difference in citizenship and country residence was explored, as was explained in the section 1.6.3. Cultural Differences.

This research is exploratory, and its main goal is to identify the cultural factors influencing the productivity of a VSDT. Cultural dimensions identified for a traditional working environment were taken as the basis of the research, and their validity evaluated on the basis of the VT members' opinions and experiences.

This research examined the maximum number of possible factors, and can be considered as a basis for a further research, evaluating each of the identified factors and suggesting measurements and defining characteristics.

The exploratory nature of the research suggests that a qualitative approach is more suitable in answering its questions. Although the cultural factors of a traditional workspace have been

taken as a basis for the research, it was not limiting, as the exploration topic is still new; unexpected but valuable dimensions were also taken into consideration.

As shown in Figure 1, the factors of interest were separated into Background Inputs, Process Inputs and Product Inputs. This project assumes a flow of cultural inputs from the background to the final product, i.e. background differences, variety and issues appear and re-appear during the process, and their effect is seen in the final product.

In Figure 1, cultural diversity factors are shown as a united shape: the actual factors included in this shape are the cultural factors from existing theories of cultural diversity developed by Hofstede and Trompenaars. These factors are discussed in the following sections.

2.3. Background

Previous research shows that the impact of culture on a working environment can play a defining role in reaching the final project goal. In a virtual environment, cultural differences may be viewed in the same way as for a collocated workspace. However, it would be erroneous to equate these two environments, and an analysis needs to be done in order to identify which cultural dimensions are applicable for a virtual team, and the scope of their influence.

As has been indicated in several studies, the initial assembly of a VT is important (Jarvenpaa & Leidner, 1999; Schweitzer, 2005), and unsuccessful combinations of team members can immediately pose a threat to the project goal. Though this might also be true for a co-located team, it might be more difficult to exchange VT members when the work has already started in the case of a short-term team objective. It seems unclear whether the cultural combination of team members plays any substantial role in the initial successful start. The following questions arise:

- Do people of similar cultures find it easier to do virtual work together?
- Is cultural diversity perceived as a benefit of joining the team or as a threatening factor?
- Would members of the team prefer a manager of a familiar culture and vice versa?
- How do the answers to the questions above differ among the representatives of different cultures in a virtual team?

2.3.1. Hofstede's Cultural Dimensions

In his work 'Culture's consequences', Hofstede (2001) defines five national culture dimensions:

- **Power Distance Index (PDI)** - *the extent to which the less powerful members of institutions and organisations within a country expect and accept that power is distributed unequally.*
- **Individualism (IDV)** *is a dimension defining how the individual relates to the collective; individualism pertains to societies in which the ties between individuals are loose: everyone is expected to look after himself or herself and his or her immediate family; collectivism characterises societies where an individual is integrated into a group from birth, and is always viewed as part of the group to which he/she belongs*
- **Masculinity (MAS)** relates to *the distribution of emotional roles as masculine and feminine.*
- **Uncertainty Avoidance Index (UAI)** identifies *how society tolerates/avoids the uncertainty of the future.*
- **Long- Versus Short-Term Orientation** identifies *which values are dominant: persistence and thrift, or personal stability and respect for tradition (Hofstede, 2001).*

On applying these to an organisational culture, it is important to remember that the cultural dimensions defined above are only partially useful (Hofstede, et al., 2010, p. 660). In fact, organisational culture is defined more by practices than by values (Hofstede, 2002), which means that the dimensions above can only be used as a possible indication of cultural differences that are applicable to a virtual team. It follows that a review of how these dimensions apply to VSDTs is appropriate.

2.3.1.1 Power Distance Index

In his work, Hofstede (2001) points out that PDI is negatively related to the educational level of the workers. This suggests that for highly educated software professionals, this difference is negligible.

2.3.1.2 Individualism/Collectivism

The *individualism* dimension in organisational theory defines the relationship between the individual and the organisation (Hofstede, 2001). In collectivist societies, a greater emotional connection from the individual is expected in exchange for greater responsibility from the organisation's side. In individualist societies, this relationship is governed by more calculative reasoning.

A virtual team as a multicultural group can face the difficulty of merging collectivist and individualist mind-sets; in a virtual team this merging appears to be unavoidable. Looking at the world in general, there are many more collectivist cultures than individualist, so any truly multicultural team will tend to be collectivist (Hofstede, et al., 2010).

In individualist countries, the management of individuals is required (Hofstede, et al., 2010): individuals can be moved around individually or given separate tasks and rewards. In a virtual team, this is much easier to implement than the management of groups - characteristic of collectivist societies. It becomes a paradox: a multicultural team that tends to be collectivist can mostly be managed individually due to space and time constraints. An important question to answer in this research is how this management dilemma can be solved. How should the management / reward structure be adjusted to cater for a collectivist culture in a virtual team?

In applying the Individualism/Collectivism dimension to a virtual team, it is also important to remember that organisation culture can deviate from the prevailing national culture, thus earning a competitive advantage (Hofstede, et al., 2010). There is a possibility that virtual work will attract more individualistic people from different cultures. The evidence for that is in the fact that collectivist cultures are usually less active in virtual communication, as the conscious decision to connect is characteristic of individualist cultures; collectivist cultures have other ways to connect through already established social ties (Hofstede, et al., 2010).

2.3.1.3 Masculinity/Femininity index

The Masculinity/Femininity index is measured by the differences in expected behaviour from men and women (Hofstede, et al., 2010). In Masculine cultures, this difference is significant: men are supposed to be assertive and women tender and caring; in more Feminine cultures both sexes can show tender, caring behaviour (Hofstede, et al., 2010). The difference

in gender roles in more masculine countries also affects the distribution of professions: some professions are considered more feminine and others more masculine (Hofstede, et al., 2010). Multicultural virtual teams can help reduce this gap in professional definitions, but it can also create a conflict, for example, if a woman from a different culture takes up a position culturally unacceptable to the other team members.

Masculine countries are often characterised by parenting style, where one parent is a full-time parent and another parent is a full-time breadwinner (Hofstede, et al., 2010). From that point of view, virtual work can be seen as an advantageous work condition for females in cultures where a woman's role is defined with reference to the family and childcare. VSDT is especially attractive to women who want to advance their career without neglecting their family.

In masculine cultures it is often expected that the job takes over life (Hofstede, et al., 2010); this can be dangerous for virtual teams where work/leisure hours are already uncertain (Divol & Fleming, 2012). In this case, the presence of other cultures may be beneficial in setting up reasonable working hours and work/life balance; however, it can also be disturbing. For example, a manager who expects the employees to be available '24/7' will create conflict and dissatisfaction when dealing with people from cultures where this style of work is inappropriate.

Overall, different perceptions created by the masculinity/femininity affiliations of cultures seem to be a possible reason for conflict in cases where a team consists of both females and males. However, there is also a possibility for individuals to find a more comfortable working environment where this is not available for them in proximate work within their own culture: for example, the ability to work from home for women who are culturally expected to look after their children.

2.3.1.4 Uncertainty Avoidance

Uncertainty Avoidance could have an influence on the initial selection of the team members, as well as on the further work process (Jarvenpaa & Leidner, 1999). Visual cues often provide additional security, and give an employee additional layers of confidence (Cascio, 2000; Dubé & Paré, 2001). At the same time, VTs are often established as non-permanent and short-term teams (LeMay, 2000; Nandhakumar, 2006; Sze-Sze Wong, 2000),

which makes the job offer embed uncertainty about future employment. Alternatively, virtual work can provide more confidence than relocation, where the employee has to deal with the new job concurrently with a new environment, lifestyle changes and new problems.

2.3.1.5 Long- Versus Short-Term Orientation

The long- versus short-term orientation (LSTO) dimension was added primarily to describe the cultural values of several Asian countries, influenced by the teachings of Confucius. However, it proved useful in measurement against Western and other cultures (Hofstede, 2001). In terms of a virtual team, LSDT can also be useful in cases when the team is composed of members of Confucian and non-Confucian cultures.

2.3.2. Cultural Dimensions by F. Trompenaars

Another set of cultural dimensions was suggested by F. Trompenaars (Trompenaars, 1996):

- **Universalism versus Particularism** distinguishes cultures that tend to apply the same general rules for all situations, compared to cultures that ascribe greater value to the particular circumstances and relationships involved in an incident.

- **Individualism versus Collectivism** was discussed in the previous section.

- **Neutral versus Affective** deals with the acceptable degree of displaying and controlling emotions.

- **The Specific and Diffuse** dimension characterises the separation between work and private life.

- **Achievement versus Ascription** separates the view that status is earned by achievements from the view that status is ascribed by birth.

- **Internal or External Control** identifies the individual's perception about whether he/she can control external forces, or whether these forces are unchangeable and a person must therefore be subjugated to them.

- **Past, Present or Future** - this dimension deals with the relative importance that different cultures assign to time - the past, the present and the future.

2.3.2.1 Universalism versus Particularism

Universalism versus Particularism does not seem to attain any additional meaning in the VSDT context. However, VSDT is a relatively new phenomenon, so it would be logical to suggest that there are no established rules regarding the solving of common work issues in a virtual team. In this case, the members of the team may find it unavoidable to accept a particular approach to any work issue.

2.3.2.2 Neutral versus Affective

In a virtual context, emotions also become 'virtual'. People invent their own way of expressing emotions using emoticons, bold type or capital letters in the case of text communication. In the case of voice-only communication, emotions can only be expressed by the tone of the voice. The absence of visual cues can be misleading, whereas emotions in face-to-face communication often help to convey the message better. How do VSDT members from different cultural backgrounds adjust the expression of their emotions? How do they manage to adapt to multicultural differences in emotions, magnified by an electronic means of communication?

2.3.2.3 Specific and Diffuse

This dimension could be relevant in a VSDT context. Members of the team will usually have to do part or most of their work from home. How does this influence their home environment? How easily can members of different cultures adapt to this style of work? How do they deal with work interference in their family life?

2.3.2.4 Achievement versus Ascription

In the context of a multinational VSDT, ascribed values are unlikely, due to the fact that most of the members of the team do not know each other personally and do not share the same environment and history. However, is it possible that such a situation would cause discomfort to the members of the team whose culture is dominated by ascription? The answer was sought in this research.

2.3.2.5 Internal or External Control

Individuals with a dominating view of internal control are characterised by a strong sense of inner direction (Trompenaars, 1996). It seems logical to suggest that the members of a virtual software development team share a view of internal control, which allows them to be motivated to work independently and productively without the visual support of the other team members and office environment. This proposition needs to be tested.

2.3.2.6 Past, Present or Future

This dimension is of particular importance in the VSDT context, as for a team to be successful in finishing the task within a reasonable time limit, the members must share the same expectations about time (Trompenaars, 1996).

Questions of time can be viewed differently when analysing cultural diversity (Saunders, Van Slyke, & Vogel, 2004). Time works to the advantage of a virtual team. Virtuality brings the ability to shift working schedules, to incorporate flexible family time, to break routine and to meet deadlines more easily. Different cultures live on different schedules – some wake up early, some start their day late. In a multi-country collaboration, time zone differences bring another aspect of shifted zones, which can be used as an advantage, allowing team members to proceed with the project during the other users' non-working hours (Espinosa, DeLone, & Lee, 2006).

However, time can also be an obstacle (Saunders, et al., 2004), for example, when cultural understanding of time is not the same: What is fast, what is slow? How urgent are deadlines? How do members manage each other's time without insulting the other's feelings? How early or late can one arrive at a meeting? How long should one wait before leaving, or taking action to find an explanation for delay?

Another time dimension relates to cultural and religious holidays – all these aspects have to be learned, respected and communicated between team members.

2.3.3. Additional Diversity Factors

Other cultural diversity questions related to the initial team assembly include personality dimensions within cultural groups, virtual communication, and language differences.

2.3.3.1 Personality

Furumo (2005) argues that certain personality traits like openness, extroversion and consciousness can affect the success or failure of a team. The question can be posed whether certain personality types are more willing and/or suitable to participate in a multicultural virtual team.

Another question is whether these personality traits can be trained. Wang et al. (2011) introduce a measure of *'Individual virtual competence'*, which characterises the ability of an individual to be successfully integrated into a virtual team; this competence has been proved to affect the perceived performance and overall job satisfaction of the virtual team members.

An aspect of a successful virtual team personality is the ability to create trust; people who possess this ability perform better within such teams (Saonee, et al., 2011), and they are also better suited to establishing team communication, which has the potential to increase the performance of the entire team.

2.3.3.2 Language

Language barriers are a common issue in virtual teams (Dubé & Paré, 2001; Espinosa, et al., 2006; Pauleen & Yoong, 2001); global teams often consist of members who speak different languages. Although English is often accepted as the language of international communication, non-native English speakers may find it difficult to use for all team communication, and as a result may distance themselves from the team process (Dubé & Paré, 2001; Espinosa, et al., 2006). Even having fluent English skills, non-native speakers fail in "reading between the lines and understanding subtle differences" (Pauleen & Yoong, 2001).

Language barriers are emphasised through the lack of visual cues characteristic of most virtual communication channels (Dubé & Paré, 2001; Espinosa, et al., 2006; King, 2007). These non-verbal cues can be the one of the most important factors in defining effective team communication (Chhay & Kleiner, 2013).

However, teamwork fosters the development of appropriate language skills, and can be viewed as a language-learning exercise on its own (Vick, Crosby, & Ashworth, 2000).

2.3.3.3 Team Culture

Hofstede et al. (2010) claim that culture is unavoidable, and any group left on their own will create their own culture, distinguishing them from other social groups. A virtual team can be an example of a cultural group identity. This group identity is represented by **Team Culture** on the diagram.

Team identification gives members a feeling of belonging (Sivunen, 2006), which can help to overcome alienation resulting from national culture differences. Team support is viewed as one of the factors increasing individual performance within a virtual group (Saonee, et al., 2011). Successful teams have shared goals focused on the team as a whole (Panteli & Tucker, 2009).

2.3.3.4 Professional Culture

Often people relate to others with whom they share symbolic membership, like in social networks and professional associations (Hofstede, et al., 2010); this forms another type of culture and is presented as **Professional Culture** on the diagram. A good example of professional culture in IT can be seen in open-source (OS) projects. The practices used in open-source projects to establish and maintain a desirable level of communication and commitment (Stewart & Gosain, 2006) can be used by VSDT managers. The question arises whether OS projects are more successful with people of the same culture, or at least if the core team of the project belongs to the same culture. If so, is it practical to advise that virtual teams should be composed of people who share the same culture?

2.3.3.5 Home Environment

The home environment plays an important role for professionals working from home. Research shows that virtual workers see both positive and negative influences of virtual work on their family life (Hill, Hawkins, & Miller, 1996). Among the benefits listed are: an ability to handle childcare, improved relationships with the family, and flexibility of working hours (Hill, et al., 1996). The negative aspects of the home office include longer working hours and family conflicts (Hill, et al., 1996). In the experience of one virtual team, removing the control of working hours was “surprisingly successful” (Divol & Fleming, 2012); however, questions were posed as to whether this is sustainable, or whether it can lead to burn-out of the individuals

who fail to incorporate enough rest time into their schedule. Working from home also creates an additional challenge to virtual team managers, as they have to coordinate tasks in highly variable working schedules (Divol & Fleming, 2012).

It remains unclear whether the influence of the home environment is dependent upon the cultural background of the virtual worker's family.

2.4. Process

In the following sections, the **Process** concepts from the models will be discussed (the subtitles are linked to the concepts as mentioned on the diagram). Bold font is used to mark the concepts presented on the diagram.

2.4.1. Manager's Role

When it comes to the **Process**, a VT manager has the same responsibilities as a manager in a traditional team; however, his/her role is more complex (Berry, 2011) and becomes one of the main difficulties of implementing global virtual teams (Hosseini, et al., 2013). Managers in VSDT are required to recognise differences in communication patterns between people of different cultures, as well as time differences, and the perception of personal and work relationships. (Koeszegi, et al., 2004). The VT manager's role in mitigating cultural differences and establishing multicultural communication (Parvis, 2003) becomes more important due to the limited communication means available to the team members.

A virtual team manager is expected to develop specialised skills and foster the development of virtual work skills, such as decision-making techniques, in his/her team (Ananth, et al., 2011). A positive influence of the team leader on developing team identification, trust, obligation and norms has been identified (Goh & Wasko, 2012).

In order to answer the research question about managerial behaviour (research question 2), this study needs to identify the managerial behaviour that is expected by team members, and the manager's expectations from a team in a VT environment. Is any special education/training necessary for VSDT managers as opposed to managers in traditional software development projects?

2.4.2. Face to Face Communication

Several authors suggest that initial **face-to-face** contact is important in defining trust levels and establishing initial relationships between the team members (Benbunan-Fich, et al., 2001; Nedelko, 2007; Nyström & Asproth, 2013). However, this contact is not always possible, and other communication means such as conference or phone calls might be used instead, which certainly make language differences a bigger issue with the absence of visual cues (King, 2007). On the other hand, this statement is challenged by authors who suggest that the absence of visual cues makes cultural differences less apparent (Berg, 2012; Cogburn & Levinson, 2003). In cases when face-to-face communication is not possible or undesirable for some reason, relationships within virtual teams should still be fostered, and special activities should be incorporated in the team life to allow the members to get to know each other (Nunamaker Jr, et al., 2009).

Further research is required to determine the perception of the VSDT members themselves with regard to initial face-to-face contact, and, in the case of a first face-to-face meeting occurring only at a later stage, how this affects established relationships. As a result of this research, advice may be derived for a manager of a VSDT with regard to the planning and organising of face-to-face meetings of team members.

2.4.3. Creating Common Context

The VT process is ensured not only through the actual task given; it requires established communication practices. In the absence of common working practices amongst people of different cultures, this **common context** (as on the model) has to be created (Chinowsky & Rojas, 2003). It is suggested that the process of creating a common team context can be steered with appropriate managerial strategies like training, reward systems and organisational support that are appropriate for virtual work task design (Chhay & Kleiner, 2013; Nunamaker Jr, et al., 2009; Schweitzer, 2005). Educating the members about cultural diversity is also important (Parvis, 2003).

2.4.4. Conflict

Team communication in VSDTs tends to be asynchronous, giving each member more time to reflect and form his/her own opinion (Berry, 2011; Cogburn & Levinson, 2003;

DeLuca, 2006). Asynchronous communication makes cultural diversity less sharp, and **conflict** more avoidable (Berg, 2012; Buchanan, Wilson, & Gopal, 2008). However, there could be a negative effect too. A hidden conflict might remain unnoticed by the manager or the participating members themselves, thus the lack of understanding could be deep enough to be unresolved for a long period of time, and might show up only in the final product - at which time it may be too late to repair or resolve.

Another source of conflict may be apparent in virtual teams separated by significant time zones; this becomes apparent in communication delays for issue resolution when there is a dependency on another member, communication clarification or delays in reporting (Cummings, 2011). Power conflict can be mitigated by assigning power according to task and knowledge, i.e. the person best suited to do the task takes control (Panteli & Tucker, 2009). Other ways proposed to mitigate conflict are cultural sensitivity training (Chhay & Kleiner, 2013) and creating awareness as part of building trust (Chyng-Yang, 2013).

2.5. Product

The final **Product** is the area where cultural diversity can bring valuable benefits (Buchanan, et al., 2008; Chauvet, 2009; Powell, Galvin, & Piccoli, 2006; Vick, et al., 2000). Different cultures contribute original views regarding problem-solving, exceptional knowledge and unique experience. Once the difficulties of mitigating communication are smoothed out, the variety of opinions, views and originality of thought can bring certain benefits to the product. The disadvantage of such variety is the creation of difficulty of choice, whereby the variety of solutions does not allow for simplicity regarding the direction to be taken (Schweitzer, 2005).

2.5.1. Integrity

The quality of the final product closely links to the issue of the conflict described above – hidden conflicts in the development cycle may mean a lack of **integrity** in the final product. Another aspect of quality – usability - might be perceived differently by different cultures. Lack of agreement between design and implementation is often the case even in a collocated, culturally uniform team.

Integrity is achieved by learning to work across borders; when seamless integration is achieved, the boundary on its own ceases to be a problem (Watson-Manheim, et al., 2012).

2.5.2. User Interface Design

The diversity and difficulties of face-to-face communication with visual cues in a VSDT can have an influence on the eventual product's internal design, which can be at variance with the **User Interface (UI) design**. However, local input of a specific culture may contribute to a better UI design suited to the specific cultural market. This was also found in the case of outsource software (Krishna, et al., 2004).

Common standards for work style and implementation are sometimes found in professional culture, and might help to mitigate the risks of development. Additional help for creating a successful product is a strong team culture, uniting the members' efforts to produce the product which will be associated with the team.

Another aspect may be the selection of the correct technology for the task, and standard tools (Aiken, et al., 2013) and standard terminology (Nunamaker Jr, et al., 2009). These measures can force a more uniform-looking result, even if the team members have different opinions about the UI design.

2.5.3. Timeframe

Another foreseeable challenge is the **timeframe** of the project, which is difficult to agree on without a common context between the team members. The members' input is important, as they are there to do the job, but their opinions can differ substantially without a common understanding of the task at hand. Modern developments strategies suggest *agile*[1] or *waterfall*[2] project management to ensure delivery on time. The question remains unclear as to whether there is a preferable strategy for a multicultural team, and whether the same project management strategies can be applied, taking into consideration the different way of work, shifted schedules and difficulties of meetings (Espinosa, et al., 2006).

Timeframe is also a function of team performance. Performance measurement is vitally important to achieve competitive results in a virtual team (Hosseini, et al., 2013). Some authors

[1] See "Agile Definitions"
[2] See "Agile Definitions"

suggest that an additional reward system is required to foster performance (Nunamaker Jr, et al., 2009); this is explained by the absence of the usual visual motivators in a VSDT (such as seeing one's colleagues working).

The final product is certainly the goal of team work. However, this cannot be viewed in isolation from the other dimensions of team effectiveness, such as member satisfaction, professional growth and the possibility of future collaboration (Schweitzer, 2005). This is another topic for the canvassing of VSDT members' input and opinions.

2.6. Conclusion

This literature review confirms that the research questions have yet to be answered. The existing literature acknowledges the existence and influence of cultural diversity in virtual teams, however, its benefits and problems are being questioned (Benetytė & Jatuliavičienė, 2013; Berg, 2012; Chhay & Kleiner, 2013; Nunamaker Jr, et al., 2009; Watson-Manheim, et al., 2012). Though there are benefits to multicultural collaboration (Benetytė & Jatuliavičienė, 2013; Berg, 2012; Nunamaker Jr, et al., 2009), its effects can also be detrimental to trust, performance and collaboration (Berg, 2012; Nunamaker Jr, et al., 2009; Panteli & Tucker, 2009). While there is a lot of debate about the benefits and disadvantages of multicultural virtual collaboration, there is no clarity about the factors of cultural diversity playing a defining role in either benefits or disadvantages. Practical advice on mitigating cultural diversity is generic, suggesting structuring the work in a clear and transparent way, using cultural sensitivity training etc. (Benetytė & Jatuliavičienė, 2013; Chhay & Kleiner, 2013). However, practical measures that can be implemented are not clearly defined.

The Conceptual Framework presented in Figure 1 summarises the key influences of cultural diversity in a work environment. Although based both on proximate team and virtual team research, it suggests ideas which can be tested in a VSDT environment. The Conceptual Framework diagram was used as a base for answering the research questions:

1. *What challenges do software professionals face when working in a culturally diverse virtual team?*

The **Background** factors from the model are the possible probes for finding challenges.

2. *What kind of management behaviour do software professionals expect will help mitigate the cultural diversity impact on their work?*

The model suggests that the manager's role becomes active in the **Process** stage, where the manager's responsibility is to help the establishment of effective communication and to organise face-to-face meetings, creating common context and resolving conflict.

3. *What kinds of relationships are developed among members of a team with different cultural backgrounds?*

The answer to this question is not clear from the previous research and is not visible in the model. However, the discussion of the **Process** factors with the interviewees is expected to shed light on this question. At the same time, the model **Product** factors can be used as an evaluation of successful relationships: i.e. was the integrity of the product established? Did the UI design meet customer requirements? Was the timeframe agreed upon by all team members?

4. *What kind of cultural adjustments can be suggested for VT members?*

This question is expected to be answered through evaluating the practices used by different teams in the **Process** stage and the results achieved. It is important to note that these cultural adjustments are dependent upon the challenges found in the **Background**, and the effectiveness of the adjustments become evident in the **Product** stage.

The concepts presented in Figure 1 have been used to develop the research instrument. An interview plan based on the findings of the conceptual framework assisted in the initial data reduction.

Codes and concepts have been developed based on the conceptual framework and the data collected for the purposes of analysis. These were compared to the factors presented in the conceptual framework in order to develop propositions about the influence of cultural diversity on the effectiveness of VSDT; this will be discussed in Chapter 5. These propositions are expected to contribute to the development of a theory of cultural diversity in the virtual environment.

On the practical side, a comparison of the similarities and differences between the factors presented in the conceptual framework, and the findings of this research, contributed to

a better understanding of virtual team work and were used to suggest management practices for businesses using VSDT. This will be discussed further in chapters 5 and 6.

Chapter 3. Research Methodology

This research is focused on questions of cultural diversity and its effects on work and productivity as seen by the members of the team themselves. This is a relatively new approach, as most of the previous research in IT productivity used quantitative measures, and individual views were not taken into consideration (Chan, 2000; Powell, et al., 2004). However, it is suggested that both qualitative and quantitative approaches are necessary to provide a fuller picture of the phenomenon (Jones & Alony, 2007). And the most recent research using qualitative analysis exists (Panteli & Tucker, 2009).

The topic of Cultural Diversity is also under-investigated in a VSDT context, and no solid theoretical base is available at the moment (Chauvet, 2009). Interpretive research methodology seems to be suitable for the exploratory nature of the research. It is also worth noting that mostly theoretical investigations are available at present on the topic of cultural diversity in virtual teams (Carte & Chidambaram, 2004; Chauvet, 2009; Jones & Alony, 2007). However, case studies (Lee, 2002; Suchan & Hayzak, 2001), mixed methods (Koeszegi, et al., 2004) and quantitative methods are present as well (Panteli & Tucker, 2009; Paul, Seetharaman, Samarah, & Mykytyn, 2004).

Interpretive researchers collect their knowledge of the phenomena studied through social constructs such as language, documents, shared meanings etc. (Klein & Myers, 1999). This approach can be useful in describing a social process (in current research – VT work) that is dependent on context and time (Orlikowski & Baroudi, 1991).

3.1. Research Design

This research is exploratory and, being so, it does not seek to find the trends common to the majority of virtual software development teams. The main goal is to find out which factors of cultural diversity exist and require further investigation. For these research goals, an interpretive research design appears to be appropriate.

Interpretive research does not prescribe an exact set of rules for conducting it (Klein & Myers, 1999), which supports the exploratory nature of this research. Interpretive research gives the researcher the freedom to consider the opinions of all research participants as valid, without requiring a single absolute truth for everybody. It is important to remember that qualitative research has inherent drawbacks, such as a lack of exact measures, questionable general application and the

possibility of being affected by bias (Huberman & Miles, 1983). To protect this research from these problems, and to ensure that it is valid, useful and verifiable, the set of principles suggested by Klein and Myers (Klein & Myers, 1999) for evaluating interpretive research in information systems has been used. These principles are described in section 3.8. Data Analysis and Interpretation.

An alternative approach to this research could be phenomenology. Phenomenology is defined as *a style of philosophy which seeks to describe a phenomenon as it appears subjectively to the experiencer* (Moran, 2000). A phenomenological approach could be suitable as it would allow this researcher to explore the perceptions of work in a virtual team and experiences of its cultural diversity as viewed by the team members themselves. However, phenomenology requires a longer time frame for research, which is not practical for the timeframe of a master's dissertation. Initial exploratory research does not require such a deep investigation, which would make more sense during subsequent research, when the factors of interest are already defined and a better detailed research design is possible.

In order to achieve a better view of the research object, several methods of data collection have been used:

- semi-structured interviews with team members;
- semi-structured interviews with team leaders/managers;
- web-research about the companies and their products;
- informal conversations with team members (not recorded).

Interviews were used as the primary source of data, as one of the distinguishing features of interpretive research is that the participants' perspectives are used as the main source of understanding phenomena (WenShin & Hirschheim, 2004). Other sources provided additional information and aided understanding of the context of the team work. These sources were useful both as part of interview preparation and at the stage of data analysis. Web-research provided some initial information about the company, their product, target market etc. Informal conversations with the team members were only possible where the team member was a good acquaintance of mine.

In the process of data collection, it emerged that there had been some changes in the team structures compared to the initial state of the teams at the time of the research proposal. One of the teams – code-named Team B – was split into several teams. Though these teams continued to be part of the same company and were working on the same product, their working style changed from collaboration to cooperation, with the communication between the teams handled mostly on the company management level. Two of the interviewees refused verbal interviews, citing time constraints, and opted to provide a written report based on the interview questions. These reports

provide less information than the voice interviews; however, they are still valid in providing information on the topic.

3.2. Selection of Research Participants

The initial plan was to study two virtual teams as case studies by interviewing their members, collecting data from group chats and participating in meetings. However, this idea proved to be unrealistic, as one of the teams was split into several smaller teams and their meeting pattern was irregular, group chats were not established, and communication was often dictated by the management. The other team refused to allow access to their chats. Access to the customer base was also unavailable for one of the teams.

Taking these difficulties into account, I decided to broaden the area of research, to include more participants of other virtual teams, and to concentrate on personal experiences in a virtual team. Thus the unit of analysis in this study became an individual – an IT professional working at present or having worked in the past as part of a multicultural virtual team. The research focused on the influence of cultural diversity and its effects on the work and productivity of a VSDT as seen by the members of the team themselves. All the data was collected and analysed at the individual level. The method for the selection of participants is described in the following chapter. However, the information concerning the perception of team-belonging of the participants provided a valuable understanding of the context of every interviewee. A detailed description of the teams is provided in section 3.4.

3.3. Solicitation of the Sample

The approach to collecting the participants was a limited form of snowball sampling:

> *A random sample of individuals is drawn from a given finite population. … Each individual in the sample is asked to name k different individuals in the population, where k is a specified integer.* (Goodman, 1961, p. 148)

Virtual team members were approached, based on previous acquaintance with them. They were also asked to refer other virtual team members where possible. The majority of the interviewees were people whom I knew personally, with the rest being referred to me. This sample structure can be beneficial, but it also has disadvantages. The benefits of interviewing

people who are known personally can be in the fact that they might have more trust towards the interviewer and might be more willing to share. This was confirmed by one of the interview participants:

"I trust you …what I tell you is going to end up in the right hands. I mean I wouldn't probably speak to a journalist, which I don't know, like this. I wouldn't tell it like this because I would be more guarded." (sic) [INTERVIEW 3].

However, working with personal acquaintances can also mean more bias, as the conversation occurs within the context that was created in this relationship, and certain facts might not be mentioned as something that both parties feel is obvious due to previous shared knowledge.

In this study, twenty members of virtual teams participated in the interviews, with two of them opting to respond to the interview questions in written form. The interview plan was the same for all participants, with the exception of the founder of one of the teams, who was additionally asked about the process of founding the team. One additional interview was conducted by an independent author and though the structure and plan of this interview is unknown, some of the questions/answers have provided information valuable for this research.

3.4. Teams' Description

The unit of analysis in this research was an individual, at IT professional working in a virtual software development team. Team context, however, is an important factor in this research. In the conceptual model (Figure 1) team context can be seen on the 'Background' as part of **Team Culture** factor and in the 'Process' as part of **Creating Common Context** factor. Thus, description of the participants' teams appears appropriate.

In order to protect the confidentiality of the participating teams, code names have been used for all participating teams, companies and people.

3.4.1. Team A

Team A was an established virtual team working on the development of an open-source software product. In addition to software development activities, Team A also provided customer support and consulting.

Team A was initially created in year 2000, and its composition has changed several times since then. I was a part of team A during 2006-2009. At the time of the research, Team A consisted of people from the USA, Europe, South America and India.

Team A followed *agile* software development practices, with an emphasis on Extreme Programming and pair programming. Most of the team communication was done through the internet, with occasional face-to-face meetings.

Team A appeared to be a suitable research participant, as it is an established and effective virtual team with a well-developed management strategy. As an open-source team, Team A could provide an insight into creating team culture (Stewart & Gosain, 2006).

3.4.2. Team B

Team B was a relatively new team, which was created in 2008. It consisted of people from Europe, the USA, China and Japan. Some of the members of Team B originally worked in Team A. This relationship offered an opportunity for the comparison of the two teams from the point of view of the members themselves.

Team B combined collocated and virtual work. The team members' opinions about these two different modes of work were to be useful in answering the research questions, as it allowed for the understanding of the difference between the effects of cultural diversity in a virtual workspace as opposed to a traditional one.

The product developed by Team B has reached market recognition, which was one of the indications of the team's effectiveness. It also suggests that the team was stable and could be used for the research.

By the time of the interview, Team B was split into three smaller teams, working on different components of the same product. The smaller teams became less multicultural, namely a Chinese team, a Japanese team and a mixed team. The reasons for the split will be discussed further in the Results section.

3.4.3. Team C

Team C became a part of this research when interviews were begun with one of the developers, who had left team A to work for another company which was at the same time working in a virtual team mode. This developer was the only interview participant from Team

C. Team C was part of multinational company which began as a collocated startup and then expanded in other countries, opting for virtual collaboration in many cases. At the time of this research, this company had employees in about 27 countries. The interviewee was, at the time of the interview, a member of two teams working on different components: Team C1 and Team C2. Team C1 consisted of 5 people, with people from England, Italy, Brazil and Holland. Team C2 was represented by the USA, Lithuania, Denmark and Brazil. Since the communication setup in both C1 and C2 was basically the same, it was analysed as one team.

Team C used some of the *agile* methodologies, such as collective code ownership and product owners. In this company setup, dedicated team leads were designated to communicate company-wide decisions to the team, and to make sure that the tasks that the team was taking on were in line with the company's direction. However, daily stand-up meetings were not taking place, and the general work planning was very loose; there was no iteration planning, just individual pick-up of the tasks as they approached. Team C had occasional pair programming sessions, but this was not a day-to-day practice. Team C's company also arranged three-monthly collocated meetings, where the developers could write code together from the same place.

3.4.4. Team D

Team D was a part of a successful IT company. It was not virtual in general; however, this software development team changed form, initially when the need arose to have an office in Ireland, and later on by hiring a developer in Australia. The team therefore has become international and a virtual mode of work has been elected as a viable option.

Team D was developing a large retail application, which was used successfully in a number of retail store chains.

Team D used sprints[3] for task planning, and weekly stand-up meetings to plan their work. The rest of the communication took place through Skype chats, e-mails, blogs, wiki's and task assignment. In team D only one team member was interviewed.

[3] See "Agile Definitions"

3.4.5. Team E

Team E was an international company, whose main product was a web-based service for software development. Team E used a free approach to company management and task coordination. They did not have a designated manager role, and employees were encouraged to choose the projects they wanted to work on. They also could select their team and organise their work. Team E promoted self-management, and the employees proved to be highly-motivated individuals ready to work independently, and at the same time to engage their colleagues.

Team E used initial face-to-face meetings for the new employees, when the new employee was invited to meet his or her new colleagues. There was also a bi-annual company meeting where everybody was able to meet each other. In addition, they had semi-informal video meetings on Fridays, where founders gave short presentations. This was done to give cohesion to the team.

In team E only one team member was interviewed. This information was supplemented by an interview from an online publication.

3.5. The Researcher as a Participant

In order to explain my affiliation with the teams researched and the possibility of bias, it is important to mention that I was part of one of the teams from 2006 to 2009. Inevitably, I possess some insider knowledge about the team work and processes. This also includes my opinions about the work of the team. In order to allow the reader to separate these opinions from the opinions formed as part of this research, I provide a detailed reflection on my experiences with this team in section 6.1. Reflection on the Research Process.

3.6. Procedure for Data Collection

The first step of data collection was website review to get information about the company, their product, customer base etc. Website URL's cannot be disclosed as this will reveal the identity of the teams and participants. In cases where I had had contact with the interviewees previously, this was partially replaced by informal conversations with the interviewees before the actual research. This information allowed understanding of the context of the virtual teamwork and facilitated preparation to lead the interview conversation.

For the interviews, online Skype calls were used to interview and record the conversations, which allowed synchronous communication similar to a live interview. However, it is important to note that visual information valuable for interpretive research was unavailable.

Forums/blogs were available for open-source teams only, and provided limited information. However, this medium was also useful in gaining understanding of the context of the team work and its relation to the outside world. There was no participation in the closed groups in order to avoid compromising the privacy of the members (Beddows, 2008).

Where quotations from interviews were used in the data analysis, the following interview reference format was used:

[INTERVIEW X]

INTERVIEW X – interview number, where X is the random number given to the interview. This number is not related to the sequence in which the interviews took place.

Table 1 provides information about the team of the interviewee and his/her formal position within the team.

Table 1. Interviewee Information

Interview number	**Team**	**Position within the team**	**Country of residence**
1	Team A	Developer	Brazil
2	Team A and B	Manager	USA
3	Team A and B	Founder	USA
4	Team A	Developer	Netherlands
5	Team B	Developer	Spain
6	Team B	Manager	China
7	Team A	Community Manager	Argentina

8	Team A	Developer, Team Lead	Germany
9	Team A, B	Developer, Manager	China
10	Team B	Developer	Spain
11	Team A	Developer	Argentina
12	Team A	Developer	Germany
13	Team D	Developer	South Africa
14	Team A	Developer	South Africa
15	Team E	Engineer	USA
16	Team C	Developer	Brazil
17	Team A	Tester, documentator	Switzerland
18	Team B	Developer	Japan
19	Team B	Developer	Japan
20	Team A	Support Engineer	India
21[4]	Team A	CEO	USA

3.7. Research Instrument

The interview plan was developed with the purpose of allowing the participants to talk freely about their experiences and express their opinions in the course of the interview. Interview questions were generated based on the research questions (see Appendix AB). These questions may appear to be limiting the expression of the interviewees; however, this should

[4] This interview was done by an independent author and published online. The source is not provided to protect the identity of the team. The source is available to examiners on request.

not be viewed as a concern, but as initial data reduction for this stage of data collection (Huberman & Miles, 1983). The same interview plan was used for team members and team managers. However, the interview plan was slightly amended for the team founder as I've expected that he could provide some visionary information about virtual teams based on his business planning.

Interviews concentrated on collecting participants' own views and reflections of their situation. They were based on open-ended questions, which gave the participants more freedom to express what they consider important.

Appendix B contains a letter to the prospective participants of the interview to request their participation.

3.8. Data Analysis and Interpretation

An interpretive researcher does not begin his investigation with a predetermined set of categories to measure; instead, he seeks to extract themes and categories by exploring the phenomenon with a suitable instrument (Orlikowski & Baroudi, 1991). The objective of the data analysis in this research is to categorise and find connections with and relationships between the categories, and at the same time to relate the findings to the existent theories of Cultural Diversity.

Rich qualitative data is usually too large to be suitable for analysis (Huberman & Miles, 1983). Therefore, a strategy is necessary to reduce the data and prepare it for analysis. Data reduction is the beginning of data analysis, where the researcher must make decisions about how the data can be partitioned and aggregated (Huberman & Miles, 1983). The objective was to look at the maximum of possible factors that should be considered as a basis for a further research. Once these factors were identified, the data was aggregated around them.

Coding was applied to reduce the data and find categories and links between them and to identify exceptions. Codes were developed intuitively based on logical partitioning and categorisation. Badly made decisions regarding this categorisation can lead to data that is impossible to analyse; however, this categorisation process is often left to intuition (Huberman & Miles, 1983). In order to avoid this problem, a strategy suggested by Huberman and Miles (1983) was used which generated possible probes using the existing factors of cultural diversity (see Figure 1), which were further adjusted and extended to match the data collected.

Coding was done using "RQDA: Qualitative Data Analysis" package (License: BSD, Version: 0.2-3, year 2012), which is freely available at http://rqda.r-forge.r-project.org/. The details of codes and categories are presented in Appendix C. RQDA package allowed to create descriptive codes like "Agile", "Achievement vs Ascription", "Neutral vs Affective" – some of these codes were taken from the conceptual model (Figure 1), others were intuitive labels given to the interview extracts discussing same or similar concepts or topics. Further RQDA package allowed to group the codes into categories, which is also presented in Appendix C.

At the end of the coding process, the data was in a form that was suitable for further interpretation. Categories of data were compared to existing cultural diversity theories, and conclusions were made based on the similarities and differences found.

3.9. Limitations of the Study

This research is taken from the interpretive perspective, therefore it is affected by the participants' views and the researcher's bias (Orlikowski & Baroudi, 1991). I kept an accurate record of my own opinions and thoughts that could influence the research outcomes. In interpretive research, the fact of the researcher's intrinsic initial prejudice is accepted and is part of the process of understanding and drawing meaning from the collected data (Klein & Myers, 1999). It was assumed that the information provided by the participants in the interviews (the primary data source) is true and reflects their thoughts.

By design, interpretive methodology does not account for situations when participants' intentions are different from their actions (Orlikowski & Baroudi, 1991). It also focuses on a current situation without the analysis of the historical events that have led up to it (Orlikowski & Baroudi, 1991). In the context of the current research, this means that the work conditions of the virtual team in the present time might be the result of multiple previous adjustments, which may or may not play an important role in the emerging of the current balance.

In a case study, research participants might behave differently due to the knowledge that their behaviour is under investigation (Darke, Shanks, & Broadbent, 1998). This can be verified using data triangulation or by including a second independent researcher to reproduce the results (Benbasat, Goldstein, & Mead, 1987). In this research the inclusion of an independent researcher was not an option due to the financial and time constraints of a Master's dissertation. Data triangulation sources were also very limited, since, owing to the nature of the teams, no formal documentation existed with regard to company policies, and access to

private meetings or discussions was refused. As a result of this situation, questioning the team members about their experiences in working with each other was the only means of confirming the information provided by the participants. This allowed for the discovery of inconsistencies and the confirmation of the participants' opinions.

This research is influenced by the fact that only a limited number of teams were researched and the information might be incomplete. In addition, only members of several cultures were present as participants, so the results could have been richer with more cultures participating. However, real-world teams cannot have more than several cultures present due to the limited size of a team, so diversity levels might have been left out of the scope of this research.

Assessing the data about the productivity and success of the work practices depends on the accuracy of these factors as measured by the participating teams, and in this research it was subjective in many cases.

3.10. Validity in Interpretive Research

Klein and Myers suggest the following 7 principles that can be used for evaluating interpretive research:

1. The Principle of the Hermeneutic Circle
2. The Principle of Contextualisation
3. The Principle of Interaction Between the Researchers and the Subjects
4. The Principle of Abstraction and Generalisation
5. The Principle of Dialogical Reasoning
6. The Principle of Multiple Interpretations
7. The Principle of Suspicion (1999)

These principles were applied during the data analysis stage in steps and are expected to help in achieving a better interpretation of the research data.

The Principle of the Hermeneutic Circle suggests that people understand things by relating the independent meaning of the parts of the whole to the whole, and back to the parts (Klein & Myers, 1999). As the research question is posed around cultural diversity, its overall

influence was broken into smaller tangible factors, their effects were analysed independently, and these were then related back to the entire influence of cultural diversity.

The Principle of Contextualisation concerns the historical and social backgrounds of the research setting (Klein & Myers, 1999). In the current research it may be applied by analysing the factors that made VT possible in the current business world, their relevance as a research topic and their importance in current society. Additional data collected through forums, web research and personal conversations with the team members contributed to the understanding of the context of every team as well as the context of every interviewee. This context knowledge was used at the Data Interpretation stage, when connections were made between participants' opinions. My background as a team member is also explained.

The Principle of the Interaction Between the Researcher and Participants emphasises the importance of the critical reflection on how the research data was constructed as a result of the researcher's interaction with the participants (Klein & Myers, 1999). This kind of analysis is important for the correct interpretation of the results, as the participants' reactions were initiated by the researcher's interference and do not exist separately from the researcher.

The Principle of Abstraction and Generalisation correlates the above two principles to the general theories of social action and human understanding. It is important to show these connections in the research data in order to make it clear for the reader how I arrived at my theoretical conclusions (Klein & Myers, 1999). In this research the relation was sought to the existing Cultural Diversity theories (Hall, 1976; Hofstede, 2001; Trompenaars, 1996), which were also used for the analysis and coding.

The Principle of Dialogical Reasoning requires the author to oppose the data to his/her beliefs and preconceptions (Klein & Myers, 1999). This principle was used to ensure the neutrality of the analysis and its reliability.

The Principle of Multiple Interpretations allows the researcher to examine the results from different angles, providing different explanations for the facts (Klein & Myers, 1999). Similar to the previous principle, it adds more reliability to the research and offers the reader a choice in opinion.

The Principle of Suspicion is relevant to this study as different biases and data errors are possible (Klein & Myers, 1999). It is important to identify all the sources of possible errors and disclose those that are not possible to fix, thereby making provisions for different interpretations of data.

3.11. Summary

This research was exploratory and was approached with an interpretive perspective. The data was collected mainly through interviews with the members of the virtual teams. Additional data was collected though web search and informal conversations with the interviewees. The research instrument was developed based on the conceptual framework presented in Chapter 2.

The process of solicitation of the participants and the data collected will be described in the next chapter.

Chapter 4. Results

This chapter discusses the themes that emerged from the interviews. These themes appeared as an aggregation of topics (codes) that were given a substantial attention by the interviewees themselves. The themes discussed in this chapter directly correspond to code categories presented in Appendix C. It is important to note that the themes might not necessarily be directly related to the research questions as even though the interview questions provided the guidance to direct the interview to answer these questions, the interviewees still had freedom to talk about what they considered important to discuss. The next chapter (Chapter 5) will provide an analysis of how the emerged themes are related to the research questions.

4.1. Internet 'Nerd' Culture

In the process of this research a phenomenon emerged, which was named "Internet Nerd Culture" by one of the interviewees. This is a mixture of a professional and team culture, uniting people who feel comfortable in the internet world and use it both for work and leisure. This term will be explained further in the following paragraphs.

4.1.1. Many Cultures are Great

This research was approached with the goal of examining the influence of cultural diversity on the work of a virtual software development team. The conclusion reached is that this influence is subjective. It depends on the composition of the team. To some people, cultural diversity is its own reward, some view it as just a part of life, neither adding nor subtracting value, while others see it as an obstacle to business.

I identified with the people who love diversity, who find it interesting, challenging and exciting:

"I thought it was an impossible proposition. So that's why I thought this would be interesting, I thought it is not possible to do software, especially when everybody works on similar modules." (sic) [INTERVIEW 2].

Hence, although my view is certainly biased, it is in line with the objective of this research: to show that multicultural virtual work is possible and can be effective and enjoyable.

There are many positive influences of cultural diversity. Overcoming cultural barriers can be the beginning of successful collaboration between team members, for instance between people who are assisting each other with language learning:

"I initiate the Skype chat between that guy the you know non-English guy and the team in Spain team. And basically I kind of translate them." (sic) [INTERVIEW 19].

"So, it was really hard but I … and you get more exposed to the language and, it gets easier, of course, and it depends on how the other team members are; how are they, ah, how much are they willing to help you, you know." (sic) [INTERVIEW 1].

An interesting outlook on the contribution of goal-orientation of different cultures on the company was suggested by one of the interviewees:

"The Indians, looking for their place in the company, so, that side, that's the drive on organising the company. The Germans are following the process that creates a process. The Americans on 'how to get rich in 4 years,' very good; uh, that sort of brings the driving force. The company is not just uh, um, thinking about, "Hey, how can we build cool technology," but, "Hey, how can we, how can we really make, build something that can get sold," right? That makes a lot of sense, if you bring all of these different aspects." (sic) [INTERVIEW 8].

Cultural diversity can also be linked to a cliché, which I have called 'celebrate diversity'. It is the underlying assumption that one must be excited by the diversity of different cultures. The roots of this cliché can be historical, since conflicts have arisen (and continue to arise) between different nations, perhaps causing terrible consequences including war and genocide. So the very positive view on cultural diversity is aiming to fix the conflict. However, this view is simplistic, often blinding people from actually seeing their differences and analysing them in a practical way. There is a difference between allowing a person to remember his/her roots and way of life, and making the work collaboration suitable for everybody and productive. In this view, cultural diversity becomes a matter of understanding:

"Trust is also understanding, in some way." (sic) [INTERVIEW 3].

4.1.2. Citizens of the Global Village

"People who embrace other cultures basically in their personality [is] the important critical starting point" (sic) [INTERVIEW 2].

The people who are members of these teams already live in a global village, created by the internet. People who already perceive themselves as the citizens of this global village may be the best candidates to work effectively in a global team. It requires a certain type of individual: one who has the willingness to adjust, accept, be flexible:

"It may get really, really hard to work if you are not willing to, you know, to take some things in consideration; OK, that's just a different culture and it, I should not get angry about that or stuff like" (sic) [INTERVIEW 1].

However, being flexible must be combined with the strength and assertiveness required for the work to be done:

"You have to be aggressive in that and you have to get hold of them and you have to get the answers from them" [INTERVIEW 20].

Part of the portrait of a global citizen is an ability to share emotions over the internet media, as will be discussed later in section 4.5.

This research is also partially a virtual multicultural collaboration, and being such it had to overcome the problems of limited virtual communication. Partial understanding of some of the interviewees due to their belonging to a different culture is still a concern in this project.

In addition, some people are simply not ready for this yet. In this case, conflict created by culture may become overwhelming:

"I don't think it is very productive but I think it has a huge cost." [INTERVIEW 3].

4.1.3. Unique Ability to Learn

Multicultural virtual teams bring a unique learning possibility. Though many people did not notice any technical aspects of learning attributable to diversity, there was a definite influence of diversity into generally broadening the horizons noticed by several team members:

"super experience to be able to meet .. all the people and learn from all the cultures and take the best"[INTERVIEW 10].

The aspect of cultural diversity comes into technical learning through the ability to reach talent all around the world.

Many of the interviewees mentioned that hiring globally allows access to global talent:

"…if you can't get a guy from South Africa… [who knows] those indexing or clustering or database fundamentals, then if you can get a guy from overseas" [INTERVIEW 13];

"We're focused on finding the very cream of the crop" [INTERVIEW 21].

Another important angle noticed in one of the interviews [INTERVIEW 11] is that it is an important learning experience, since the interviewee could learn from people who were best in their fields, and also learn what was not available in his country:

"you usually end up doing much interesting type of jobs" (sic) [INTERVIEW 11].

He described management of international teams as allowing risk, for example developing utilities that were not crucial, but resulted in great success. That learning experience was also confirmed in other interviews, though it was not clear if that learning experience was attributed to the multicultural setup or simply the composition of the team:

"firstly that it is a great opportunity for me to learn a lot, first thing, because I have had the opportunity to work with such smart guys" [INTERVIEW 1].

4.1.4. Personality of an 'Internet Nerd'

Another factor that contributes to developing good relationships is the personality traits of the participants.

"…are also OK because they seem to be very outgoing kind of people. And they don't seem too arrogant."(sic) [INTERVIEW 13].

Arrogance is limiting, while willingness to make adjustments and accept other cultures helps in creating a productive relationship:

"It may get really, really hard to work if you are not willing to, you know, to take some things in consideration; OK, that's just a different culture and it, I should not get angry about that or stuff like…" (sic) [INTERVIEW 1].

Also part of the skillset of a global citizen is the ability to accept, listen, communicate and connect with other people:

"He could bring a lot of different people together" [INTERVIEW 13 about the manager of Team A].

'Internet nerds' tend to be able to connect with each other easily. For example, the idea of the virtual work in team A had its roots in the Java community, which provided valuable team support to one of the organisers of the team before the product was commercialised and the actual team hired. Members of the Java community were willing to participate in his work, providing feedback and advice free of charge. This volunteerism and interest in the work they perform is characteristic of an 'internet nerd'. It also comes with strong feelings of belonging:

"We absolutely love what we're working on" [INTERVIEW 15]; note the use of 'we' instead of 'I'.

4.1.5. The Job is Also a Hobby

Software developers occupy a very special position in the 'Internet Nerd' culture. They are the explorers of the internet world; they create the tools, open new routes and change the environment. Their interest in internet cooperation is their job, and vice versa. From one point of view, this appreciation and deep interest in the job helps team members to connect and become friends based on this interest. A group of members from Team A even created a social event out of this interest, going to visit a team member abroad to combine travel with coding and discussing programming-related topics [INTERVIEW 12, INTERVIEW 16]. This social work-related communication was a great aid in creating friendships and bonding among team members that outlived the duration of their work together. This interest is what contributes to creating a 'geek' culture – a professional culture that links people from different countries:

"We share a lot in terms of how we think, about like programming, how we approach, even like the things about the books that we've read, the kind of conversations we could have. So we do share a lot of culture, a lot of culture." (sic) [INTERVIEW 16].

However, it was also noted that having this interest in their work makes it tempting to just sit in front of the computer until the problem is solved, even if the working time is already exhausted:

"…actually now I have an idea on how to handle this and that; and basically at midnight sitting there and doing work…" [INTERVIEW 12];

"…for me the big challenge is stopping myself working, and not working too long." [INTERVIEW 14].

So it can be both helpful and challenging.

4.2. Communication

Communication stands as a cornerstone in a virtual team:

"... in a distributed team you have to communicate, right. If communication doesn't work it just doesn't work at all." [INTERVIEW 8]. Communication is also an integral part of team effectiveness as it will be shown in the following sections.

4.2.1. Limited Communication Media

Compared to the collocated team, communication in a virtual environment imposes additional challenges. One of them is the limited abilities of the communication media.

"Because one more problem with this virtual communication medium is also, I mean, I am looking at your face, on Skype, and you are always smiling. I am not sure if you are smiling right now." [INTERVIEW 16]. So an important emotional component is getting lost with internet communication. As was shown in the previous chapters, it links to trust, and trust links to understanding.

The lack of visual cues adds to another difficulty of remote communication:

"…although, people being accessible, or asking questions, was, or can be a bit more difficult. I mean if you have Skype it's very difficult to assess if someone is busy or not." [INTERVIEW 4].

On the contrary face to face communication helps to spot problems and conflicts:

"… because the guy is right there, working with you… if there is a problem it is immediately visible"(sic) [INTERVIEW 16].

Visual cues give us information about what a person is busy with at the moment, or how busy he/she is. If there is no answer, a team member has to be persistent and able to insist on getting help:

"And sometimes they are easy, sometimes they don't have time for you. But you have to be aggressive in that and you have to get hold of them and you have to get the answers from them. Otherwise who's gonna help? Nobody's gonna help you." (sic) [INTERVIEW 20].

This type of assertiveness is required, and is linked to a person who is able to work in isolation.

4.2.2. Communication Development

As a critical communication role was well understood by team members, there was some obvious work on improving it. Firstly, personal communication skills could be improved:

"The first thing is they need to start is writing a good e-mail." [INTERVIEW 6].

Communication must be encouraged and enforced, as will be discussed in the following chapter. The frequency of communication starts to play a determining role as well:

"Tackle those shortcomings by having more pairing sessions and having like a constant Skype chat and trying to communicate more often than you would if you were in a collocated situation." [INTERVIEW 16].

Some improvement in communication tends to happen automatically. For example, language proficiency improved with most of the participants through regular practice, and the only cases where the language remained a problem was in the case where communication was limited:

"We had meetings, but we didn't have days and days of meetings, it was just sort of an hour of two, over a couple of weeks, that type of thing, so, wasn't really enough time." [INTERVIEW 14].

However, in cases where language proficiency did not improve, there was usually no critical need for such communication - at least from the team's point of view. In some cases, team members resorted to written-only communication, and team managers were available to help with the translation. It remains questionable, though, if this style of communication was sufficient to create a strong team, since in the cases researched, the teams with limited communication were short-lived and no connections were created that outlived the duration of the particular project.

Communication can also be improved by using better tools:

"... You have to have [an] excellent set of tools. To coordinate what they do, the priority, the timeframes and for reviewing the code, the quality of code, and what we did." (sic) [INTERVIEW 2].

Other team members also noted that the set of tools must be standardised, since too many tools create difficulty in finding relevant information:

"Because stuff gets confused over e-mails and Skype" [INTERVIEW 13].

Many teams agreed on having an ongoing chat for keeping constant communication flow, and to create a feeling of working together or being in the same "virtual office".

It is important to notice that the non-work-related communication promoted by the team management was a successful tool for bonding the team members in participating teams. In most cases, this is just a group chat, specifically labelled as non-work, which encourages team members to post jokes and random thoughts. But there were even more creative examples:

"Once we added streaming, every single person, no matter where they work, can listen to the music that is playing in the office. That immediately brought everybody together and made them feel like they were doing the same thing." (sic) [INTERVIEW 21][5].

[5] The source is available to examiners on request.

4.3. Isolation

Isolation in a VSDT shows itself in several ways – this will be discussed in the following sections.

4.3.1. Remote Isolation

This is the isolation of working remotely, without face-to-face contact with your colleagues:

"For me sometimes it is hard, you know, you will get neurosis and you work basically talking with your computer most of the time." (sic) [INTERVIEW 1].

"Maybe for one whole day you don't say a word to anyone. Just keep silent." [INTERVIEW 9].

However, it seems that people are still able to create a deep bonding, even in a virtual world:

"I felt that they cared about what I did and understood the importance of spreading the word about the technology. So I wasn't alone." [INTERVIEW 7].

Relationships created within a team can be helpful in reducing the feeling of isolation (this will be expanded in the following chapter). Another aspect is structured communication, when the routes for communication are established, providing support for the members of the team. Most of the teams interviewed had constant open chats in order to get immediate feedback. Also, some teams had special chats for general communication - not work related - thus trying to imitate coffee-talk communication. Another effective way of breaking the feeling of isolation was pair programming:

"I find it much easier to work with pair programming when I work, than I find it working on my own; and that's perfect. For me, that's basically as if I would be sitting beside somebody in the office" [INTERVIEW 8];

"With [pair] programming I am starting to, you know, to work a good way not to feel that [isolation]." (sic) [INTERVIEW 11].

4.3.2. Cultural Isolation

Cultural isolation – working constantly with people from other cultures – can also be difficult:

"And they didn't want to talk about exclusion, they felt, the 3 of them felt it is fine. It was just me." (sic) [INTERVIEW 13].

This particular case remained unresolved, and could be a warning sign.

"They just said, 'It's not the issue.'" [INTERVIEW 13].

From the words of the interviewee, this situation was also triggered by cultural differences. Since all the members were at the same level of seniority, this interviewee expected to have equal input in the decision-making process. However, this was not the case: *"I was constantly excluded and outvoted"* [INTERVIEW 13].

4.3.3. Home Cultural Isolation

The third type of isolation is home cultural isolation. This was noticed by one of the team members working with Asian employees.

"You go to work in the morning and you come back home in the evening and if you don't do that, you are, I think, you are considered a loser in this society" [INTERVIEW 3].

This was not confirmed by the Asian participants. However, it can be explained by the fact that the interviewees who stayed working in this virtual multicultural team for a long period of time were less affected by prejudice. Alternatively, it may be the fact that it takes a certain type of person to be able to handle this type of work well:

"It is a little different because maybe they go to tasks that I could not join… But it is not a big issue." [INTERVIEW 5].

On the other hand, the majority of people find this work arrangement very convenient:

"…because I have a much better incentive, I have son at home, whom I like to spend time more that with my colleagues"(sic) [INTERVIEW 20].

All interviewees reported good support from their families, who preferred them working from home.

"… families would appreciate that they work from home but there would be a lot of noise from kids etc..." [INTERVIEW 2].

Interruptions from children are common:

"She manages to open my door and says, "Hey, daddy, I want to see pictures on the computers" (sic) [INTERVIEW 1].

All of the interviewees reported this element as non-problematic, although it may be possible to interpret their positive answer as being due to their appreciation of the time with the family and their willingness to resolve any apparent problems in order to maintain this lifestyle.

4.4. Relationships

Working with several teams, I discovered different attitudes towards work and relationships among colleagues. Some were excited:

"I became friends with most of the team. It felt almost like a big family. Work issues outside work hours were common and welcome, we're all fanatics of technology and what we do for a living."[INTERVIEW 7].

Some neutral:

"We got on well with the people…" [INTERVIEW 14].

Some noticed a negative impact of multicultural work:

"There is also a lot of miscommunication. So, for instance, one of the Japanese guys hardly ever speaks; so I hardly speak to him, right."(sic) [INTERVIEW 3].

In some cases, it resulted in the creation of non-personal, but well-functioning work relationships:

"… it's always official. Always. Actually there's no problem at all, and whenever I ask them a question they are more than happy to help me and they go out of their way to help." [INTERVIEW 20].

4.5. Emotions in a Virtual World

One of the questions that the participants were asked was how they express their emotions within virtual communication. In the live interviews, interviewees were not well able to express their responses. However, in the first written interview, the answers were clear – smiley faces (☺), exclamation marks, using expressive words ("enjoy", "terrible"), jargon ("pretty cool"), short sentences ("It's fun!!") – these all brought the written text to life.

> *"Relax. Enjoy. Learn from your colleagues. Accept differences. Become friends!"* [INTERVIEW 7].

The sentence above conveys joyful energy; it shows how its author is able to express his emotions in a written sentence.

One of the interviewees expressed an opinion that developers like to chat and communicate over the internet, so this is a comfortable environment for them:

"People tend to laugh and express themselves fluently using the internet, it wasn't a barrier." [INTERVIEW 7].

When one does not see that person face-to-face, it can give you a certain extra freedom. Topics that a person can find difficult to talk about in a real conversation can be expressed more easily in an e-mail. Also, the topic may be more favourably interpreted even when it is a hard topic. However, the opposite may also be true, where the tone of the e-mail can sound angry and harsh when this was not the intention of the author:

"Apparently my e-mail tone was very bad whereas my [same culture] guys thought the tone was fine." [INTERVIEW 13]. Some felt excited about working in a multicultural environment:

" pretty cool" [INTERVIEW 14];

"so it's more fun ..." [INTERVIEW 19];

"*It felt almost like a big family"* [INTERVIEW 7].

I propose that researching the role of emotions in virtual multicultural team work must be the next step. Most of the people interviewed mentioned problems with interpreting

emotions within the virtual media (*"I don't know if he's angry or not"*), and the importance of understanding jokes. This also closely links to the importance of face-to-face contact, as this can be targeted to remove the difficulty of reading emotions.

It seems that emotionally stable people with friendly, outgoing personalities make better members of virtual teams. They believe themselves to be 'global citizens', associate with other team members as 'part of the family' and they create more friendly ties.

4.5.1. Emotional Understanding

In a virtual environment, emotional understanding plays an important role, and was explicitly mentioned by most of the participants.

"He is not angry" [INTERVIEW 13], *"he's just serious"* [INTERVIEW 21], *"joking"* [INTERVIEW 12]. It is clear that participants felt the need to understand the emotions of their colleagues hidden behind the computer screen.

Differences in emotional expression were specifically mentioned as a problem:

"he get upset easily and just everything it ditched out of handle … "we don't say something like rough speaking... direct thing" (sic) [INTERVIEW 19].

Is inability to read emotions related to ineffectiveness? This research did not include any quantitative measurements, but it is possible that a lack of emotional understanding may link to a lack of trust, which could then be an obstacle to productive collaboration.

4.5.2. Emotional Impact on Relationships

The emotional value of team communication seems to play a special role in a virtual team, both in the level of satisfaction of team members and in the longevity of the team:

"I felt that they cared about what I did … So I wasn't alone." [INTERVIEW 7].

Team A members showed the highest level of emotional satisfaction. Their team also was the longest-lived. Also, when this team was merged into a bigger company, they preserved a lot of their autonomy and established communication and work style. It is worth noting that members who left the team to pursue a different career retained their connection to the remaining members. Team A used a lot of pair programming, which could be one of the factors

which influenced the creation of emotional bonds. As mentioned by one of the members who left Team A to work in another team:

"What I miss from all the work… is the feeling of, the collective feeling of accomplishment every week" [INTERVIEW 16].

Virtual multicultural communication brings specific difficulties in emotional sharing. Language was one of the obstacles in conveying the emotional message: *"very sensitive in how you speak … so they would get offended very quickly"* [INTERVIEW 13].

Several interviewees pointed out that it is difficult to understand others' emotions through limited communication media: *"It is also, it is also hard; it is more difficult if we just type on Skype. So, for instance, so we don't know; maybe it is a joke or maybe he feels angry."*[INTERVIEW 9].

In addition, there was a difference in emotional sharing between European and Asian (Chinese and Japanese) teams:"*... they only share with you what you have to do during this week; so you don't have this passion..."* [INTERVIEW 5]. This statement shows that the lack of emotional sharing causes a lack of passion towards work as well, which can cause a decrease in team effectiveness as a consequence.

A shared sense of humour was also an important factor of better bonding of the team: *"People will have different sense of humour too…So that is a bigger barrier than the language"* [INTERVIEW 16]; *"…so long as they have a sense of humour"* [INTERVIEW 14].

4.5.3. Face-to-Face

Regular face-to-face meetings were appreciated by all team members and contributed to creating a "feeling" for what the other person is about:

"After you have like a face to face conversation with someone then, I mean, situations improve a lot and, as time goes by, yes, you learn to understand each other better." (sic) [INTERVIEW 16].

"It is different when you are facing the people; where you are looking into the eyes, the eyes of the guy, you know, the person." [INTERVIEW 1].

This intangible visual understanding, which is instrumental in creating trust is often a missing component in virtual work. Thus it is vital to offer team members a chance to meet face-to-face and get a better sense of the other team members.

4.6. Management

The interviews revealed a wide variety of opinions about the role of management in VSDTs, ranging from *"please the manager"* [INTERVIEW 8] to the *"simply don't [manage]"* [INTERVIEW 12].

In the following sections it will be shown that the issue of management is partly a cultural notion. In Asian cultures, people tend to accept the more senior position of a manager. In Western cultures, the manager's role is perceived as an equal, often undesirable, career choice; the manager is somebody who takes care of the developers' needs, allowing them to concentrate on what they are good at: coding. Western cultures seem to be influenced by *agile* software management methodologies.

4.6.1. Management Conflict

Different countries approach management in different ways, and part of the cultural conflict in the interviewed teams concerned these differences. Several members reported some kind of disagreement on the management level.

On the topic of a female manager introduced after a merger of American and Japanese companies, the manager herself reported that *"the top management did not feel comfortable"* [INTERVIEW 2].

Furthermore, additional conflicts were created by a lack of coordination between the different cultural teams: *"the Japanese management they decided to hire some Japanese to do the same kind of work that the Chinese part did, then because it was from outside the process system that I use, of course it created some conflict" (sic)* [INTERVIEW 2]. Coordination between the teams seems to be more difficult when more cultures are working together: *"…before we were a single team … composing (sic) of people of Spain, Czech Republic,*

Singapore, China and U.S., also and Japan … [now] we interact mostly between Japan and Spain… So it is not so messy and it is a little more organised" [INTERVIEW 10].

Team members working with managers from other countries also noticed that there was a tendency to wish to be in control, especially from Japanese and Hong Kong managers:

"I think they want to keep control." [INTERVIEW 5].

"They like to control everything." [INTERVIEW 6].

It is suggested this controlling attitude is unsuitable in a virtual environment:

"Control has to emerge from the way in which the team works, but no individual has to exercise full control, that would be bad" [INTERVIEW 7].

Other disagreements appear to be on the management communication levels (*"One of the Japanese guys hardly ever speaks; so I hardly speak to him… he does his stuff and I do my stuff"*[INTERVIEW 3]), although it was accepted on the company level; as the interviewee qualified it himself: *"it is not a multicultural effort that creates any value or much value… I don't think it is very productive but I think it has a huge cost"* [INTERVIEW 3]. In this case, the cultural barrier was too high to make it more productive, and no solution was suggested from the interviewee on how to address it. As mentioned before, accepting multicultural cooperation requires flexibility, and if the participants lack it, it becomes more of a compromise, often with negative results.

4.6.2. Position of a Manager

Among the teams interviewed, a 'power distance' was discouraged between the employees and the manager. One company opted for no selected senior positions at all: *"We don't have managers*" [INTERVIEW 15].

In other teams friendships were forged between employees, and managers themselves were trying to promote friendly relationships: *"I would have private dinners with many people and stuff and have a good time"* [INTERVIEW 3].

However, a 'power distance' was noticed with the Chinese employees: *"Chinese (say), "What does the boss say," really, that's my experience. "Let's make the boss*

happy." (sic) [INTERVIEW 8]. It is worth noting, however, that other interviewees related this more to the fact that the Chinese employees in the company were more junior compared to others: *"I can imagine that an engineer in, let's say, in China who just moved to Beijing for the first time a year ago, would feel intimidated."(sic)* [INTERVIEW 3].

4.6.3. *Agile* Management

Compared to higher management, developers and team leaders were able to find working cooperative solutions more easily. In fact, most of the teams introduced creative self-managing methods to help them structure their work. Most of these methods are rooted in *agile* management practices.

In the context of VSDT, *agile* methodologies can be viewed as an aid to communication; they provide a structure to communication and establish certain compulsory communication channels:

"…then there is that visibility, as to what's happening in the team" [INTERVIEW 14].

Below is an example of an answer about using *scrum* and *pair programming:*

"it is a very effective type [method]. I, I know that I would be getting much more trouble if I would be working alone because I would get more distracted and things like that" (sic)". [INTERVIEW 1]. The interviewee compares working alone to pair programming, where you have a pair support while coding.

Team A used scrums, pair programming with compulsory weekly meetings, and two-monthly to yearly face-to-face meetings. Team B used scrums and weekly meetings while it was working in a more multicultural mode. After the split, team B reverted to the management style of the team manager giving directions and controlling the work of team members. Team C used scrums, daily meetings and occasionally pair programming. Team D used sprints; however, their communication via e-mail was not sufficient. Team E used chat rooms and different ways of connecting people in a social virtual way. Pair programming and meetings directly assisted their communication.

Pair programming seems to be a great aid in distributed teams as it not only enforces communication, it also spreads the load of taking decisions to both participants and becomes a social event:

" the feeling of, of, of having someone else sharing the burden and also, you know the social aspects of doing something together, you know, "Oh, let's have a session and discuss this." You always have someone to discuss a task with and that is part of the setup" (sic) [INTERVIEW 16].

Some team members who were exposed to pair programming expressed enthusiasm when describing pairing:

"It was pretty cool, following agile development techniques" [INTERVIEW 7].

It was a part of their job that they valued:

"I actually do like the very strict separation of roles, very process, like [what] XP and Scrum gets [gives] you" [INTERVIEW 12].

However, not all cultures seemed to be willing to accept pair programming, though it is difficult to relate this to any particular cultural attribute. The one aspect that is evidently related to culture was in the example provided by one of the interviewees. In his observations, Eastern Europeans understood *agile* practices almost as a religion, i.e. a set of rules to follow, and for that reason were unwilling to accept it.

4.6.4. Self-Management

In addition to self-managing teams, the importance of personal self-management skills was stressed by many team members:

"You need to take a lot of decisions, you know, by yourself, and you need to get discipline" [INTERVIEW 1].

"People has to adapt while being responsible for what they do at the same time." (sic) [INTERVIEW 7].

"You have to learn kind of self-discipline"(sic) [INTERVIEW 17].

"you have to manage your time very efficient" (sic) [INTERVIEW 20].

In all these sentences an imperative is used, which stresses the importance of self-management. It requires a certain type of individual to be able to cope with the work, where the pressure from the management and colleagues is not as tangible as it is in an office environment. There seems to be an interconnection between culture and the ability of people to work from home: *"...in China, we have seen several times that people just didn't work."*[INTERVIEW 3]. So this personal feature may also be related to the cultural "Collectivism vs Individualism" dimension as described by Hofstede (2010). In cultures where people are more accustomed to doing things together, individual isolated work can be more difficult to get used to. However, it is important to remember that personal features are more important than cultural, and lack of self-management skills can be a sign of the maturity of an individual: *"it's possible that ... in the countries where they expected more detailed management, micromanagement, that I did not have somebody who's been very-very mature." (sic)* [INTERVIEW 2].

4.6.5. Cultural Clusters

It appears that teams whose members work in the same conditions, i.e. remotely - have a better opportunity to create equal relationships amongst the team members. In the teams where there were 'clusters' of employees working together and communicating with other remotely, there appears to be some tension appearing on these break lines - especially considering that 'same office' employees usually belong to the same culture as well:

"They are doing everything together and they are sitting in an office together, they are talking about wives and kids and drinking coffee. So they are bonding a lot better than I .... I felt excluded."(sic) [INTERVIEW 13].

4.7. Time

Time influences the work of a virtual team in several ways: expectations of the time use, working hours, duration of tasks, working around time zone differences. This will be shown in the following sections.

4.7.1. Time Planning and Estimates

Time expectations are an important part of any business, as employees are required to plan time and resources. This is very difficult to measure even on a personal level. When different people from different cultures come together, time expectations may become problematic. The virtual style of work adds even more ambiguity, as people work according to their own personal schedule: *"Sometimes you work more… But sometimes I work less than I usually do." (sic)* [INTERVIEW 1].

Agile methodologies have created a special approach to help estimate the time used by a team by calculating team velocity, where velocity is an estimation of how many tasks a team can finish in an iteration (one to two weeks). The tasks are rated in their approximate duration by a consensus of the team members. In manager-managed teams, the manager has to learn to provide an estimate based on his knowledge of the team: *"I have to learn from my experience, basically. So I always adjust the expectation... this person sees double also, then I have to cut down to basically half. Something like that."(sic)* [INTERVIEW 19].

Team members working with Japanese and Chinese team members noticed that Chinese members tend to underestimate [INTERVIEW 19], while the Japanese estimate conservatively [INTERVIEW 19]. Estimation of the task by the Indian team seems to be unreliable: *"But if you ask them, "Can you do it by Friday, please?" They will say, "Yes." Even if they know they cannot do it. If you ask them, "What would you need to finish it by Friday?" They will give you a list of things that you can never deliver and then, you know, they have a 'saved face'."(sic)* [INTERVIEW 3]. The idea of how the time should be used was also controversial: *"They [Americans] could waste hours, weeks and days just talking about the best model, about how to implement something; instead of just prototyping something."*[INTERVIEW 5].

These comments do not represent an ultimate truth, and are just opinion and generalisation; however, they do point to cultural differences and adjustments that team members had to make to help them understand one another's cultures better.

One of the problematic views of time was regarding the use of time. This conflict appeared mostly in the teams having both Chinese and Japanese members. Chinese members were described as pushing to do more features in a shorter time, whereas Japanese members

tried to do it right the first time [INTERVIEW 3]. However, in another interview, the opinion was that Japanese team members work faster [INTERVIEW 9]. This is in agreement with the first statement, as a job done correctly the first time does not require re-work. The problems resulting from these different attitudes were evident in the quality of the delivered work.

A creative solution to the problem of time estimation was suggested by one of the teams: *"We don't have deadlines"* [INTERVIEW 15]. Apparently, this strategy worked very successfully. A similar approach was used by Team A, also successfully: *"What release date? We are just doing the best we can." (sic)* [INTERVIEW 8]. This strategy was valued positively by the team members, which is evident from the tone of their description. *"Quality is always more important than some arbitrary deadline"* [INTERVIEW 15]. This could be a recommendation for businesses to evaluate as a possible business model.

4.7.2. Working Hours

Another aspect of time management was the separation of work and rest time. For example, Asian cultures (Chinese and Japanese) described that working very long hours was quite usual for them: *"Work until 10 or something. It happens very often."* [INTERVIEW 19]. European members, however, tried to develop a discipline of working only a set number of hours: *"You just learn to… organise yourself really, so that you kind of have strict barriers between." (sic)* [INTERVIEW 12]. The argument presented by one of the members was that these time barriers are required for proper project management: *"and the project doesn't require that, they're not paying you for that and it affects your timing on the project."(sic)* [INTERVIEW 14].

An interesting observation was offered by another team member: that in the virtual environment, there is much less pressure to adhere to 'normal' working hours: *"If people are leaving every night at eleven and you don't, there is more pressure [in the office environment] for you not to be the one leaving at six"* [INTERVIEW 16].

However, other members confirmed that, in general, the separation of work/home time requires a lot of flexibility and willingness to accept changes in working routines in order to accommodate others: *"[The] Chinese wanted to work weekends and overtime and I had to adjust"* [INTERVIEW 5]. This flexibility is also required as a result of the time difference

between different time zones, which in most cases caused a problem. Indeed, the problem of time zone separation was raised by all affected interviewees as a very serious problem:

"Time zones have been a constant challenge and they are a constant challenge. I mean it is always a zoo. It slows down communication, so this is a price; this is probably one of the bigger prices to pay." [INTERVIEW 3].

The general advice from team members was to limit the participating countries to the maximum of one large time difference: *"The communication should happen only between two locations like Spain and Japan." (sic)* [INTERVIEW 19].

In general, it is evident that the time issues should be communicated much more carefully in a multicultural environment, since the default context is different.

4.8. Masculinity/Femininity

The interviews revealed that the number of women in the technology work environment is quite low. Some teams did not include any females at all. Team A had a female manager, documentation manager and support person. The female manager has subsequently taken up a job as a manager of team B. In Team A, the female manager was accepted as the norm; however, when she moved to team B, there appeared to be some tension, but more from the side of the other managers rather than the IT professionals *"In the end I did feel more resistance from the management of Japanese, rather than the engineers"* [INTERVIEW 2]. This can be explained by the personal tensions as well; however, according to the interviews, female managers in Japan are still an exception, and the more senior people might have difficulty accepting it. At the same time, a Chinese interviewee reported a much higher percentage of women in management positions:

"many women or colleagues are project managers" (sic) [INTERVIEW 9].

However, still very few women have taken up positions as developers in China. The most equal distribution was reported in India: *"It's 50/50, I should say."* [INTERVIEW 20]. It is worth noting that the numbers given here are mentioned as the perception of the interviewees, and do not represent actual gender distribution in the participating countries.

Research participants offered their explanations of the lack of women in technology. Their opinions were mostly around personal preference: (*"People just chose whatever they thought was interesting, and a lot of women were expect to… stuff like cultural sociology or languages or, psychology or, er, well, communication studies or stuff like that."(sic)* [INTERVIEW 4]) or historical expectations of the female role: *"just everything technical..uhm, you know, that's not really for girls, think of something else. You will get your clothes dirty and your fingernails will break – oh, no." (sic)* [INTERVIEW 12].

At the same time, the interviewees expressed their wish to see more equal gender distribution: *"Unfortunately the gender balance within technology circles is very uneven. We would love to have a more balanced team."* [INTERVIEW 15].

The female participant in this study also expressed great satisfaction with her work in the VSDT due to her ability to work flexible hours and spend more time with her young son. This suggests that females are suitable candidates for VSDT jobs, where they can find both a welcoming environment and some personal benefits related to the flexibility of home-based work.

4.9. Cultural Translation

Cultural differences are not necessarily a problem; however, the lack of understanding that comes from these differences can be an issue. To work around this lack of understanding, members of virtual team learn to "translate" their communication with the other cultures, based on what they already know about them and what they learn in the process of communicating with them. The pathways of cultural translation will be shown and explained in the following section.

4.9.1. Prejudices

Cultural prejudices still exist. However, not all interviewees were willing to admit this. Prejudice must not be viewed as necessarily negative; as noted by Klein and Myers, prejudice forms an important starting point of understanding (Klein & Myers, 1999).

However, it is not clear from the interviews conducted whether prejudices are indeed a problem. The interviewees felt that, in general, it does not affect the work.

The comment *"I kinda expect it, that's probably the point."(sic)* [INTERVIEW 17] can be interpreted as 'forewarned therefore forearmed'.

I suggest that the issue of cultural diversity boils down to understanding. If certain behaviour – for example, directness of emotional expression - is expected from a particular culture, it makes it easier to accept it from a representative of this culture. In the same way, deviation from a norm is easier to be subject to personal judgement, and if the norm is adjusted to another culture, this deviation from one's own cultural norm ceases to be a deviation and becomes just another norm. A kind of cultural interpretation of behaviour occurs.

On this topic, it is important to mention, that the fact of cultural translation was present in this research between me and interviewees. This could have imposed prejudices both from my and the interviewees' sides. Some of the questions could have been misunderstood by the interviewees. Some of the answers could have been misinterpreted by me. Written interview transcripts were used as a safeguard against these misinterpretations.

4.9.2. How the Job is Done

Some misunderstandings within teams may simply be work related: *"I think there are definitely different approaches to coding… it is difficult to put your finger on it."(sic)* [INTERVIEW 13]. Work-related differences between different cultures were also noted by other interviewees:

"The Indian Team, they never really delivered the quality of code that we needed." [INTERVIEW 14].

"They try to create something perfect from the beginning. So you have to be very, very careful with everything that you do, and write everything with a high quality." [INTERVIEW 5 about the Japanese].

"Japanese guys… prefer lots of documentation and, ja, they need you to design everything before you start work. … people have different ideas on how to develop out of the application." (sic) [INTERVIEW 6].

"Chinese people do mmm make much account of speed" (sic) [INTERVIEW 18].

"They work very hard. They work many, many hours of the day but the quality maybe is not the same." [INTERVIEW 5 about the Chinese team].

"It seems each one has his own style and it is hard to cooperate." [INTERVIEW 9].

Some cases have a clear description of the differences, which makes it easier to assess. In the example of the Japanese/Chinese team, who have different expectations about the speed of work, their manager had to learn how to reconcile their estimates *"I have to learn from my experience, basically. So I always adjust the expectation."* [INTERVIEW 19].

In the example of the Chinese/Japanese company, the difficulty of reconciling the work expectations actually led to a split of the team: *"We concluded that the Chinese team is not the best team to be the SDK [6]development."* [INTERVIEW 18]. This case can be also linked to prejudice. Earlier, it was suggested that prejudice is necessary for the beginning of understanding, but that understanding must be developed further with the help of communication. If this does not happen, prejudice can become an obstacle, and can lead to team division.

Moreover, there is the additional difficulty of identifying the exact issue, which makes it more difficult to resolve. The problem is not clearly understood, and an absence of *"unintended communication"* [INTERVIEW 16] makes it difficult to address. This might also be a case of prejudice present, where the problem is stubbornly not seen: *"the Irish guys said the issues that we had was bad communication issues and they wrote it off." (sic)* [INTERVIEW 13].

4.9.3. Language

Language can be learned and improved in the process if there is enough communication. While this was a problem for several of the people interviewed, it was not a problem for others. It is important to note that lack of proficiency in a language can prevent people from expressing their opinion, since it is already difficult to express oneself, and even more difficult to expose oneself by objecting to somebody's opinion, especially in a meeting:

[6] SDK – Software Development Kit

"…that there is some barrier of the language" [INTERVIEW 19].

"I initiate the Skype chat between those that guy the you know non-English guy and the team in Spain. And basically I kind of translate them. What he will say." (sic) [INTERVIEW 19].

"My English was even worse than what it is today. So, it was really hard but I … and you get more exposed to the language and, it gets easier, of course, and it depends on how the other team members are; how are they, ah, how much are they willing to help you, you know." *(sic)* [INTERVIEW 1].

4.9.4. Adaptation through Experience and Face-to-Face Communication

In most of the cases examined, people in different virtual teams got to know each other better and created common context:

"You really learn context everyday …when you get that [context], it's pretty enriching" [INTERVIEW 10].

Part of that process was establishing trust:

"There was no problem in trust or something, because I know them since long, I'm working with them."(sic) [INTERVIEW 20].

"Trust is also understanding" [INTERVIEW 3].

Thus developing trust aided cultural translation, made it instant, and created understanding. This better understanding and trust was attributed in this study to face-to-face communication or to working in the same office.

Through working together, team members learned to adapt to cultural differences: *"I make some adjustment on expectation. But basically I believe the team."(sic)* [INTERVIEW 19] (this was in reference to time adjustment on the estimates, reconciling the previously mentioned conflict between Chinese and Japanese members estimating task duration).

Adjusting to accents took some communication time: *"I don't really recall there was any person I paired with . ..where it took longer than like a week or so to really get used to their kind of accent this person was speaking. And I think also it was the other way around*

also."(sic) [INTERVIEW 12]. It is worth noting that one week here is related to intense pair-programming communication. In many cases, where intense communication was not required as part of the job, language adaptation did not occur at all: *"we didn't have days and days of meetings, it was just sort of an hour of two, over a couple of weeks, that type of thing, so there wasn't really enough time to [improve language]"* [INTERVIEW 14]. So it is not only the time of working together, but the quality of the communication that matters in achieving trust, understanding and bonding within the team.

The general opinion appears to be that face-to-face communication provides the best quality of communication, and through face-to-face communication they have learned to understand the emotional component of communication better, as discussed in chapter 5.

Also mentioned by other people as the best way to discuss complex design issues is face-to-face: *"it just takes longer if you have technical discussions remotely"* [INTERVIEW 12].

A chance to work for some time in the same office was also mentioned as important: *"... would really help if you got to know the guys up front, face-to-face, not so much in a social way, that as well, but, but also maybe work with them a bit, before you start working in a distributive way. So you can understand how it will work and what their strengths are, weaknesses, etc."(sic)* [INTERVIEW 14]. This comment suggests the importance of non-verbal communication.

Flexibility was noted by several team members, and is related to personality: *"Are you willing to make concessions about what you believe or what you are thinking or how to handle, ah, conflict and things like that?" (sic)* [INTERVIEW 1].

Also at issue is the ability to admit to one's own faults and mistakes (*"I've made a mistake. Let's sort it out."* [INTERVIEW 13]), and to be patient about the actions of others (*"be a bit relaxed, for example as I say, when you are asking the question, you need to know that maybe the people are not working at the moment, so you kind of get, have to be relaxed, say yeah, well, we can do other things while questions get answered."* [INTERVIEW 17]).

4.10. Summary

In this chapter, the themes and topics that emerged from the interviews have been discussed. Some of these themes were expected, based on the literature review and my previous familiarity with the virtual work environment; others were unexpected, and some might have been omitted, since as an interpretive researcher my opinion of what should be included is biased. In order to create a fuller picture for the reader, the topics which emerged from the literature review will be related to the topics which emerged from the real interviews in the following chapter. Also discussed will be whether and in what way the emerged topics answer the research questions.

Chapter 5. Discussion

This chapter serves to link my research knowledge before and after the data collection. My research started with a journey into the literature concerning what is already known about virtual teams and cultural differences in the workplace. This knowledge was necessary for the development of the interview plans, and to define the direction of the research. In this chapter, the initial themes that were developed based on the literature review will be explained, as well as how they revealed themselves in the actual research, this will be presented in section 5.1. The research purpose was to identify how cultural diversity affects the team's work and productivity; as these outputs were not directly measured in this research, and only perceived effectiveness was studies as the output of the team work, this effectiveness will be discussed in section 5.2. Finally, the information obtained to answer the research questions will be presented in section 5.3, followed by the summary in section 5.4.

5.1. Relation to the existing theories

At the beginning of this research, existing theories of cultural diversity were used to create possible probes for the planning of the interviews (see Figure 1 and Dimensions by Hofstede and Trompenaars). These probes were also used as the initial codes when analysing the interviews (see Appendix C). The following sections will relate existing cultural diversity theories to the research findings.

5.1.1. Universalism vs. Particularism, and Uncertainty Avoidance

These two dimensions have been paired, since both of them create rules for every situation (Hofstede, 2002; Trompenaars, 1996). In the context of this study, the interviewees were asked about the rules that they have in place for managing conflict, problems or other unexpected situations. In most cases, such rules were not in place. In some cases, the manager was responsible for handling conflict situations, in other cases the interviewee could not remember any problems appearing at all. At the same time, several teams had used the *agile* approach to managing their work. This approach is related to managing a fast-changing environment, a characteristic of the software development business. Participants who were using *agile* confirmed that they consider this approach to be an important part of managing a virtual multicultural team. This might appear to be a recommendation for real world businesses,

but it is also important to remember that as the *agile* approach is currently very popular in the software development business, it might pose the danger of 'application for the sake of application'. Detailed analysis and adjustments are still required for every virtual software development team. Such adjustments were suggested by the interviewees themselves:

"custom-tailored version of XP[is needed]" [INTERVIEW 12], or *"And if you manage to organise the process coming from some text book thingy, like XP or scrum, something like that, and if you manage to adapt that in a way that it really works for remote working and something like that, then basically all the other pieces start to fall in place pretty quickly"(sic)* [INTERVIEW 12].

5.1.2. Individualism vs. Collectivism

Present in both Hofstede's and Trompenaars's dimensions, individualism versus collectivism relates to the way in which an individual perceives himself/herself – self-sustaining and independent, or as part of a group. In this research, the prevalent opinion among all cultural groups was that a strong self-drive, excitement about the job [INTERVIEW15], and self-management skills [INTERVIEW 20, INTERVIEW 1] were necessary. Working alone, a person has to find support on his/her own: *"...you had to like ask for things to find out."(sic)* [INTERVIEW 17]. In other cases, the inability to find this support was the reason for the failure of an individual as a part of a [virtual] team.

In most cases, this characteristic is not culture-related, and is simply a personal requirement for all team members; those without this quality are not suitable to work in such an environment. However, there seems to be some connection between more collectivist cultures (notably the Chinese team in this research) and their members' ability to work totally independently. This can be explained by the fact that individualist cultures value individual achievements and, as such, people are more prepared to work in isolation, whilst for collectivist cultures, a strong feeling of belonging is required. The suggestion here would be to include individuals who are self-driven and self-managing enough both to survive a virtual team environment and to persist through the cultural adjustment difficulties.

5.1.3. Neutral vs. Emotional

This is important and controversial at the same time. In a virtual environment, emotional understanding plays an important role, and was explicitly mentioned by most of the participants. Participants felt the need to understand the emotions of their colleagues hidden behind the computer screen.

Is an inability to read emotions related to ineffectiveness? This research did not include any quantitative measurements; however, it is possible that a lack of emotional understanding links to a lack of trust, which can be an obstacle to productive collaboration.

From the cultural diversity point of view, a difference in emotional expression was noticed between some cultural groups, especially Asian as opposed to Western. However, even Asian cultures wanted to understand the emotions of their colleagues over the internet, and marked this as important. From this can be concluded that no matter how much (or how little) emotion is expected as being appropriate by a certain culture, understanding emotion is perceived to be important in multicultural virtual collaboration.

From the interviews, it can be concluded that emotional sharing contributes to the team members' satisfaction, and also helps trust and understanding. One of the tasks of virtual team management is to improve the emotional sharing among members by means of organising communication channels, social chats and/or face-to-face meetings, and attending to conflicts.

Further research is suggested to answer the questions about the extent to which emotions contribute to the effectiveness of VSDTs, and what measures can be taken to improve effectiveness through understanding emotions.

5.1.4. Specific vs. Diffuse

This dimension is characterised by the separation between work and private life. This research found that there are different approaches between cultures towards work/private life separation.

Firstly, there were different views on the time spent working. Some cultures accepted working long hours and weekends as the norm (the Chinese and Japanese in the data collected).

Others voted for structure and discipline with regard to working hours (mostly European cultures). A disciplined approach to work and rest makes sense from the point of view of the health of the participants, and as a scheduling aid as well, since overtime is not accounted for in the project estimate.

Several opinions supported flexibility, trying to accommodate others within working hours and leaving enough flexibility for themselves to perform non-work related tasks at a more convenient time.

It is clear that both flexibility and discipline are required, and the structure of working hours should be well communicated amongst the teammates in order to support their work and avoid conflicts.

Another factor influencing work/private life separation is the fact that many of the team members interviewed were very passionate about their work – their job was also their hobby. Some developers found it difficult to stop working at the end of the day, becoming completely absorbed and involved in the task. From one point of view, this is an aid in creating good relationships among colleagues based on their common interest in the work they do. Interest in the job also contributes to job satisfaction. However, there is the danger of not getting enough rest, and neglecting other aspects of life.

Some difficulties with work/home separation were noted regarding the 'work from home' setup, but in most cases the interviewees found support with this work arrangement from their families, and were very happy with this setup.

5.1.5. Achievement vs. Ascription

This factor is best described by the question: "Do we have to prove ourselves to receive status, or is it given to us?" In the multicultural virtual team, status received by birth is not easily traceable. No notion of the different views on this issue could be discerned. The general work setup in most cases favoured equality and the growth of younger professionals, *"listen to everybody"* [INTERVIEW 21]. This is also what is promoted by *agile* management methodologies, which were accepted by several teams.

5.1.6. Past, Present, Future

This dimension deals with the relevant importance of the past, the present and the future in people's lives. In an organisation, it is linked to strategy and planning: how short- term decisions must reconcile with past issues and match future long-term expectations. In the context of VSDT, this dimension was relevant to the different time/quality expectations between Japanese and Chinese members: should more features be developed faster to get immediate gratification, or should more time be spent in order to create a long-term solution? The planning of work and career also links to the perceptions of past, present and future; however, there was no significant disagreement from this point of view. Most team members - irrespective of cultural background – evidently accepted mid-term planning towards their career without any long-term expectations. The same was applicable to project plans – goals were suggested for a year or two, but not longer. This might be related to the new (short past) and fast-changing (unpredictable future) nature of IT in general, and is also in accordance with *agile* project management, where commitment to long term plans is avoided until the future becomes clearer, and the concentration is on short-term measurable goals set in iterations of 1-2 weeks.

5.1.7. Internal vs. External Control

An important difference is the attitude of culture to the environment. Do we have control over the environment, can we change it to our needs, or should we adjust to it? This dimension links to individualistic features: a strong self-drive, enthusiasm. As discussed above in section 5.1.2, strong individualism is required from the team members to make the work in VSDT possible. The 'environment' in the case of VSDT is the setup of the team, and this environment is open to change by members of the team: *"so making the process better is part of the process."* [INTERVIEW 12]. Most of the interviewees showed strong self-drive and a willingness to work and succeed. One interpretation of this is that IT professional culture is the culture of internal control, which is in tune with a creative job, one which is targeted to make a difference (as is programming in general).

Another interpretation is that it is mostly individuals who manifest strong internal control who survive successfully in VSDT.

Thus a recommendation for business would be to select strong and enthusiastic individuals for this type of environment.

5.1.8. Short Term vs. Long Term

Values associated with Long Term Orientation are thrift and perseverance; values associated with Short Term Orientation are respect for tradition, fulfilling social obligations, and protecting one's 'face' (Hofstede, et al., 2010, p. 2588). In the interviews the culture of valuing "protecting one's face" was clearly iterated by Indian members [INTERVIEW 3].

There was conflict between the Chinese and Japanese members of team B with regard to quickly achieving short goals (short-term) on the Chinese side, and creating a long-lasting quality solution (long-term) on the Japanese side. The Germans were described as *"following the process"* [INTERVIEW 8] (short-term); the Americans controversial: *"how to get rich fast"* [INTERVIEW 8] on one side, and *"in the U.S. they are more worried about design"* [INTERVIEW 5] on the other. These comments display attributes of both short-term and long-term orientation, which can be explained by the personal bias of the interviewees, and which might also be attributed to the personality traits and levels of maturity of the individuals.

It appears that a mix of short- and long-term orientation would be valuable at company level, allowing it to move forward while achieving short-term goals to maintain cash flow. However, proper communication should be in place to make the short- and long-term goals of the team clear to all the participants.

5.1.9. Power Distance

Power distance is not very common among professionals (Hofstede, 2002). In the interviewed teams, there was no obvious distance between employees and management, and friendly relationships were promoted. In the only case of (Chinese) employees expecting more ruling from the management, this could be attributed to the team comprising more junior personnel compared to other teams. In the interview process, power distance was not ever referred to as being a problem.

5.1.10. Masculinity vs. Femininity

The application of a Masculinity/Femininity index within a virtual team can be based on the difference in acceptable job roles by different cultures.

In all participating teams, the majority of the team members were men. Most interviewees confirmed this with their observation that, in general, there are far fewer women in IT than men. However, the environment seems to be welcoming to women. In all the interviews, there was no discernible negativism towards women being part of the team. In fact, several interviewees expressed their wish to see more female members. The participants' views about the reasons behind the lower percentage of women in IT were either historically related, which can be linked to the masculinity index of the culture, or based on personal preferences.

Another aspect of the masculinity/femininity dimension applicable to different cultures is based on the role of a woman as a mother. In more masculine cultures, a woman is often expected to stay at home and look after the children. Virtual work gives a possibility to combine work and staying at home. Positive feedback was received from a female team member about the convenience of combining virtual work and family responsibilities.

Suggestions for future research could be to find the factors influencing women's decision to participate in VSDTs, and whether it is valuable for businesses to encourage this participation. No intolerance towards women participating in the VSDT was found, which suggests that the masculinity/femininity dimension does not create a conflict within a team.

5.2. Perceived Effectiveness

Team effectiveness is commonly measured as a combination of objective product-related outcomes and subjective behavioural components, including member satisfaction and the ability of the team to work together long-term. (Schweitzer, 2005).

In this research, it was difficult to estimate the quality of the real product or service, since I was dealing with the commercial world. Some of the opinions about the product from inside the company expressed excitement: *"We build great products together"* [INTERVIEW 15]. This can be taken as sincere enthusiasm and is also confirmed by the hiring policy: *"We tend to hire A-level people, people who strive and want to work on the things they're working on*" [INTERVIEW 21]. But in general, for most of the teams, there was no access to the internal

measures of their particular team's effectiveness. For one team, some critical feedback about the company's product was received from one of the users. However, these comments were only descriptive of one product, which was put on hold at the time of the comments; the reason was not disclosed and it cannot be used as a measure of effectiveness.

It is important to note that product outcomes of effectiveness are different from behavioural outcomes, and therefore it makes sense to research each of these components separately (Schweitzer, 2005). Due to the lack of information concerning product-related outcomes, and based on the suggestion to analyse components of team effectiveness separately, this study concentrates on internal measures of team effectiveness, such as member satisfaction and long-term sustainability of the team.

5.3. Analysis of the research questions

The result of the research depends on its questions. In this chapter, the questions of the research will be presented and the findings explained.

5.3.1. What Challenges?

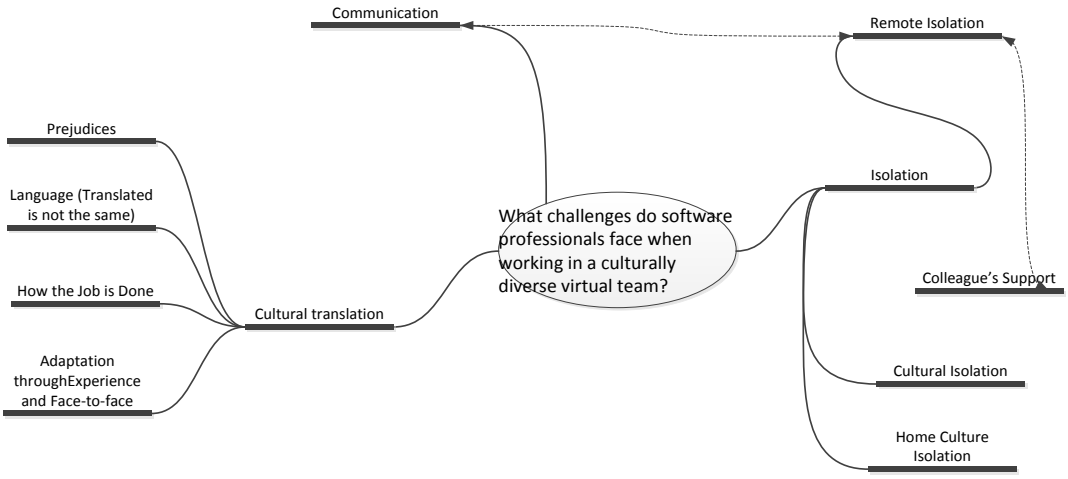


Figure 2. Virtual Work Challenges

The first research question was to identify the challenges that team members face in a VSDT. The results of the interviews can be split into three groups: *communication, isolation* and *cultural translation*. These groups are tightly linked. For example, isolation most often manifests insufficient communication, cultural translation may be required because of

insufficient communication, and quality communication can alleviate the problem of isolation and help cultural translation.

Communication is a vital part of virtual team effectiveness; without sufficient communication, virtual teams cannot function. In a virtual multicultural team, communication is affected by two threats:

- Limited internet communication media
- Difficulties in establishing relationships due to differences in cultures, i.e. cultural translation.

The importance of communication in virtual multicultural teams is stressed by many authors (Berry, 2011; Chhay & Kleiner, 2013; Chyng-Yang, 2013; Saonee, et al., 2011), and it is also recognised in the literature that establishing sufficient communication media is not an easy task (Berry, 2011).

Lack of communication can lead to the team members feeling isolated. This isolation from their colleagues, due to the remote style of work, brings threats to team effectiveness. People become less satisfied with their work, and a different understanding of tasks and lack of work visibility brings the danger of the need for re-work. Cultural isolation can further deepen the problem of disconnecting, creating cultural clusters with their own goals and standards.

The literature supports the finding that virtual team members perform better when they receive support from the network/group to which they belong (Saonee, et al., 2011) and also when they are supported by their team leader (Goh & Wasko, 2012). This support helps to reduce the feeling of isolation.

Home cultural isolation aggravates the problem on the personal level. Without support from the family and native culture, virtual work can become very difficult. This finding is also supported by previous research, where the balance of work and family was claimed to be one of the negative sides of virtual work (Hill, et al., 1996).

Cultural translation is a necessity, and is a step towards understanding. Translation starts with prejudices that are corrected to become applicable to a real situation, and that then becomes translation. The process of translation can be delayed by language differences. Even when the vocabulary of the common language is familiar to the participating parties, there is

still a translation process to match words to different contexts. Different cultures have different ideas of how to perform their work, what is the 'proper way'. Reconciling these different ways can be another translational challenge.

Existing literature offers some suggestions on how to help multicultural virtual teams reach a consensus (Ananth, et al., 2011) and select the correct set of tools to assist the reconciliation of ideas of how the work should be done (Aiken, et al., 2013); this can be used as an aid to cultural translation.

Communication, and especially face-to-face contact, aids the process of cultural translation and assists it in becoming understanding.

However, previous research has also found that face-to-face communication can be an obstacle for crossing cultural boundaries and results in creating cultural clusters (Berg, 2012), as it was described in section 4.6.5.

The ways of dealing with the challenges of VSDT will be discussed in the following sections.

5.3.2. Cultural Adjustments

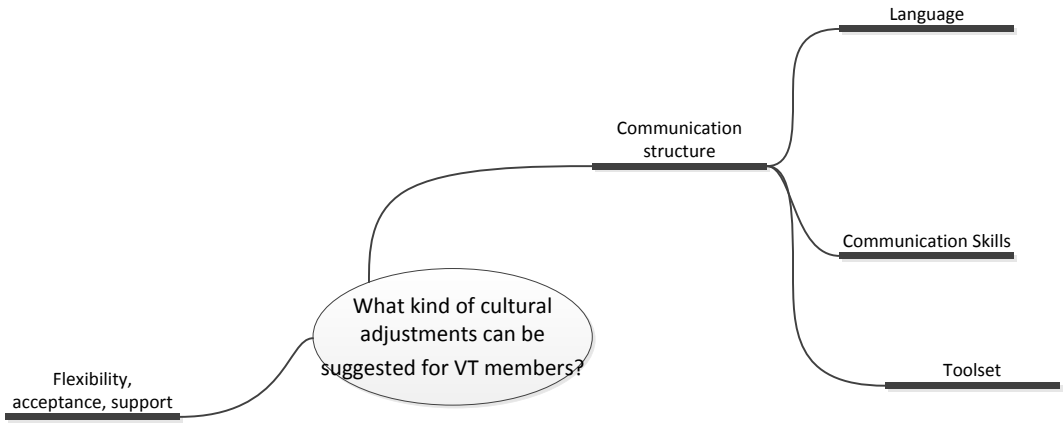


Figure 3. Cultural Adjustments for VT Members

The important thing about national culture is that it is a long-term characteristic, and that is why adjustments in practices and not cultural values are required from team members. This claim is supported by Hofstede in his finding that organisational cultures are mostly based on practices, whereas national cultures are based on values (Hofstede, 2002). Understanding this concept was crucial for being a part of the team: *"Something is from the culture; maybe*

not easy to solve that. Either you discuss it or co-work with ... people for many years but they still cannot change their culture."(sic) [INTERVIEW 6].

From the discussion of the interviews in the previous chapter, it follows that the adjustments to be made when working in a multicultural team are flexibility and the ability to communicate, and these must be supported by appropriate management strategies (to be discussed in the next section).

As discussed, flexibility and acceptance are of vital importance for the team to work well together. In a culturally diverse team, team members who are not willing to adjust their lifestyles and expectations of others are not welcome.

Communication can be viewed as another skill that members of virtual teams have to develop or re-develop for use within a virtual environment. In co-located teams, communication occurs naturally, and is supported with visual cues and a sense of the presence of the other team members. In a virtual environment, there is a risk of communication disappearing or malfunctioning, creating disconnect between team members. Communication practices and rituals are an important part of the VSDT setup. They must be supported by an appropriate set of tools accepted by all team members.

The importance of structure in communication was already noted in the literature (Chhay & Kleiner, 2013), as well as the importance of using tools suitable for the task (Aiken, et al., 2013; Wang & Haggerty, 2011) .

Language forms a large part of communication, and knowing a common language is a great aid in team bonding. Though some teams managed to work with only limited skills in their common language (English), their communication was more clustered and disconnected.

5.3.3. Management: Communicate and even Over-communicate



Figure 4. Management Behaviour

As discussed earlier (section 4.7 and 5.1.9), there were different opinions about the role of management in a virtual team. Eastern cultures accepted an authoritative role of a manager, passing control to management. Western cultures supported a collaborative and democratic way of management, with the manager tending to take the role of a support for the developers. In the virtual environment, the former approach was not very successful, and led to disconnect in the team. This can be explained by virtue of tasks being distributed by the manager, i.e. the only real necessity for communication existed between the manager and the developers, and not between the developers themselves.

Another qualitative study suggests a different explanation: for a virtual team to succeed, power should not be based on position, but rather should be allocated based on knowledge and task-fit, as such allocation helps develop trust within a team (Panteli & Tucker, 2009).

In my research, I found that the Western approach, coupled with *agile* management methodologies, made communication between all developers a necessity. This resulted in bonding the team, helping developers to get to know each other better and developing mutual trust. The *agile* approach is prominent in creating structured communication routines, which is in line with the suggestion of improving communication (see previous chapter). This conclusion does not seem to have an equivalent in the literature; however, Sharma et al. confirm that *agile* methodologies are people-oriented, collaborative and adaptive (2012) – the characteristics that seem logical for fostering the development of communication and trust.

The difference in views about the role of management created conflict on the management side, which was one of the underlying reasons for the split in the Chinese-Japanese team. Another issue was a lack of communication between the management and the team members.

On the other hand, the developers who were interviewed were flexible and ready to accept the management style suggested to them. They seemed to be open and ready to experiment. Many positive comments were directed towards *agile* methodologies. This can be an indication that *agile* methodologies are more suitable for virtual work, as they are methodologies which provide a good set of communication practices. However, this may also be treated with suspicion, as the selection of the teams was limited, and it was a matter of chance that the selected teams were successful teams. A suggestion for future research would be to investigate the applicability and success factor of *agile* methodologies in VSDT.

5.3.4. Relationships between Team Members

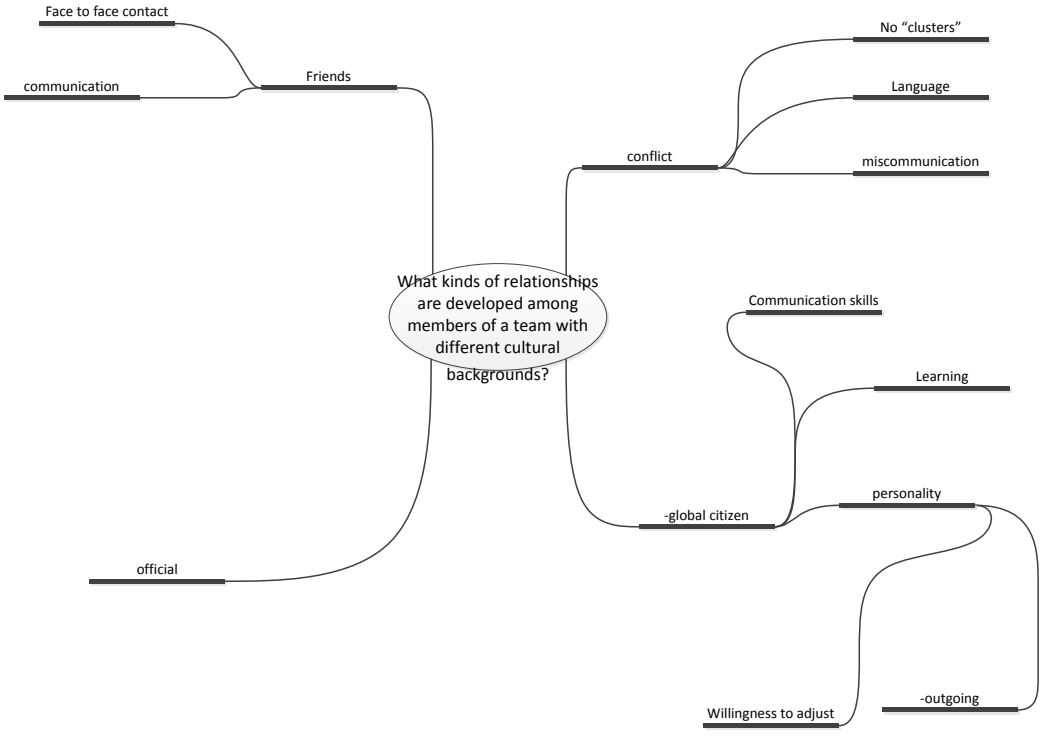


Figure 5. Relationships Between VT Members

As discussed in the previous chapter, in the researched teams, people developed different relationships with their colleagues, with happier and friendlier relationships resulting in stronger teams. It seems that the common interest of the work, regular communication and face-to-face meetings, and emotional sharing all contributed to the members' satisfaction and the durability of the team.

Another example of successful collaboration was that of official relationships, with fewer intertwined job tasks. In these cases, the individuals managed to perform their tasks on their own with limited assistance and mostly e-mail communication with their colleagues.

Interpersonal conflicts, not specifically mentioned in the interviews, existed under the surface, which was evident from the differences in how interviewees described the situation. These conflicts were caused by a lack of communication, or different expectations with regard to communication. Some conflicts were due to a lack of language proficiency and an inability to communicate subtle emotional components using non-native language. A serious conflict was mentioned by one of the interviewees, who found himself culturally and locationally excluded from the rest of the team, making him feel like an outsider.

In addition to the particular relationships that develop inside the team, there is also a unique relationship among citizens of the 'Global Village'. These relationships appear as a result of the ability to communicate via the internet. These relationships are established quickly as the answer to a requirement for information, and do not have to be long term. This constitutes a cultural connection between the members of the 'internet nerd' culture. One of the primary reasons for this connection is the unique ability to learn and share knowledge and experience, and to find answers from experts from all over the world.

Hofstede et al. acknowledge this relationship as meaningful. Even when there is no face-to-face contact, this relationship develops based on shared symbolic group membership (2010, p. 282).

These global citizens seem to share some distinct features, foremost amongst these the ability to communicate effectively over the internet media, to share emotions,

and thus to create friendships. This requires an outgoing personality ready to approach complete strangers. Together with the search for knowledge comes the willingness to accept different opinions, and the flexibility to adjust to different time zones and cultures.

5.4. Discussion Summary

In chapter 5, the themes that emerged from the interviews that were discussed in chapter 4 have been reviewed. In this chapter they have been related to the existing theories of cultural diversity – a step that was taken in order to ensure that important trends were not omitted. In addition, relation to the existing theories provides a comparison between virtual and collocated environments.

The data collected was sufficient to give answers to the research questions. These answers may not yet be complete, and further research (including qualitative methods) will be able to provide broader and more exact answers. However, the answers obtained can be used as the basis for developing a theory of cultural diversity in virtual IT teams, which remains an issue for future research and won't be addressed here.

In the next chapter, I will summarise the research journey and update the model created based on the literature review, and describe the interview results and my personal development in the understanding of cultural diversity in virtual software development teams.

Chapter 6. Conclusions

The purpose of this study was to explore the effects of cultural diversity on virtual software development team work and productivity. This research was taken from an interpretive perspective. In interpretive research, the interaction of the researcher and the research subjects becomes part of the research (Klein & Myers, 1999). It is important to explain my position in the research, as my views and biases have inevitably contributed to the research in all stages of research planning, data collection and analysis.

6.1. Reflection on the Research Process

In interpretive research, data analysis begins with research planning. How can the seven principles of evaluating interpretive research (Klein & Myers, 1999) be applied to my research preparation and process? This research was approached from the standpoint of my previous experience as a member of a virtual software development team, with the memories of the positive experience that it was. Therefore, the initial standpoint of the research concerned the advantages of working in a multicultural virtual team. Here follows my experience:

> I joined a virtual team in 2006. At that time I did not know anything about working in a virtual team, how one was managed and what to expect. All I wanted was to know that I would be paid and that I could do the job. Luckily, I met my colleagues almost immediately, as there was a scheduled face-to-face meeting within about two weeks of being hired. Meeting them in person reassured me about the reality of the company and, since my trip was paid by the company, it also confirmed that the job was real and not a financial risk. At the company meeting, I was impressed by the openness of the company management and their democratic approach about setting long-term goals and deciding on how the work should be structured. Everybody had a chance to voice their opinion, even the newest team members like myself. We decided to use Extreme Programming (XP) methodology to structure our team work, do pairing sessions, share the ownership of the code and mutually decide on what had to be done, in weekly iterations. I knew about XP; however, I had never worked in a team where it was actually implemented. This was a bit scary, but exciting at

> the same time. Another excitement about my new job was being part of an open-source product; for me as a young IT professional it provided a special pride and a status that I was glad to brag about.
>
> In the years following that initial experience, I have enjoyed travelling and participating in conferences and open-source research bodies that came with the job. It was also 'cool' to know people in so many different parts of the world; it gave me the feeling of being a global citizen.
>
> However, there were downsides for me as well. Internet connectivity problems seemed to haunt me wherever I went. Luckily, my team was very understanding about it. Another problem was the home office; having no support from my family at that time, I had to work with frequent interruptions and conflicts about my working hours. At the same time I was given some extra domestic chores, since I was at home anyway. Eventually I resigned, taking up a job with an office, regular hours and an employer providing me with the necessary documents for residence in South Africa.

This story reveals the context from which I approached my research – this is the principle 2 suggested by Klein and Myers, principle of contextualisation (1999) . With this particular background in mind, the context of virtual software development teams was of special interest to me: it seemed innovative and educational, making the whole world - with different cultures in it - easily accessible through doing business. My personal knowledge told me that it is a successful model, bringing job satisfaction to the team members and allowing the business to thrive, as I could see from the fact that there was financial stability for the employees and positive feedback from customers. My decision on context was driven by the wish to show the world how successful the management of a multicultural team can be using *agile* software development methodology. I was lucky to find additional teams – especially team B - where *agile* was not adopted, providing a good comparison to team A. At the same time, it provided an example of not-so-happy multicultural collaboration. Additional interviewees, whom I found by recommendation, seemed to confirm the principle that *agile* is the most desirable method. It is interesting to note that Team C, in comparison to all other teams, had a majority of Asian cultures in the team.

During the procedure of data collection, I found that it was impossible to avoid expressing my own opinion in conversations with the interviewees – this is the principle 3: Interaction between the Researcher and the Subject (Klein & Myers, 1999). I could have tried to remain emotionless and reserved, but I chose to be more expressive. My reasoning for this was that it would encourage people to talk more openly and increase their trust in me, especially with the people whom I had never met before. The other factor was that expressing my opinion might give the conversation another angle, thus sparking new ideas. In the process of the interviews, some of the participants explicitly asked my opinion about the topics I was questioning them about. This interchange of opinions links to the principle 1 of the hermeneutic circle (Klein & Myers, 1999), wherein I had developed a complete picture of the phenomena, and the participants (through questioning me) could see the whole picture that I had at the moment of the conversation, thereby improve their understanding.

Analysing cultural diversity, I had to familiarise myself with the existing theories. I discovered that cultural diversity in the collocated workspace was well researched, and the existing theories could be used as the starting point of my research in VSDT. I extracted the abstract factors used in the Hofstede (2010) and Trompenaars (1996) theories in order to test their applicability in the virtual software development team context – this is the principle 4 of Abstraction and Generalisation (Klein & Myers, 1999).

As described in the story of my background in virtual teams, before starting this research I had already developed my own opinion about what constitutes good and bad in VSDT and how things should be done. Throughout my research, both at data collection and data analysis stages, I had to remind myself of my own preconceptions. I have explicitly mentioned my own opinion in conjunction with the opinions of other research participants, thus treating myself as another research participant. In addition to that, I have approached this research from the perspective of interpretivism, which means that the research itself becomes part of the future of the phenomena being explored (Klein & Myers, 1999). Whatever I have been able to find out relates to the moment in time, to the participants' views of the situation at the time of interview, and that these particular views were affected by the mere fact of the interviews taking place. If this research were approached from a positivist or any other philosophical position, the findings would be different in their extent and applicability. To apply the principle 5 of Dialogical Reasoning (Klein & Myers, 1999), I needed to apply

revision cycles to my findings to challenge both my preconceptions and my explanations of the findings in a circular manner.

The principle 6 of Multiple Interpretations (Klein & Myers, 1999) is a principle which requires consideration of different interpretations of the same events/things by different people (Klein & Myers, 1999). It is applicable when defining the influences of culture; and where culture is the product of the functioning VSDT.

The principle 7 of Suspicion (Klein & Myers, 1999) is a principle that guards against different biases present in people's stories (Klein & Myers, 1999). It was applied to the narratives from the interviews and to my own reasoning as a researcher to help discern the real facts from wishful thinking, and logical explanation from cliché.

On the whole, the principle 1 of the Hermeneutic Circle (Klein & Myers, 1999) can be seen in expanding my own view on VSDT by the contributions of the participants and then further analysis by me. The entire procedure of analysis was of a hermeneutic nature – I viewed the interviews as pieces of the puzzle, and when analysing every interview, I was looking for its place in the whole picture. Adding the next interview required a review of the picture created from the previously analysed interviews. Initial data collection was constantly changing as I was becoming more and more familiar with the phenomena, and the way in which each interview proceeded was influenced by previous interviews.

6.2. Interaction between the Interviewee and the Researcher

It had already occurred to me, in the process of coding, that despite the similarity of the questions, every interviewee had his or her own central message that they wanted to share. I was able to identify these messages, as the interviewees returned to the same idea in many answers throughout the interview.

There is an inevitable difference in understanding between the author and the interpreter, emerging from the historical and cultural distance between them. The hermeneutic task consists not in covering the tension between them, but in consciously bringing it out (Klein & Myers, 1999)

It is also important to remember that I, as the interviewer, had some level of control in setting the direction of the interview. "Note that participants appropriate (i.e. make their own) ideas from the researcher and vice versa" (Klein & Myers, 1999)

For example, in the interview [INTERVIEW 3], I was surprised by the view that there is no cultural difference between all countries of Western origin: *"At the end of the day, it was still a very likeminded, I think, mix in this cultural environment, to be frank. It wasn't diverse, as in we celebrate diversity." (sic).* This view seemed new to me, and I could not avoid the wish to dispute it; I pointed out that in South Africa, cultural differences seem to be valid even within the same country, and can affect the situation in the work environment. However, later, in the process of analysing the interview, I started to see his point: multiple cultures do not mean cultural diversity, i.e. multiple cultures were present, but there was no diversity visible in the workplace, as the work aspect of all these cultures was probably the same:

"... did [different cultural behaviours] really add value or subtract value? Ah, and I don't know the answer to this. I would say it is at least ambiguous. I would probably think, at the end of the day, it was slightly negative." [INTERVIEW 3]

6.3. Virtual Research as an Example of Virtual Work

Two of my research participants could not participate in the verbal Skype interviews, and opted to write their answers to the interview questions. At first, I was disappointed by this fact, as it gave me less control over guiding the interview, and also it was giving me less information, since I could not hear voice, intonation, pauses etc. However, in the process of analysis, I began to see the advantages of this type of contribution. I recognised that I was lucky to obtain my research communication in a virtual way; indeed, it is possible to say that this research is actually a virtual multicultural project. The collaboration in the project is not team collaboration, and the nature of this collaboration is short-lived; however, it can provide additional data to the research. Having the interview data collected both as voice interview and written interview gave me the chance to understand better how these media can work in a virtual multicultural collaboration.

On Skype, I could hear the voice and imagine the facial expression of the person talking. Where the interviewee was proficient in English and the connection was good, I

could easily pick up jokes and emotions. At the same time, where I did not know the people well, I could not distinguish what the person actually thought. For example, in one interview I could not understand if the person was trying to be objective or if the topic was actually uncomfortable for him (in this case the quality of the connection was also bad). Without a good emotional connection with the interviewee, I had more suspicion about what was being said and was not sure about how it should be interpreted.

In my research, I was also a person from a different culture, as I did not share an origin with any of the interviewees. However, I could not resist some emotional attachment to what was said by the people whose culture was more similar to mine. I felt more trust towards people who were culturally closer to me, because I could understand more from the tone of their voice. I felt that if something was said with irony or as a joke I was able to pick it up from the tone of the voice, whereas talking to culturally more diverse interviewees, I was unsure.

6.4. Influences of Cultural Diversity

It is the argument of this research that cultural diversity affects the work of virtual software development teams, and understanding its factors may be useful for managing its impact and can help build stronger and more effective teams.

When the model of cultural diversity influences in VSDT was created in the conceptual framework (figure 1, repeated on figure 6), a large part of the cultural diversity factors appeared to come as part of the *background* of the team members. In the actual research it turned out that the *process* (actual time of work) of the team is much more affected by cultural diversity, as presented in Figure 7. In the diagram in figure 7, the transparency marks the factors whose influence suggested initially turned out to be minimal. The size of the shapes was used to mark the relative importance of the factor.

Culture is a long-term characteristic, which is difficult (if not impossible) to change. However, adaptation is possible, and is the key factor for successful collaboration in a multicultural virtual environment. In assessing the general value of cultural diversity on the team it was found that there need be two approaches:

- Team members see cultural diversity as interesting and exciting, a perk of this job, struggling is not noticeable and discarded in the excitement and enthusiasm of the task
- Historical prejudices and lack of communication deepen the distance, though in fact the problems are not different from the usual single-culture environment.

Both of these approaches are possible, and demonstrated themselves in the interviews. However, even though the first approach might hide internal conflict, it seems to be far more effective and produces better teams and results, it ensures higher job satisfaction and a willingness of members to stay with the team and overcome the difficulties.

In the following chapter, the factors used in the updated model will be described. For convenience, the initial diagram from chapter 1 is presented first, followed by the updated diagram, based on the results of this research. Bold type font will be used to refer to the factors in the model from the text.

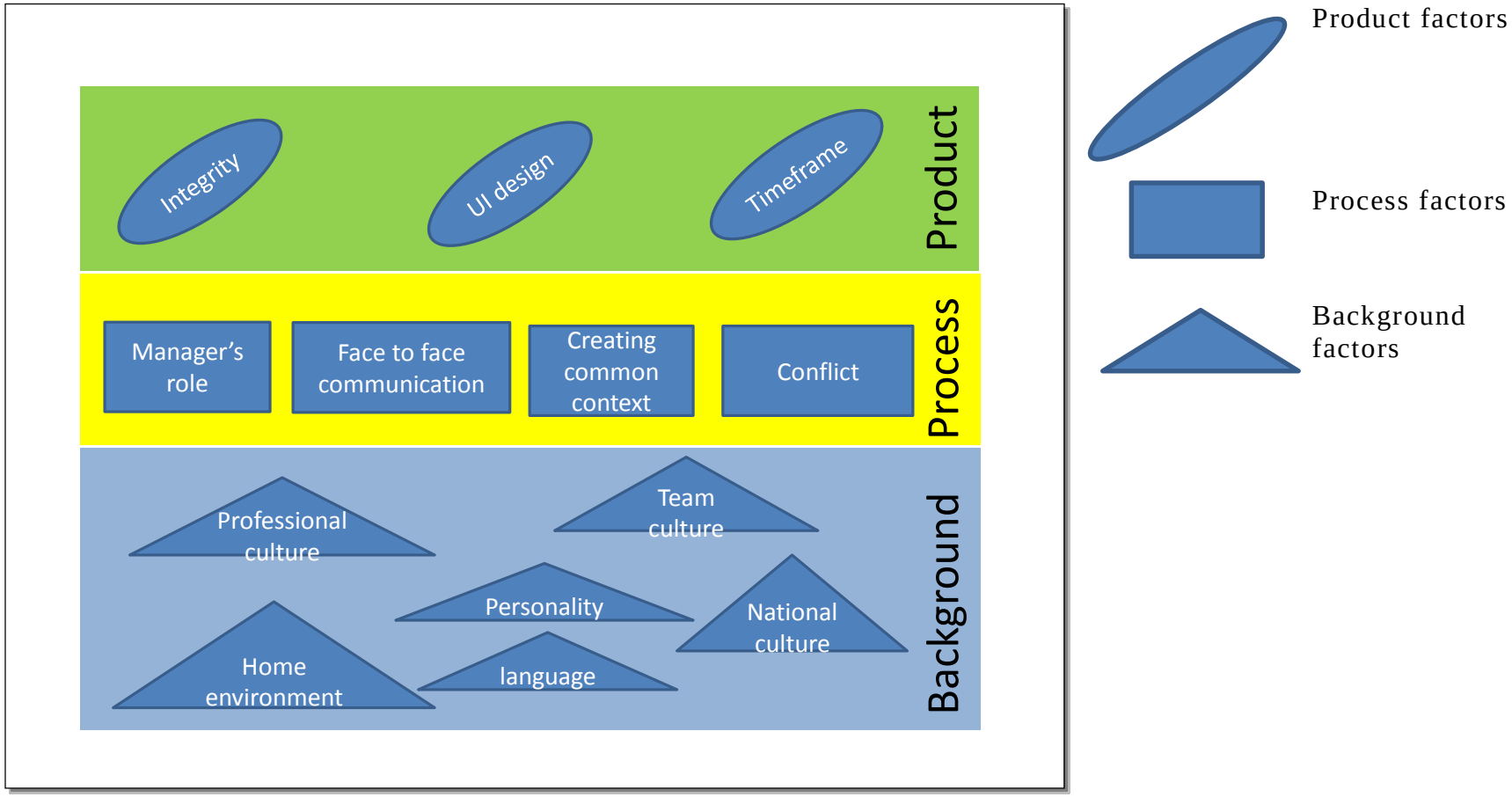
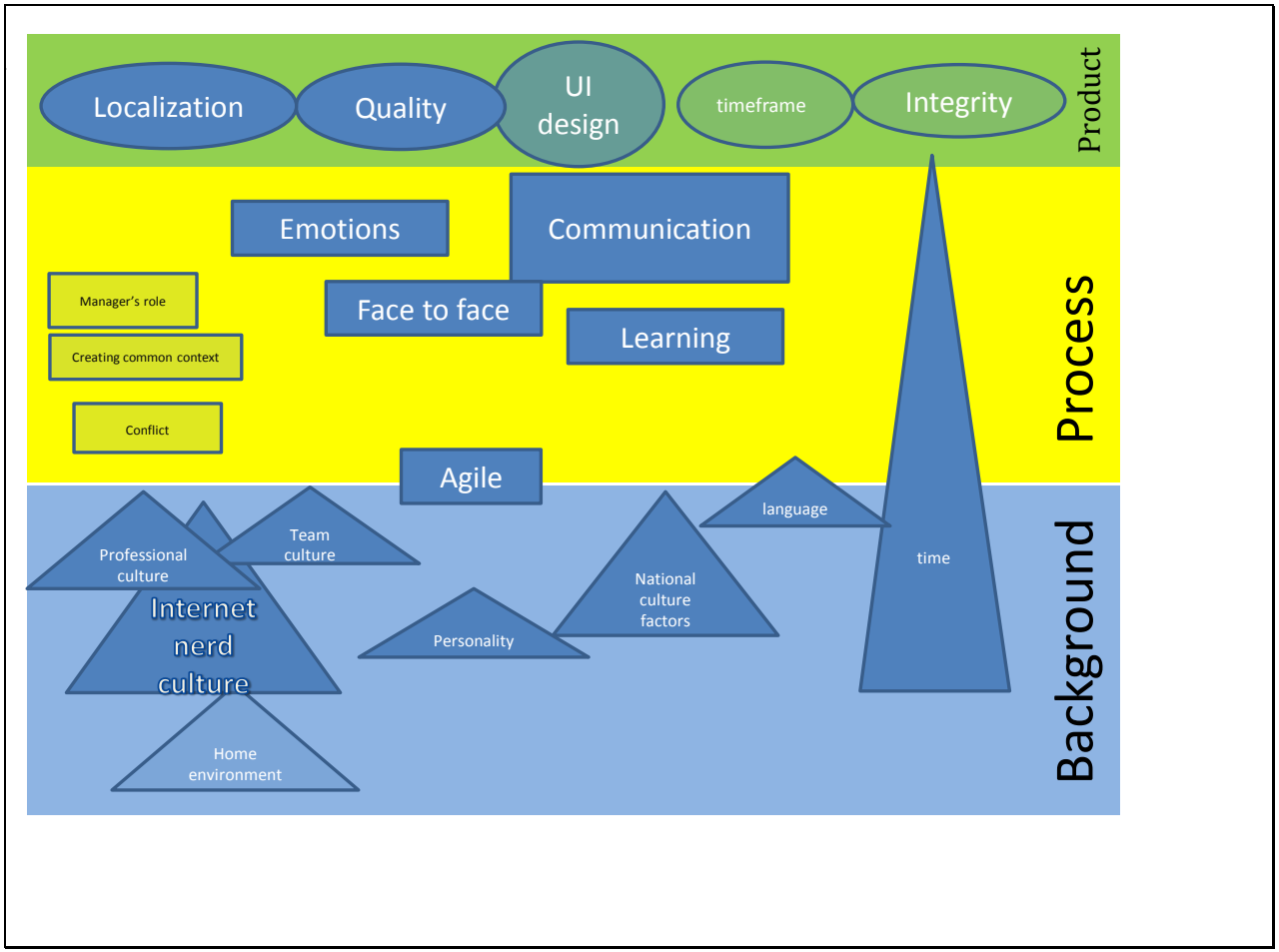


Figure 6. Initial Conceptual Framework Diagram



Product factors

Process factors

Background factors

Transparency Indicates the relative importance of the factor

Overlapping shapes Shows that the shape is applicable to more than one stage

Figure 7. Cultural Diversity Factors (Results)

6.4.1. Background

It is important to understand the context of **team** work, and the **personality** and individual context of every interviewee, to be able to relate their experiences to the situation. In the preparation for this research, I suggested that people come into a virtual team without any common context, and consequently cultural differences (see **national culture** on the model Figure 7) become an obstacle for creating this context. However, the interviews have shown the opposite: developers share their own **'internet nerd'** culture. There are differences; however, there is also a strong sense of unity, there are similarities in the way developers think, program, and solve problems, the conversations that they have and the books that they read. 'Internet nerd' culture was added to the model, and its role over-arches professional and team culture. It can be described as a strong professional culture, which helps in establishing communication, and which affects the developer's values towards the home environment.

Professional culture was pre-emptive to building **team culture** (see the model): people who shared an interest in and a passion for their work developed friendships. They saw collaboration with other cultures as a unique chance to learn – both on a personal and on a professional level. This mutual learning (which will be discussed in the 'Process' section) created a common context, unique to the particular team. The participants had their initial knowledge of ***agile*** development when they joined virtual teams, thus this factor contributed to the 'Background'. However, this factor is shown as overlapping with the 'Process' on the diagram: as discussed previously (section 4.7.3), some teams created their own version of ***agile*** development (new on the model), customised to their own needs, which made them stand out as a team, as a unique micro-society with their own rules and customs. These adjustments helped to overcome the difficulties of different **languages** (on the model), as language learning occurred due to mutual support. The 'Language' triangle on the model overlaps onto the 'Process' section – this is done to show that the process of common work helped the team members to learn the language (see the next paragraph). Different definitions of **time** (as on the model) were also adjusted through creating common context and team culture. The initial diagram included **time** as part of national culture factors, however the influence of time was mentioned as an important factor by the interview participants and for that reason was shown with a separate shape, which occupies a larger space in the model. **Time** influence was also relevant on the 'Process' stage as will be discussed further in the next section. The influence of

home environment did not come out strongly in the interviews, which is indicated with the transparency on the diagram.

These findings contribute to the answer of research question 4: cultural adjustments suggested for the members of virtual teams. The suggestions are: developing common context, an own *agile* development style, rules and customs. In addition to cultural adjustments, VSDT members must adapt to a virtual workspace and a home office environment.

It also contributes to the answer to research question 3: what relationships are developed between team members? It seems that relationships stem from the 'internet nerd' culture; it is a function of cultural support, a feeling of belonging to the same community. The closer relationships and friendships that were developed based on this culture are described in the following sub-section.

6.4.2. Process

In the process of work in virtual teams, the most important factor remains **communication**. Owing to its importance, it has been separated into a distinct factor on the model, compared to the initial model where it was mentioned in 'Face-to-face Communication'. Communication aids in team bonding, and in creating relationships and friendships. Communication is an important part of the mutual support of team members. Regular communication helps members to beat feelings of isolation, creating a more disciplined separation of work and life.

Through communication, an important **learning** process takes place between team members. Learning was not present on the initial Conceptual Framework model; however, the research showed that its value is important and was mentioned by several participants. As mentioned before, the ability to unite talent from all over the world is one of the objectives of a virtual collaboration. When this talent becomes available, knowledge transfer can take place between team members, which is of benefit to the members themselves and which can be one of the incentives of working in a virtual team.

Emotional connection – a new factor on the model: '**Emotions'** - is another important factor in virtual team effectiveness. This research has shown that most team members were looking for emotional connections and understanding via the internet media. A sense of humour

was one of critical factors of emotional communication. Chats, forums and informal instant messaging were used by team members to promote sharing jokes and gossip. Another factor was acceptability: not being excluded, knowing that your colleague is not angry.

Emotional understanding was greatly improved by **face-to-face** contact. Both initial and regular face-to-face contact was considered important by the team members. Face-to-face contact provided missing non-verbal communication cues, linked to trust and better understanding, the ability to 'feel' a person.

Several teams successfully used ***agile*** methodologies to manage their work. This *agile* factor was added on the updated model both in 'Background' and 'Process'. *Agile* methods established communication channels and enforced frequent communication. *Agile* was also helpful with time management. Another benefit of *agile* is that it is an attribute of professional IT culture shared around the world, bringing common understanding of key software development points: time, estimates and communication, thus contributing to the common 'Background' of the team members. **Time** perceptions and estimation methods were reported as improving in the process of the team work as people got to know each other better.

The **manager's role** was controversial. Indeed, one of the teams reported an absence of managers, where the designated manager's role was replaced by motivated individuals. To indicate the relative un-importance of the manager presence I use transparency on the diagram. In other cases the manager's role concentrated on establishing effective communication inside the team, and from the team to the company. This answers research question 2, which relates to the behaviour expected from the manager of a virtual software development team.

The other aspect – '**Creating Common Context**' – was not revealed in the interviews as stand-alone factor. Thus it can be concluded that this was a natural process in team life, and was taking place in the background unnoticed. This is indicated by transparency on the diagram.

The **conflict** aspect was reported amongst the management of the company and was not reported among the team members. This can be explained by the fact that conflicts were resolved easily, or they remained unnoticed by the team members. This is also indicated by the transparency on the diagram.

The ‘Process’ also reveals answers to research question 1: what challenges do software professionals face when working in a distributed virtual team? Contrary to my initial proposition, most of these challenges appeared in the process of work, i.e. they were not expected as the part of the setup, but were discovered by the team members when they started the work. These challenges are: isolation, discipline and self-management, emotional understanding and time management.

Another question that is provided with additional information in the ‘Process’ is question 3, which concerns the relationships established among the members of virtual software development teams. In the ‘Background’, it has been pointed out that there is a relationship of belonging to the ‘internet nerd’ culture. In the ‘Process’ there is the additional ‘mentor –student’ relationship that appears due to the unique learning opportunities. There is also ad-hoc leadership, which appears when team members volunteer to take on the management role in order to steer their work as a team.

6.4.3. Product

In the final product, the influence of cultural diversity could be on the **quality** of the product, especially if the underlying cultural conflicts and tensions have not been resolved. On the updated model, ‘Integrity’ has been replaced with ‘Quality’ as a more generally applicable term. Quality is not only affected by the integrity of the product, but also by different expectations of quality in different cultures. These expectations affect both quality and the development timeframe.

A minor influence may exist on the **UI design** (indicated by more transparent oval on the diagram)**;** I think it is more appropriate to replace this factor with “**Localisation**”. Localisation in this context means both translation to different languages, and reachability of the local market. Initially proposed factors of **timeframe** and **integrity** are also indicated by transparency as they did not come out strongly in the interviews.

The ‘Product’ stage is indirectly influenced by cultural diversity, and mostly shows the result of team work in the previous stages. It does not offer answers to the research questions, but can be used as a validation of the effectiveness of the team work.

6.4.4. Summary

People of different cultural backgrounds often come into a virtual team from the common ‘internet nerd’ culture, which creates initial common context and pre-requisites for understanding. However, differences in time perceptions, languages and national cultures still exist and need to be addressed at the ‘Process’ stage.

The main work on cultural adjustments occurs during the ‘Process’ stage and requires a lot of communication. This communication should be structured and enforced. Regular face-to-face meetings are required, as they address the important problem of emotional connection and understanding between team members.

The final stage – ‘Product’ – is the result of the work done during the ‘Process’ stage. If communication was established successfully, and issues resolved at the ‘Process’ stage, the influence of cultural diversity on the final product is expected to be positive.

6.5. Research Contributions

This research collected data on real world, functioning virtual teams. Until recently, most of the research on Virtual Teams was undertaken in a laboratory setting (Powell, et al., 2004), which makes the data from this research a valuable contribution to the body of knowledge. This research can be seen as a contribution towards a development of the theory of Cultural Diversity in the Virtual Work Environment. In this research, I have developed propositions about the cultural diversity influence factors on the process of work in a Virtual Software Development Team. From the interviews with the team members I have extracted possible suggestions for companies looking to implement a Virtual Software Development Business Model.

Research contributions for businesses and suggestions for future research will be discussed in the following section.

6.5.1. Possible Suggestions for Business

The following paragraphs will summarise the findings of this research applicable for use in real world companies.

6.5.1.1 Use Agile

Businesses looking into implementing virtual software development teams should evaluate using *agile* management principles. Several of the participating teams were using *agile* methods to manage the software development process in their teams. The participants in these teams reported the positive influence of this management strategy, and their own overall satisfaction with *agile*. Participants from the teams where *agile* practices were not used remained neutral about their management strategy. In fact, teams without *agile* strategies resorted to a reduced level of multicultural and virtual communication. *Agile* strategies seem to be appropriate for virtual software development for two reasons. Firstly, they enforce communication. Secondly, *agile* is part of professional software development culture and can be understood by software professionals independently of their cultural background.

6.5.1.2 Use face-to-face meetings to 'gel' the team.

Face-to-face meetings were used by most of the interviewed teams, and all interviewees reported the positive influence of these meetings. Face-to-face meetings contribute towards developing trust and understanding; they provide missing visual cues to communication, and help people to understand emotions and humour better. Face-to-face meetings also provide a chance to socialise, which helps to develop relationships among colleagues and can be viewed as a way of resolving conflict.

Face-to-face work can also be more productive, and important design decisions should be taken during face-to-face meetings where possible.

6.5.1.3 Suitable Personalities

Virtual Teams require additional skills and talents from their members. They must be proficient in the team-selected language, be able to communicate effectively over the internet, and possess discipline and self-management skills. This skillset is non-negotiable for virtual team members, and business owners need to be able to evaluate their potential employees based on these requirements.

6.5.1.4 Long and short-term Goals

It appears that the mix of short- and long-term orientation is valuable on the company level, allowing it to move forward while achieving short- term goals to

maintain cash flow. However, proper communication should be in place to make the short and long term goals of the team clear to all the participants.

Another creative suggestion is to focus developers' work on quality and not on deadlines, in order to achieve the best product. This works successfully with highly motivated individuals forming the team, but may be risky and leaves the ambiguity of unresolved timelines.

6.5.2. Possible Suggestions for Further Research

One of the limitations of this study was the limitation of the definition of effectiveness. This research was only concerned with internal measures of effectiveness: member satisfaction and team sustainability (Schweitzer, 2005). Future research is required to investigate objective outputs of team effectiveness in VSDT, i.e. team work evaluation by companies, customers, etc.

In this research, two factors have drawn special attention due to the amount of attention the interviewees paid to them. These factors are emotions in virtual multicultural work, and the role of *agile* methodologies in team management. Suggestions for future research would be:

- Evaluate the role of emotions in virtual multicultural teams
- Investigate the applicability and success factor of *agile* methodologies in VSDT.

In the research, there was a noticeable disagreement between the number of females in the teams, and the positive attitude towards female participation in such teams from the existing members. It is suggested that further research is required to find the factors influencing women's decisions to participate in VSDTs, and whether there is value to be added to businesses to encourage this participation.

Further research is also required to find qualitative confirmation of the applicability of the cultural factors proposed in this research.

6.6. Summary

In this research, data has been collected on real-world functioning virtual teams. This data is based on the personal experiences of the team members. It provides an interpretive view

on this type of work. A range of factors influencing virtual multicultural work was defined, which may be used in future research for the development of a theory of virtual multicultural work. Though this research is an indication of the potential of productive virtual multicultural collaboration, it still leaves some important measures of effectiveness to future research.

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Appendix A

This appendix gives the details of the interview plans. In order to relate the interview questions to the research questions, the interview plans are presented in a table, where the 1st column contains the interview questions and the 2nd column is related to research question numbers. Where the interview question is not directly linked to the research question, this is also explained in the 2nd column. The 3rd column provides links to the conceptual model (Figure 1) factors that the question is expected to probe.

For convenience, the research questions are repeated below.

Research Questions

1. What challenges do software professionals face when working in a culturally diverse virtual team?

2. What kind of management behaviour do software professionals expect will help mitigate the cultural diversity impact on their work?

3. What kinds of relationships are developed among members of a team with different cultural backgrounds?

4. What kind of cultural adjustments can be suggested for VT members?

Interview Plan (general)

Interview Question	**Research Question Number**	**Conceptual Framework Factor**
Introductory section:		
- Please introduce yourself and describe your role within the organisation.	Introductory	

- What influenced your decision to take this job? How did you find this position and apply for it?	Introductory	
Main section:		
- Describe your first impressions of the new job.	1,3,4	Personality, Team Culture, National Culture (any factor), Language
- Describe your work environment. How are the tasks determined? Who is responsible for what? Do you prefer to work together with the other team members to reach the team goal no matter who is responsible for what, or do you have separate tasks, which each member of the team is responsible for? Do you think this style of work is preferred by all the team members, or do some team members tend to work in a different way? What can you suggest to improve the way you work? In a case when there are differences in the work style preferences, how would you accommodate the other team members?	1,2,3,4	National Culture (individualism, power distance, achievement vs ascription), manager's role, creating common context, Team culture, Professional culture

- How do you communicate with the other team members? Describe formal and informal communication. How do you share emotions with your team colleagues? Do you find that some of your colleagues tend to control their emotions more than necessary or express too much emotion? How does it affect your relationship with them (work and personal)?	1,2,3,4	National culture (specific vs diffuse, neutral vs affective), team culture, home environment
- Have you developed personal friendships with any other team members? When you meet outside of your working schedule (online or face-to-face), do you discuss work issues? If you can think of an example of such a conversation, what was the reaction from the other team members? Were they willing to participate, or did they prefer to talk about non-work related issues?	1,3,4	Team culture, personality, national culture (specific vs diffuse) , home environment
- Do you have a specific set of rules regarding your work issues, or do you approach any issue as it appears, trying to find the best solution? Can	1,2,4	National culture (universalism vs particularism), conflict, manager's role

you think of an example of an issue that you had to solve, and how did the team members approach it?		
- What do you think about the general work set-up and its effectiveness in reaching the project goals?	1,2,4	Integrity, team culture
- How is working with people from different cultures different from working in a more homogenous team?	1,4	National culture (any factor)
- How do you manage time (your own, and time to communicate with the other team members)? How does the team make sure that the project goals are reached in time? Do you make any special provisions to accommodate time perceptions of the team members from the other countries?	1,2,4	Timeframe, National Culture (past, present or future, long-term vs short term orientation).
- How do team members relate to the team management? Is there any noticeable difference in how the team	2,3,4	Manager's role, National culture (power distance), conflict

members relate to the manager?		
- Do you have both males and females in the team? What roles do both sexes perform?	1,3,4	National culture (masculinity vs femininity)
- Do you think that the members should control the situation or rather respond to it? Which of these is more important to survive as a virtual team?	1,2,4	National Culture (internal or external control)
- How does your team deal with the uncertainty of the future? Do you have any specific strategies to confirm that you are reaching your goals and that the team is doing well? Can you describe them? Were these strategies (if they exist) developed with the participation of all of the team members? If they do not exist, do you think team members feel uncomfortable about their absence?	1,2,3,4	National culture (uncertainty avoidance, long-term vs short-term orientation), timeframe, Team culture, Professional Culture, Manager's Role
- What language do you use for team communication? What communication difficulties do you face due to the use of a foreign language? How is language proficiency tested	1,4	face to face communication

when a new team member is hired?		
- Can you think of an example from your past experiences where cultural diversity of the team resulted in a different outcome from what it could have been if the team was more homogenous?	1	National culture (any factor)
- Can you offer some advice for people working in a virtual environment and/or multicultural environment?	4	Integrity, UI design, Timeframe, face to face communication
- What can make your work better (more productive, more enjoyable, more stable)?	3,4	Integrity, UI design, Timeframe, Manager's role, creating common context, conflict
- Is there anything else you want to share about your work experience?	What could have been omitted	

Interview Plan (team founder)

Interview Question	Research Question Number	Conceptual Framework Factor
- Please introduce yourself and describe your role within the organisation	Introductory	Introductory
- How did you come up with the idea of Team A? What do you see your role as? Then Team B?	2,3,4	Manager's role, UI design, timeframe, integrity
- What is your business now?	Understand the current background in order to adjust questions if necessary	
- Why virtual? What inspiration did you get from MySql[7]?	1,2,3,4	UI design, timeframe, integrity
- How did you get the capital?	This question was expected to provide some existing solutions to VSDT problems, as financing a project requires proof of the viability of the business setup	
- What's next?	Understand the current background in order to adjust questions if necessary	
- How did you set up the team? How did you find people for your organisation?	2,4	National culture (individualism vs collectivism), personality,

[7] MySql – open source database engine

		team culture, professional culture
- How do you find working with different cultures? What are the differences?	1,2,3,4	Integrity, conflict, timeframe, manager's role, creating common context, national culture (any factor), language
-		
- What jobs can be done virtually, and which ones require face-to-face contact?	2,4	Face to face communication
- Did you develop personal friendships with any people you worked with from different cultures? Do you think social interaction is important in virtual international organisations?	1,2,3,4	National culture (specific vs diffuse, neutral vs affective, individualism vs collectivism), face-to-face communication, home environment, team culture,

		professional culture
- Why did you immigrate?	1	National culture (any factor), personality
- Do you think it is important to set up a proper structure for business, or is it more important to be *agile* and react to specific events? Is it different when working with different cultures?	2,4	Team culture, professional culture, creating common context, manager's role
- How do you combine your business, social and private life? Is it challenging? Managing time? Running international business? Strategy meetings?	1,2,3	Home environment, timeframe, integrity, national culture (any factor)
- Do you notice any work-related differences among different cultures?	1,4	National culture (any factor)
- Did you notice any differences with regard to how different cultures approach deadlines? Virtual work in general?	1,4	National culture (past, present or future, long-term vs short term orientation), timeframe, integrity

- Any gender-related perceptions in different cultures?	1,3,4	National culture (masculinity vs femininity
- What are the benefits and disadvantages of a virtual organisation? How effective is a virtual organisation compared to non-virtual?	2,4	UI design, integrity, timeframe
- Emotions? Is it possible to share emotions in the virtual world? Is it required for a healthy climate in an organisation?	1,2,3,4	National culture (neutral vs affective), team culture
- What kinds of people are best suited to working in a virtual multicultural environment?	1,2,3,4	Personality, Professional culture
- How does your team deal with the uncertainty of the future? Do you have any specific strategies to confirm that you are reaching your goals and that the team is doing well? Can you describe them? Were these strategies, if they exist, developed with the participation of all of the team members? If they do not exist, do you think team members	1,2,3,4	National culture (uncertainty avoidance, long-term vs short-term orientation), timeframe, Team culture, Professional Culture, Manager's Role

feel uncomfortable about their absence?		
- What language do you use for team communication? What communication difficulties do you face due to the use of a foreign language? How is language proficiency tested when a new team member is hired?	1,4	Language, face to face communication
- Can you think of an example from your past experiences where cultural diversity of the team resulted in some different outcome than what it could have been if the team was more homogenous?	1	National culture (any factor)
- Can you offer some advice for people working in a virtual environment and/or multicultural environment?	4	Integrity, UI design, Timeframe, face to face communication
- What can make your work better (more productive, more enjoyable, more stable)?	3,4	Integrity, UI design, Timeframe, Manager's role, creating common context, conflict

- Is there anything else you want to share about your work experience?	What could have been omitted

-

Appendix B

Letter to the Respondents

The Graduate School of Business Administration

2 St David's Place, Parktown,

Johannesburg, 2193,

South Africa

PO Box 98, WITS, 2050

Website: www.wbs.ac.za

MM RESEARCH CONSENT FORM

The Influence of Cultural Diversity on the Effectiveness of Virtual Software Development Teams

INFORMATION SHEET AND CONSENT FORM

Who I am

Hello, I am Tetyana Loskutova. I am conducting research for the purpose of completing my MM at Wits Business School.

What I am doing

I am conducting research on the influence of Cultural Diversity on the effectiveness of Virtual Software Development Teams. I am conducting a qualitative study with 5-15 informants to establish:

4. What challenges do software professionals face when working in a culturally diverse virtual team?

5. What kind of management behaviour do software professionals expect will help mitigate the cultural diversity impact on their work?

6. What kinds of relationships are developed among members of a team with different cultural backgrounds?

7. What kind of cultural adjustments can be suggested for VT members?

Your participation

I am asking you whether you will allow me to conduct one interview with you. If you agree, I will ask you to participate in one interview for approximately one hour. I am also asking you to give me permission to tape record the interview. I tape record interviews so that I can accurately record what is said.

Please understand that **your participation is voluntary** and you are not being forced to take part in this study. The choice of whether to participate or not is yours alone. If you choose not to take part, you will not be affected in any way whatsoever. If you agree to participate, you may stop participating in the research at any time and tell me that you do not want to go continue. If you do this, there will also be no penalties and you will NOT be prejudiced in ANY way.

Confidentiality

Any study records that identify you will be kept confidential to the extent possible by law. The records from your participation may be reviewed by people responsible for making sure that research is done properly, including my academic supervisor/s. (All of these people are required to keep your identity confidential.)

All study records will be destroyed after the completion and marking of my thesis. I will refer to you by a code number or pseudonym (another name) in the thesis and any further publication.

Risks/discomforts

At the present time, I do not see any risks in your participation. The risks associated with participation in this study are no greater than those encountered in daily life.

Benefits

There are no immediate benefits to you from participating in this study. However, this study will be extremely helpful to us in understanding the influence of the cultural diversity on the effectiveness of virtual software development teams.

If you would like to receive feedback on the study, I can send you the results of the study when it is completed sometime after 1 Jan 2013.

Who to contact if you have been harmed or have any concerns

This research has been approved by the Wits Business School. If you have any complaints about ethical aspects of the research or feel that you have been harmed in any way by participating in this study, please contact the Research Office Manager at the Wits Business School, Mmabatho Leeuw. Mmabatho.leeuw@wits.ac.za

If you have concerns or questions about the research you may call my academic research supervisor Louise Whittaker on +27 11 717-3684.

CONSENT

I hereby agree to participate in research on the influence of the cultural diversity on the effectiveness of virtual software development teams. I understand that I am participating freely and without being forced in any way to do so. I also understand that I can stop participating at any point should I not want to continue and that this decision will not in any way affect me negatively.

I understand that this is a research project whose purpose is not necessarily to benefit me personally in the immediate or short term.

I understand that my participation will remain confidential.

……..

Signature of participant **Date**:……..

I hereby agree to the tape-recording of my participation in the study.

……..

Signature of participant **Date**:……..

Appendix C

The table below presents initial codes developed from the data and the categories into which they were aggregated. For convenience, chapter numbers corresponding to the code categories are shown in column 1.

Some of the codes were categorised in more than one category. Some parts of the interviews were also assigned to more than one code as they could be related to more than one concept. For example, "Management role" and "Agile" often are described together, because establishing *agile* methodologies could have been a manager's role and is described by the interviewee in the same paragraph. Code categories in this research are not simply groups of codes; I have used them to restructure the codes found in such a way that a logical flow is established to be presented to the reader.

Chapter number	**Code category**	**Codes**
4.2.	**Internet 'nerd' culture**	
4.2.1.	Many cultures are great	Cultural diversity as attraction Diversity for the sake of it
4.2.2.	Citizens of the Global Village	Personality Traits, Flexibility, Internal/External control – self management
4.2.3.	Unique ability to learn	Learning, talent, skills
4.2.4.	Personality of an 'Internet Nerd'	Personality Traits, Neutral vs Affective, Management Role, Social life and friendship, gel/connection,

		individualism, internal/external control – self management
4.2.5.	The Job is Also a Hobby	Specific vs Diffuse, Social life and friendship
4.3.	**Communication**	
4.3.1.	Limited Communication Media	Communication/miscommunication, isolation, virtuality
4.3.2.	Communication Development	Communication/miscommunication, agile, management role, trust
4.4.	**Isolation**	
4.4.1.	Remote Isolation	Isolation, agile, home environment, communication/miscommunication
4.4.2.	Cultural Isolation	Cultural diversity conflict, prejudice/cliché, misunderstanding,
4.4.3.	Home Cultural Isolation	Home environment
4.5.	**Relationships**	Social life and friendship, communication/miscommunication, neutral vs affective
4.6.	**Emotions in a Virtual World**	Cultural diversity as attraction, agile, team/professional culture
4.6.1.	Emotional Understanding	Manager's role, neutral vs affective
4.6.2.	Emotional Impact on Relationships	Isolation, agile, neutral vs affective, face to face communication, humour

4.6.3.	Face-to-Face	face to face communication, isolation, home environment, virtuality, trust
4.7.	**Management**	
4.7.1.	Management Conflict	Power distance, masculinity vs femininity
4.7.2.	Position of a Manager	Internal/external control – self management, time management, Manager's role
4.7.3.	Agile Management	Agile, team/professional culture
4.7.4.	Self-management	Internal/external control – self management, personality traits
4.7.5.	Cultural Clusters	Cultural diversity conflict, communication/miscommunication, manager's role
4.8.	**Time**	
4.8.1.	Time Planning and Estimates	Time management, manager's role, contradictions
4.8.2.	Working Hours	Home environment, isolation
4.9.	**Masculinity/Femininity**	Masculinity vs Femininity, power distance
4.10.	**Cultural Translation**	
4.10.1.	Prejudices	Prejudices/cliché

4.10.2.	How the Job is Done	Cultural diversity conflict, communication/miscommunication, prejudice/cliché, effectiveness
4.10.3.	Language	Language, learning talent skills, flexibility
4.10.4.	Adaptation through Experience and Face-to-Face Communication	Trust, language, face to face communication, time management, flexibility, personality traits