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Using new generation collaboration & social computing technologies in managing virtual teams: An exploratory study into enablers and barriers in a multicultural context

MMIM592

by

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ABSTRACT

Purpose – To explore the various enablers and barriers of collaborative technologies in virtual teams through literature reviews and participant interviews and to develop findings with considerations to organizations embarking on similar initiatives.

Design/methodology/approach – A constructivist methodology. One-to-one interviews with participants from researcher's organization: a cross-section of senior managers and team members with either previous or current virtual team experience. Thematic analysis has been used to draw out the themes in the interview transcripts, and to develop interpretations and connections to the literature.

Findings – There is a great consensus among participants towards the importance of collaboration in virtual teaming and the need for proper planning and uptake. However caution is necessary for organizations embarking on these ventures as there are various barriers that need consideration. There are many aspects that organizations venturing into virtual team initiatives need to consider. These include various integration aspects of technologies, people & processes, choosing technologies that work together well, various people aspects associated with virtual team collaboration initiatives and establishing the virtual team culture as part of the overarching organization & group culture.

Research limitations/implications – Small sample sizes make it hard to generalize. Further research could include larger sample sets, surveys of various types of teams affected, the individual collaboration technologies, social computing interdependencies, specific Enterprise 2.0 technology suites etc.

Originality/value – Contributes a small body of research on the experience of managers and team members on collaborative technologies and virtual teaming. Provides the only such research in the banking sector and in the New Zealand marketplace, and contributes a set of findings & considerations to organizations embarking on similar initiatives.

Keywords – Collaboration technologies, Virtual teaming, Multicultural issues, Enterprise 2.0

Paper type – Research paper

PREFACE

This Report is not confidential.

I would like to acknowledge the support of several people for the guidance and support offered to me during the research and writing of this report.

I wish to thank the Applications Systems Manager (Information Technology Division), Mr. David Birrell, and the Operations Manager, Mr. Nathan Richardson, for giving me access to information technology and operational staff at Westpac New Zealand Ltd.

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I would like to sincerely thank Dr. Brian Harmer for his guidance, support and supervision of the report.

Finally, I would like to thank my wife Neelima for her support and forbearance.

I certify that this is my own work and the opinions expressed herein are mine.

All the references I have used are properly recorded in the bibliography.

Brahma Dev Veeramachaneni.

INTRODUCTION

Software development is a major industry today and the shortage of skilled IT staff and pursuit of lower costs have forced companies to broaden their search beyond local markets. Many companies started to look for skilled people regardless of physical location and started using technology to manage the engagement process. Today's visibility on collaboration and outsourcing, and the large sums of money spend on IT highlight the importance of determining the characteristics (enablers and barriers) of virtual IT teams collaboration initiatives. Despite the many benefits of virtual teams, companies that use these teams must overcome potential coordination problems, free riding (where individuals try to benefit from the system without actually contributing to the system), and other process losses and dysfunctions. These dysfunctions may be exaggerated in a virtual context where members are not at the same place and time (Ocker et al., 1998).

Effective team work may need 'trust', and it may be true that 'trust needs touch' (Ocker et al., 1998). 'Touch' in this context means being able to physically meet the other team members and on a regular basis. This is often the case with co-located teams. Trust may persuade individuals to take more risk which is some times attributed to more innovation in the IT sector (Ocker et al., 1998). Trust in virtual teams is especially fragile and temporal (Humphrey, 1989). On the other hand, there is open source type of development that illustrates that successful software development can be achieved in the absence of 'touch'. The aspects of trust in virtual teams are further elaborated in the literature review section. Apart from touch and trust, the other aspects of team culture and team norms, for establishing successful virtual teams are elaborated as well.

Members of virtual teams often communicate with each other using collaboration technology. Collaboration technology is a form of shared-space technology that aims to create distributed computerized environments where participants can manage their communication. The current study is concerned with this particular type of IS innovation, namely the adoption of collaborative technologies in managing virtual project teams. Feldman and March (1981) note that technology plays a distinctive and interpersonal role in organizations. By saying this, they are highlighting the fact that, introducing new technologies sometimes necessitate behavioural and functional changes in employee roles and responsibilities. Susman et al. (2003) contend that the introduction of

collaborative technology in the workplace does not necessarily enhance intensive collaboration among virtual team participants. In this line of reasoning, it is important to investigate the changes that the introduction of new collaborative technologies brings to the work place and how these technologies are actually used by people.

Harvard professor Andrew McAfee defines Enterprise 2.0 as the "use of emerging social software platforms within companies, or between companies and their partners and customers". He goes further and says it is the predominant technological initiative in the collaborative software space for organizations. This concept has been used to form a basis for selecting individual technologies for this research paper. Enterprise 2.0 is offering an alternative to the traditional way of capturing data [e.g. spreadsheets, databases]. It includes social and networked modifications to company intranets and other classic software platforms used by companies to organize their communication. Enterprise 2.0 sometimes describes the introduction and implementation of Web 2.0 technologies within the enterprise including rich internet applications, providing software as a service, and using the web as a general platform. In contrast to traditional enterprise software, which imposes structure prior to use, this generation of software tends to encourage use prior to providing structure (McAfee, 2006a).

A number of companies are developing enterprise-ready products under the umbrella term Enterprise 2.0. Aside from the usual suspects, like Microsoft Sharepoint and IBM's Web 2.0 Work package for WebSphere, other companies working in this space include Social Text, Traction Software and iUpload.

The phenomenon of Web 2.0 on the Internet leads to what is commonly termed as 'Social computing'. Social computing is usually initiated at the grassroots level and is growing quickly in several divergent sectors: some leading to real business models, while others remain community oriented. Some of the better known social computing initiatives include blogging; Wikipedia; flickr; social networks like Orkut, MySpace, Bebo, FaceBook, and LinkedIn, social bookmarking services like del.icio.us; and multiple initiatives from Google. Social computing also impacts various other domains such as politics, education and arts by providing community based information sharing and feedback loops (Manoj & Andrew, 2007).

An opinion can be formed based on the aforementioned concepts that the act of online collaboration does have a lot of importance in communication; provided it can be leveraged to better organizational communication and collaboration especially in the virtual context where it is difficult to establish face-to-face and/or on-site engagement.

This paper adopts adoptive, structurational & social theoretical concepts in order to reveal the collaboration technology-culture-VT-organization relationship. It explores how the social structures embedded within the collaboration technology affect and are affected by work context characteristics. Several authors note that teamwork cannot be understood apart from the organizational context in which it is embedded (Ancona 1990; Mohrman, Cohen & Mohrman, 1995). For this purpose, we need to understand how humans act, view, reflect, accept or neglect the introduction of new technology in the social context of their work place. This premise will form the basis and guide the research for the rest of the paper.

To understand this further, the author proposes the following research question that will help steer the research in the right direction:

> **How can new generation of collaboration & social computing technologies help in establishing the uptake of multicultural virtual teams?**

This study aims to identify the new initiatives in the collaboration technology space that can help with virtual teaming and organization communication in general. It will perform an exploratory study into enablers and barriers of these new technologies in a multicultural context. Majority of the existing literature on virtual teams covered the usage of different types of media like audio and video, often supplemented by the traditional text based communication (e.g. messaging and mailing aids). Researchers mainly concentrated on using these media in performing both qualitative and quantitative research for identifying various enablers & barriers of collaboration in virtual teams. But the more recent phenomenon of web based collaboration and cross-team communication tools went largely unnoticed. This research aims to plug in this gap. The rest of the paper unfolds as below:

The first part of the paper will comprise a review of the existing literature on various factors pertaining to virtual team collaboration. The main topics covered will include virtual

teaming, organizational culture & collaborative technologies. The challenges facing the virtual teams using the collaborative initiatives were outlined as well. This part will also cover the fundamentals of social identification, cognitive and adaptive structuration theories to seek guidance as to what motivates or otherwise, individuals in a virtual context. All of these theories will form the basis for the rest of the research.

The second part of the paper will explain the methodology adopted for the research, and an overview of the data analysis process. This is then followed by an explanation of the results from the qualitative data captured during the interview process. This section is will identify the patterns that serve as enablers [and barriers] of up-taking the collaborative technologies in enterprises. These are further explored and tied back to main research question and theory in the implications section. The implications sections also elaborate on the limitations of the current research and scope for any further research. The final section will conclude the paper with some closing thoughts.

The analysis of the content from the interviews and literature is expected to uncover a measure of what makes the new generation of collaboration and social computing technologies useful for virtual teams. It is also expected to derive any commonalities from successful virtual team establishments and provide a best practice guide by documenting the findings from the research conducted.

LITERATURE REVIEW

Virtual Teams

Globalization, the emerging technologies, and advent of information era have created a new type of environment for organizations. The organizations have been facing a trend towards a workplace that has no walls or boundaries, and one that enables individuals to work from different parts of the world from different geographies, cultures and environments (Krishna & Akhilesh, 2002). This has created a series of challenges for organizational leaders including but not limited to ever increasing and diverse change, managing the diversified teams, managing the complexity that the new technological initiatives bring along with them etc.

There has been an increasing trend towards strategic alliances, joint ventures and subsidiaries in the organizations that want to expand their operations globally (Krishna & Akhilesh, 2002). This has resulted in an increased need to source resources from across the globe for enabling these organizations to work as one cohesive unit by providing a more collective approach. In this regard, the nature of work conducted in organizations has started to shift from traditional production based operations to a more service oriented focus, enabling a new kind of worker -the knowledge worker (Drucker, 2000). The need for knowledge workers contributed for organizations to invent new ways of utilizing their dispersed and diversified knowledge pool and resources. This requirement saw the emergence of a need to source people from various geographies, cultures and nations. This resulted in the formation of virtual teams.

"A virtual team is a group of people who work interdependently with a shared purpose across space, time, and organization boundaries using technology" (Lipnack & Stamps, 2000, page 18).To pool their intellectual capital resources to achieve key organizational objectives and strategies the collection of individuals who work together, regardless of their physical location, is referred to as a 'global virtual team'.

The growing importance and prevalence of these virtual teams has been attributed to the

growing influence of technological and organizational developments along with a range of business benefits associated with using these types of teams (Solomon, 2001). Virtual teams can be composed of the best individuals for the task regardless of their physical or organizational location that might result in enhancing the quality of decisions (e.g., Lipnack & Stamps, 1999; Townsend, DeMarie & Hendrickson, 1998). Further, to attract and retain employees, knowledge workers in particular, some organizations are offering remote working options to their employees (e.g., Cascio, 2000). This could be beneficial for attracting top talent that cannot be sourced locally as the potential pool of employees expands with space and location. The options for obtaining these knowledge workers however, changes between organizations as not all companies function the same way.

Overall, virtual teams provide an effective mechanism for bringing together geographically and functionally dispersed employees to work on a common task by providing an effective means for communication and by negating the costs associated with travel & time coordination.

Virtual Team Categorization & Diversity

While categorizing the virtual team members based on their diversification factors, Milliken & Martins (1996) came up with observable differences like race, ethnicity, gender and age and the differences that are not readily noticeable like skills, information and knowledge, values, cognitive processes and experience. In elaborating these differences further Carte & Chidambaram (2004) referred to readily observable traits as surface-level diversity and unobservable characteristics are referred to as deep-level characteristics.

There can be both positive and negative aspects of team diversity. Value in diversity comes from increased creativity, innovation and flexibility (Jehn, Northcraft & Neale, 1999; Lau & Murninghan 1998; McLeod, Lobel, & Cox, 1996). The various perspectives and experiences deep-level diversity brings can help in generating more information and ideas in the team, stimulate thinking, and can also help in obtaining different networks of contacts and resources to the team. But McLeod et al. (1996) argues that the aspects of deep-level diversity are only beneficial if it is relevant to the task the team is set out to achieve. If it is relevant then a higher quality outcome can be expected from the whole

team.

Some of the common aspects of diversity in virtual teams include miscommunication, misunderstandings, decreased cohesion and increased conflict. These process losses result in decreased performance and satisfaction (Hambrick et al., 1998; Lau & Murninghan, 1998; Williams & O'Reilly, 1998). Social identity theory & social cognitive theory [explained in detail in the later sections] suggests that the negative effects associated with diversity are due to the creation of in-groups and out-groups (Carte & Chidambaram, 2004; Salk & Brannen, 2000).

Social identity theory, states that people often categorize themselves into subgroups based on the geographical location they are working in and the local teams they can relate to. As these subgroups become more established individuals tend to associate themselves with their subgroups at the expense of their relationship with other subgroups. These conflicts can reduce job satisfaction and overall team performance. If group members are diverse on multiple attributes that align together, strong fault-lines can develop which creates, further subgroups and/or team development problems (Lau & Murninghan, 1998).

In order to overcome the challenges thrown by the diversification factors of virtual teams and to identify proper direction to group categorizations, as outlined by the social theories, a number of authors outlined virtual team models that help in establishing virtual teams in organizations. The inputs-processes-outcomes (I-P-O) model (e.g., Hackman & Morris, 1975) is the dominant framework used in the study of virtual teams and provides a sound basis for organizing and integrating the literature on virtual teams (Martins, Gilson, & Maynard, 2004).

Inputs represent starting conditions of a group, such as its material or human resources. *Processes* represent dynamic interactions among group members as they work on a group's task. *Outcomes* represent task and non-task consequences of a group's functioning (Martins et al., 2004).

Team Inputs

The team inputs can be defined as "what" the team possess to achieve their outcomes (Weingart, 1997). These can be treated as the basic ingredients and/or the people skills

necessary to make up a team. Input variables represent the design and compositional characteristics of a team such as member personalities, knowledge, skills, and abilities (KSAs), group size, technology, task, and history or experience that influence how teams operate and perform (Hackman & Morris, 1975).

Team Processes

Team processes have been defined as "how" teams achieve their outcomes (Weingart, 1997). They may be classified into planning processes, action processes, and interpersonal processes (e.g., Marks, Mathieu, & Zaccaro, 2001).

Planning processes encompass mission analysis, goal setting, strategy formulation, and other processes related to focusing the group's efforts (Martins et al., 2004).

Action processes are those dynamics which occur during the performance of a group's task, such as communication, participation, coordination, and monitoring of the group's progress (Martins et al., 2004).

Interpersonal processes refer to relationships among group members; they include conflict, tone of interaction, trust, cohesion, affect, and social integration, among others (Martins et al., 2004).

Team Outcomes

Much of the literature on virtual teams has been devoted to examining the effects of virtual interaction on team outcomes (such as member satisfaction), and on performance outcomes (such as effectiveness, speed of decisions, and decision quality). Further, researchers have examined various contingency factors that may influence the effects of virtual interaction on team outcomes (e.g., Baker, 2002; Maznevski & Chudoba, 2000; Straus & McGrath, 1994). Figure 1 below depicts the I-P-O model that is derived from the broader definition of the aforementioned team inputs, processes & outcomes.
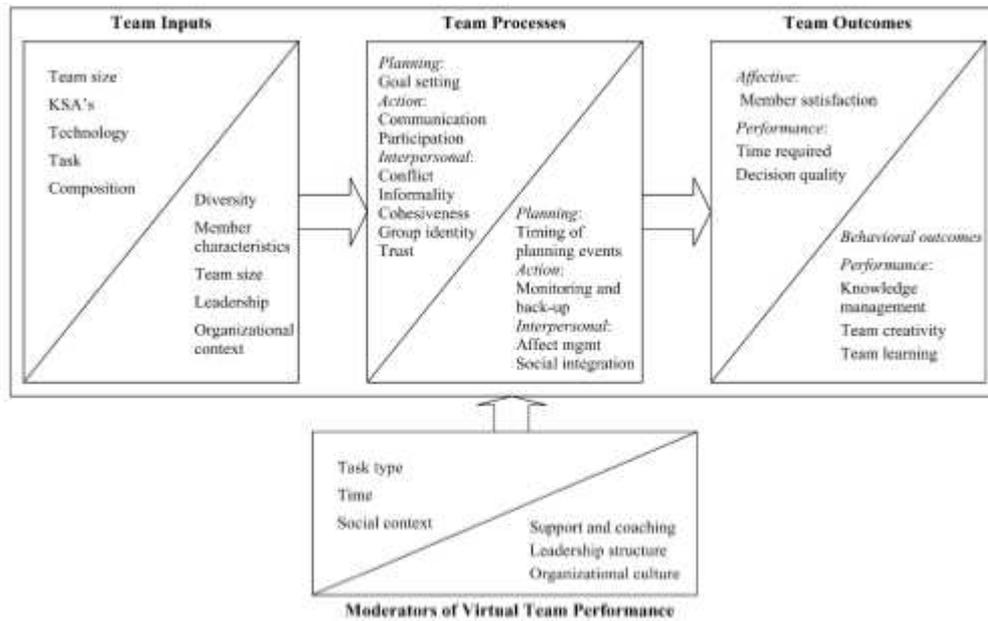
*Within each category of variables, those that have been examined in research on VTs are listed above, and those in need of future research are listed below, the diagonal.

Figure 1: I-P-O model of virtual team functioning (Martins et al., 2004).

Success factors for a virtual team

In a survey conducted at BOC on virtual team success factors, they identified that the main factors that determine the success or failure of virtual teams fall into three main categories (Jenny, 2005).

• Team formation

• Trust and collaboration

• Team communication

Team formation

Team formation is the critical stage in the life cycle of any team, co-located or virtual. Without identifying the direction and objectives of the team it will be very hard to establish the team and make it self-contained. Some of the contributing factors in establishing and

developing strong virtual teams are clear sponsorship, agreed goals, recruiting the right team members, linking performance measures to priorities, kick-off meetings, and awareness of cultural influences, right competencies and skills and developing a team identity (Jenny, 2005).

Trust and collaboration

Trust is at the foundation of all successful relationships. For virtual teams to be successful they need to build their relationship carefully and intentionally (Hiltz & Rotter, 2004). This is different to the traditional models where trust is linked with 'team evolution'. Trust is often the case of team members counting on each other to perform a certain task allocated to their team-mates (Bergiel, Bergiel, & Balsmeier, 2006). Trust is an important element that must exist in all types of personal relationships and teams (Bergiel et al., 2006). This is especially vital for virtual teams, due to the lack of personal face-to-face interaction.

"Even if team members can't meet on a regular basis, an initial meeting will help members understand who they're working with and strengthen their working relationship. Physical meetings aren't always possible, particularly for short-term or on-the-spot projects. Even so, virtual teams can meet each other through teleconferences or videoconferences that allow individual voices and personalities to come through" (Joinson, 2002).

It is often said that being able to associate a face with a name is beneficial for team members when they cannot meet in a face-to-face manner. Table 1 identifies some individual characteristics that help build trust in virtual teams (Harvey, Novicevic, & Garrison, 2004; Shin, 2004).

Table 1: Building blocks of Trust (Bergiel et al., 2006).

Clear Communication	Expressing thoughts clearly, orally and written
Honesty	Telling the truth
Vulnerability	Willingness to share strengths and weaknesses
Self-disclosure	Sharing personal information, thoughts, and beliefs
Respect	Respecting team members whether they are different or alike
Humor	Keeping a healthy perspective even when stressed
Awareness	Being attuned to others' needs, perception, and reactions
Involving others	Drawing out others, asking for ideas, input, and feedback
Understanding	Valuing differences and unique characteristics
Loyalty	Commitment to team goals and team members

In co-located teams trust is developed overtime through informal social interaction and sharing of information. For virtual teams social interaction is very limited however, development of trust is still dependent on interaction and information exchange. Some of the factors that help developing an atmosphere of trust and collaboration are: ensuring consistency, encouraging collaboration, celebrating achievements and keeping information flowing (Jenny, 2005).

Team Communication

Virtual teams more often than not don't have the same level of communication as the traditional teams as virtual team members are typically more reliant on information technology for communication (e.g., Staples & Webster, 2007; Bergiel et al., 2006). Consequently, Fiol & O'Connor (2005) argued that teams should not be considered in terms of their degrees of virtuality as there are non-linear differences between types of teams [e.g. semi-virtual, semi-local teams]. There are various barriers for good communication, such as time zones, working hours, team norms etc. Even though communication is as important in virtual teams as traditional teams, the element that distinguishes them is the mode of communication. In co-located environments communication can be instantaneous and in virtual teaming, people have to often rely on asynchronous modes of communication like email, phone only.

Even in the virtual teams where there is a team chat room or frequent meetings, virtual teams simply don't have the frequency or the synchronicity of the real time communication that traditional teams do (Bergiel et al., 2006). "The effective use of communication,

especially during the early stages of team's development, plays an important role in gaining and maintaining trust. Team members must understand the importance of providing timely accounts of work deliverables, and offer feedback on member contributions" (Isfahani, 2002, pg. 1). There are also alternate theories that suggest that the nature of virtual teaming demands a higher degree of independence and being able to cope with large chunks of work without consulting the rest of the team. In this line of thinking, the success [or failure] of the team depends on how effectively each team member manages to exchange the information despite the barriers like time and place.

From the start, virtual team leaders must work with their team to establish very strict guidelines regarding not only what and when to communicate, but also how (Bergiel et al., 2006). Daily communication between a team leader and individual team members is the glue that holds a virtual team together (Ojala, 2004). The critical success factors to maintaining effective communication within virtual teams are: selecting appropriate technology, sharing information pro-actively, facilitating and participating in team meetings (Jenny, 2005). She goes further in saying "communication is the final element that will ensure the success of the virtual team" (Jenny 2005, pg. 21).

Challenges for virtual teams

The following are some of the challenges virtual team members may need to overcome in order to establish a successful team. These issues deserve proper consideration both while looking at virtual teams as an option in organizations and while researching the issues associated with these teams. These problems are further explored with the help of research participants in the following sections to identify any workarounds and/or resolutions in dealing with them.

Technical: Technology is a vital part of virtual teaming and it demands expertise that some business leaders don't possess. Virtual teams may sometimes experience a kind of generation gap. The younger generation has an advantage because they have successfully used computers for most of their lives. Members of the older generation, on the other hand, are generally not as comfortable or familiar with this sort of technology.

Training: Virtual teams are a new concept in many organizations and many employees have a lack of training in this area. "It's scary. A lot of organizations create virtual teams with almost no understanding of the unique implications of that decision" (Snyder, 2003, pg. 56). Even when the individual members are computer savvy, they may not posses the technical knowledge required that virtual teams require.

Sector: Virtual teams are not an appropriate tool for every company. As Joinson (2002) pointed, there are industries such as manufacturing in which virtual teaming won't work. Any type of work that is very sequential or integrated might cause problems for virtual teams.

Team Structure: Virtual teams are not always the answer for every type of worker. "Employees who are stimulated by interaction with other people or who need external structure to stay on track may be unsuccessful in a virtual environment..." (Joinson, 2002). These employees would potentially benefit from rigorous training and support if they were to be successful in virtual team environments. Some other aspects that have negative impact on virtual team structure are too much interdependency between virtual team members and need for proximity.

Time Zones: The window of opportunity for contacting each other can diminish with time zones. Making routine tasks, like scheduling a meeting become complex when one person begins his/her workday as another person is about to finish his (Zigurs, 2003). These delays may frustrate team members who can't proceed without an answer from a colleague (Joinson, 2002).

Communication: There are communication barriers even in traditional teams. Even when employees have good language skills, they naturally interpret written and verbal communication through the filter of their own culture (Snyder, 2003). In virtual environments there is a necessity to ensure that the communication is polite and direct and this is a challenge for team leaders and team members alike. Communication problems could arise anytime and it is necessary to find a common language to conduct team business (Bergiel et al., 2006).

Conflict: Virtual teams are more often faced with conflict resolution issues than traditional teams. It is more difficult to manage virtual teams than face-to-face teams because of their reliance on virtual means of communication & collaboration. Problems that would normally

come to the team leaders' attention by walking around the water cooler or over casual conversations now only come to light if the team leader actively extends communication opportunities to the virtual team (Bergiel et al., 2006, pg. 21). As Zakaria, Amelinckx & Wilemon (2004) points out, when relationships begin to go bad in virtual teams, it often happens electronically and the team leader might not see it coming.

Support for the current research:

Some prior studies suggested future directions based on their relative research drawbacks. This section is set to outline those drawbacks, in-order to support the current research project.

As suggested by Pinsonneault & Caya (2005) even though developing some of the abilities and activities are relatively straightforward, others, such as developing effective knowledge sharing in virtual teams, present many challenges. With the current research study the author wants to also discover the perceptions of how the new generation of technologies can facilitate and enhance the knowledge sharing in virtual teams.

Despite the fact technology mediation may occur as much in traditional teams as in virtual teams (Mortensen & Hinds, 2001); virtual teams rely more heavily on technologies for communication and have fewer opportunities for informal, face-to-face interactions. As suggested by Staples & Webster (2007), future research could examine virtual teams' reliance on leaner media, with the resulting effects on task-technology fit. The leaner media in this context is used as a communication mechanism using non-traditional media. This could mean using some of the web based communication tools as media for collaboration across team members. For instance, the use of leaner media may reduce the sharing of sensitive information among virtual team members (Breu & Hemingway, 2004), resulting in substantially different types and levels of knowledge sharing than occurs in traditional teams. With the current research the author suggests the exploration of these leaner media technologies could help with the current research question of how new generation of collaboration & social computing technologies can help in establishing the uptake of multicultural virtual teams.

Culture

Many cross-cultural IS studies are based on Hofstede's culture dimensions (Myers & Tan, 2002; Ford, Connelly et al., 2003). According to Hofstede (1980, 1991), national differences could be understood in terms of national culture "the collective programming of the mind which distinguishes the members of one human group from another" (Hofstede, 1980).

Among the four dimensions of cultural difference (i.e., power distance, individualism/collectivism, masculinity/ femininity, and uncertainty avoidance), individualism/collectivism and masculinity/femininity have relevance to the current research study as they both have an element of collaboration and communication that people employ in their interactions with each other.

Masculinity/femininity refers to the beliefs of individuals about gender roles. Masculine cultures tend to have bias between men and women where the emphasis shifts based on the gender. More masculine cultures emphasize more on goals such as earnings, advancement, and assertiveness where as feminine cultures tend to emphasize personal goals such as maintaining a friendly atmosphere, getting along with co-workers, and having a comfortable work environment (Hoecklin, 1995). With respect to the current research interest these aspects of masculinity and femininity are more at an individual level of analysis, where they are looked at in a person's socialization rather than biological sex (Stets & Burke, 2000).

Individualism means that loosely connected social relationships are valued in which individuals are expected to care only for themselves and their immediate members, while collectivism means that tightly knitted relations are valued in which individuals expect to look after their extended social relations (Hofstede, 1980, 1991).

Organizational Culture

As (Schein, 1984, pg. 3) outlines it "Organizational culture is the pattern of basic assumptions that a given group has invented, discovered or developed in learning to cope with its problems of external adaptation and internal integration, and that have worked well enough to be considered valid, and therefore to be taught to new members as the correct way to perceive, think and feel in relation to those problems."

Organizational culture which is sometimes termed as corporate culture has been a popular issue in the management literature since the early 1980s (e.g. Deal & Kennedy, 1982). The concept of 'organizational culture' as that aspect of the organization which is managed was already used by Blake & Mouton (1964, p. 169), but it only became a common literary strand twenty years later. Organization Culture is a characteristic of the organization, *not of individuals,* but it is manifested in and measured from the verbal and/or nonverbal behaviour of individuals — aggregated to the level of their organizational unit (Hofstede, Neuijen, Ohayv, & Sanders, 1990).

Another definition of organizational culture is 'the collective programming of the mind which distinguishes the members of one organization from another' (Hofstede, 1991, p. 262). Organization culture is more often than not termed as the collective behaviours of individuals following a certain code like the way they dress, their working environment, how they receive new employees, the manner they conduct their business etc. Each organization has its unique cultural dimensions: visible and invisible. The visible dimension of culture is reflected in the espoused values, philosophy and mission of the firm while the invisible dimension lies in the unspoken set of values that guide employees' actions and perceptions in the organization (McDermott & O'Dell, 2001). But as Schein (1984) puts it these behaviours and dimensions are only dealing with surface level norms of the individuals in an organizations and he says we often cannot understand why a group behaves the way it does. To look further into why members behave a certain way we need to look into the values that govern these behaviours. But as values are often hard to observe it is often necessary to infer them by interviewing key people in the organization or content analyze the documents or charters (Schein, 1984).

Hofstede (1991) views culture as being collective, but often intangible and is what distinguishes one group, organization, or nation from another. Hofstede (1991) termed the visible and invisible elements of culture from the above as practices. Practices are particularly important to investigate organizational culture because they are the most direct means for changing behaviours needed to support knowledge creation, sharing, and use (De Long & Fahey, 2000). Hofstede et al. (1990) measured the perceived work practices in employees' work situations in 20 organizational units and discovered six dimensions underlying organizational culture. Contrary to his dimensions of national culture (Hofstede, 1991), these organizational dimensions deal with key sociological issues. They are process-oriented vs. results-oriented, employee-oriented vs. job-oriented, parochial vs. professional, open system vs. closed system, loose control vs. tight control and normative vs. pragmatic. It is important to consider these dimensions in any culture based studies within organizations as they provide valuable queues as to which questionnaire/surveys to construct to obtain inputs from participants.

Importance of a Group

There cannot be a culture without a group to carry it forward. Culture is embedded within groups hence the creation of a group should always be clearly defined (Schein, 1984). If we want to define a cultural unit, we must be able to locate a group that is independently defined as a creator, host or owner of that culture (Schein, 1984). "A group is a set of people who have been together long enough to have shared significant problems, who had opportunities to solve those problems, to observe the effects of their solutions and who have taken in new members into the group. If a group manages to pass with some degree of conviction the ways of perceiving, thinking and feeling then we can assume that the group has enough stability and have developed a culture" (Schein, 1984, pg. 7).

Also as Schein (1996) identified and elaborated in his article, it is not enough to consider organizational culture as one dimension as many different kinds of organizations are operating silently with three different cultures within. Two of these cultures are based on larger occupational communities and thus more stable in the assumptions they hold (Van Maanen & Barley, 1994). He outlines these three cultures as operators, engineers and executives. Operators typically consist of workers and their managers that deliver products

and services to fulfil the organizations basic mission (Schein, 1996). Engineers include technocrats and core designers in any functional group that deal with core technology of what the company does (Schein, 1996).The final group the executives have the basic financial accountability to the owner shareholders often embodies in the principle to keep the company profitable (Donaldson & Lorsch, 1983).

Understanding the various aspects pertaining to group dynamics will provide useful information to the current research as inherently all virtual teams are comprised of groups of individuals. The group dynamics will also play a role in making sure how the new technical initiatives are carried forward when there is uncertainty involved in the success of the initiatives.

As outlined by authors like Schein it is not just the technical feature sets that technologies provide that will help in their successful implementation in organizations but the way the group culture promotes their use.

Collaborative Technologies – Tools and Technologies

Collaboration Technologies provides various means of communication in virtual teaming. They provide a platform to build information and resources starting from individual contributions with little or no prior structure. They provide a means to attend to any gaps, delays or conflicts that might arise in virtual teaming and cross-cultural communication due to the lack of understanding in the team norms and practices.

Authors like McAfee (2006a) termed collaboration technologies as the suite of technologies like blogs, wikis, prediction markets, and folksonomies (a categorization system developed over time by folks by tagging) within companies. These tools all share one important characteristic: they're largely free-form. These technologies don't follow the organizational hierarchies and have very little workflow built into them. They don't check that data is in the right format or follows certain syntax. They don't have many built-in authorization loops (McAfee, 2006a).

Internet collaboration forums like Facebook, MySpace and Wikipedia made these technologies popular before people start to realize their potential in the organizations. Before the advent of these new technologies companies were doing most of their communication using media like e-mail, teleconferencing, messaging, intranets etc. But they lacked what the new technologies are offering that is to bring together the organizational information flow and facilitate knowledge work in a more dynamic and fluid fashion.

Interaction is at the heart of collaboration and communication as without interaction these activities simply won't be possible. Wagner (1994) distinguished between interaction and interactivity, and noted that neither concept had been sufficiently defined. She thus wrote: "Simply stated, interactions are reciprocal events that require at least two objects and two actions. Interactions occur when these objects and events mutually influence one another" (Wagner, 1994, pg. 8). In organizational collaboration, such interactions are interpersonal and occur within an instructional context. She distinguishes between such human interaction and interactivity, which she describes as a characteristic of the technology itself. "Interactivity may eventually be viewed as a machine attribute, while interaction may be perceived as an outcome of using interactive instructional delivery systems" (Wagner, 1994, pg. 26).

Anderson & Garrison (1998) further extend this theory by noting the growing sophistication of online tools such as databases, search engines, and intelligent agents and propose a content based interaction which is the interaction achieved by content to content communication. By this they mean collaboratively generating the content. While they note that this is the "most embryonic" type of interaction, more recent technologies such as blogs, wikis, and content aggregators merely increase the likelihood of content to content interaction occurring in a meaningful way.

There is also a matter of immediacy when collaborating which is the time lapse between a sender sending some information and a receiver successfully receiving it. Mehrabian (1967) defined immediacy as the extent to which selected communicative behaviours enhance physical or psychological closeness in interpersonal communication. In other words, immediacy can be understood as "those communication behaviours that reduce perceived distance between people" (Thweatt & McCroskey, 1996, pg. 198). Although immediacy was originally developed in the interpersonal communication context, it has

been frequently used in communication research during the past two decades (Thweatt & McCroskey, 1996). The common availability of Internet gave a lot of importance/priority to the interpersonal communication in the online environment. Although not necessarily referencing the immediacy concept by name, there is significant conceptual overlap between traditional immediacy producing behaviours and discussions of online interpersonal communication dynamics, most possibly provided by collaboration technologies.

While examining some online courses for education Harasim (1989) drew some conclusions about the value of interaction and online collaboration. She added: "Knowledge building occurs as people explore issues, examine one another's arguments, agree, disagree, and question positions. Collaboration [learner-learner interaction] contributes to higher order learning through cognitive restructuring or conflict resolution, I..." (Harasim, 1989, pg. 55).

Collaboration, with respect to information technology, seems to have several definitions. Some are defensible but others are so broad they lose any meaningful application. Understanding the differences in human interactions hence becomes a necessary step towards ensuring the appropriate technologies are employed to meet interaction needs. Harasim (1989) expands the *collaborative interactions* by saying that "the main function of the participants' relationship is to alter a collaboration entity". Examples of collaboration entities include the development of an idea, the creation of a design, achievement of a shared goal etc. Therefore, real collaboration technologies deliver the functionality for many participants to author and change at will a common deliverable. Record or document management, threaded discussions, audit history, and other mechanisms designed to capture the efforts of many into a managed content environment are typical of collaboration technologies (McAfee, 2006a). An emerging category of computer software, a collaboration platform is a unified electronic platform that supports synchronous and asynchronous communication through a variety of devices and channels.

According to McAfee (2006b), most of the information technologies that knowledge workers currently use for communication fall into two categories. He termed the first one channels – such as mailing and person-to-person messaging where information can be distributed by anyone but only visible to authors of the information and participants of that particular conversation. He termed the second category as platforms like the intranet,

corporate portal etc. According to McAfee (2006b) these are opposite to channels in that their content is generated by a few but is visible across the organization- production is centralized and commonality is very high. These technologies doesn't offer or encompass the tacit form of knowledge which is in the heads of personal working on a particular project or assignment as they are all based on a pre-determined pattern for information dissemination. Some knowledge management systems in the past tried to encompass these behaviours; however these are increasingly being moved to enterprise collaboration suites (McAfee, 2006b).

Another fundamental problem is that current technologies for knowledge workers aren't doing a good job of capturing their knowledge. As quoted by McAfee (2006b) from Davenport's book (2005), "The dream … that knowledge itself — typically unstructured, textual knowledge — could be easily captured, shared, and applied to knowledge work … [has not] been fully realized … Progress is being made … [but] it's taken much longer than anyone expected."

To achieve a common understanding of what collaboration technologies are, the various components that make up Enterprise 2.0 suite are discussed briefly in the following sections:

(a) Blogs are a mechanism for an individual to write on the topic they are interested in and give others in the rest of the community to comment on it. The author will also have a chance to respond to the comments and queries. Usually any contributions by an individual accumulate over time providing everyone else in the community a feel for his/her interests and/or domain knowledge. As McAfee (2006b) puts it when authoring tools are deployed and used within a company, the intranet platform shifts from being the creation of a few to being the constantly updated, interlinked work of many.

(b) Wikis are web pages that can be developed collectively by a group of individuals with common interest. In the Wiki world any individual that is part of the group can view or edit any part of the site, even others work. This provides a collective responsibility for the individuals involved to bring together their thoughts to derive an outcome with mutual agreement. According to the authors' personal experience the outcome of such an effort is almost always better than any individuals' single contribution. In Wiki development it will often provide personal involved a chance to undo and redo each other's work in an

iterative fashion, which is probably the most fundamental way of content generation while working on projects.

(c) Tags are a means of defining a page or a group with a short name for easy recollection and easy search. Others can also search tags created by individuals in the same community or other employees in the organization that might find that topic interesting. As time passes the tags that are proven to be more popular will have better highlighting making them more visible for new comers in a way telling them what the generic community interests are. This way information and opinions can be passed up and down the organizational hierarchy as a community without sounding individualistic.
The categorization system that emerges from tagging is called a folksonomy (McAfee, 2006b). The perceived main advantage of a folksonomy is that they reflect the information structures and relationships that people actually use, instead of the ones that were planned for them in advance.

(d) RSS Feeds, the final major category that forms the collection of Enterprise 2.0 technologies is the RSS, which stands for Real Simple Syndication. It is a feed to an individual's computer that amalgamates various topics and categories that are of interest to him/her and signalling them of either new content or updates to the existing content. It is an individualistic view of the Meta world where you see what you want to see from the rest of the world.

These components also lead to concept of social computing which is concerned with intersection between social behaviour and computational systems. Social computing, a term used somewhat interchangeably with ubiquitous computing, social informatics, Web 2.0 and pervasive computing, describes any type of computing application in which software serves as an intermediary or a focus for a social relationship (Schuler, 1994). Social Computing can be used to create, analyze, and assess organizational processes, particularly in collaboration and virtual communication.
It is based on creating or recreating social conventions and social contexts through the use of software and technology. Thus, blogs, email, instant messaging, social network services, wikis, social bookmarking and other instances of what is often called social software illustrate ideas from social computing. A somewhat stronger sense of the term includes collaborative filtering, online auctions, prediction markets, reputation systems, computational social choice, tagging, and verification games.

Collaboration Challenges

Social networking on the web brought with it an appreciation for online collaboration. Given the fact that most employees also have access to ICT facilities at home and knowledge of social networking software in their personal life, it is prudent for organizations to invest in this technology stack as the uptake will be faster and easier. To understand how online collaborations can be moved to the working environment there is a need to rethink the ways we work online and the way we form relationships. Once formed, online relationships can be maintained fairly well online (Walther, 1992), however the initiation of relationships is slower and less easy than face-to-face (Walther, 1996; Lipnack & Stamps, 1997; Bal & Teo, 2001) and these differences need to be understood if collaboration initiatives are to be up taken.

Beyond relationships is the issue of attitude. Negativity can be a stressor in online collaboration that has a potential to poison relationships and arrest learning (McLoughlin & Luca, 2001). Organizations need to understand their collaboration challenges, both internal and external, in-order to be successful. As suggested by the above authors the difficulty and slowness in establishing online relationships in virtual teams, attitude and negativity issues with individuals warrant further exploration in the later sections. This might help us identify any mitigating effects of the new generation collaboration technologies in addressing these challenges.

Theoretical Background

Team members interact with each other in various ways in their work environment. This is equally important in both traditional and virtual team settings. Believes and influences on a person are partially influenced by activities of team members, organizational practices and the support they receive. Any of these can have an impact on individuals' ability and their capacity to perform well. Accordingly it becomes important to study the individuals' beliefs in the way they identify themselves with their respective teams and environment. It is also equally important to understand the belief in their abilities and how they perceive their abilities will perform a certain task. The following individual theories will help us in identifying these aspects as it is deemed important to understand the theoretical

underpinnings for the purposes of the current study. The theories studied have relevance both in terms of performing the analysis and explaining the findings in the later sections.

Social Cognitive Theory:

Bandura's (1986) social cognitive theory provides a theoretical foundation for understanding the aforementioned relationships and beliefs as it provides a powerful theoretical base to predict behaviour. Social cognitive theory proposes a dynamic, triadic relationship between cognitive and other personal factors (i.e., the person), the external environment, and behaviour (Gist & Mitchell, 1992; Wood & Bandura, 1989). These three elements have a great influence on each other and are reciprocally determined. Behaviour in a given situation is affected by environmental and personal factors, which are in turn influenced by behaviours.

People have self-reflective and self-reactive capabilities that help them exercise some control over their thoughts, beliefs, motivation, and actions (Bandura, 1991). These capabilities affect their behaviours and the environment around them, i.e., they choose or influence their environment. A key aspect of the person is self-efficacy expectations with respect to the behaviour(s) under examination (Bandura, 1991). Self-efficacy is "a judgment of one's ability to execute a particular behaviour pattern" (Bandura, 1978, p. 240). The positive relationship between self-efficacy and different motivational and behavioural outcomes has been demonstrated in the past two decades in various situations including clinical, educational and organizational settings (Stajkovic & Luthans, 1998). The evidence supports self-efficacy as a strong predictor of work-related performance (i.e., if a person has strong beliefs in his or her ability to do a specific action, then he or she will be more effective in doing the activity).

Self-efficacy has been used to study work-related performance in many situations that are relevant to our present study. Some of these include job searching (Ellis & Taylor, 1983), coping with difficult tasks (Stumpf, Brief, & Hartman, 1987), adaptability to new technology (Hill, Smith, & Mann, 1987), remote work (Staples, Hulland, & Higgins, 1999) and telecommuting (Raghuram, Wiesenfeld, & Garud, 2003). All of these studies have relevance with remote and virtual work and are deemed important in the literature

reviewed when it comes to working remotely with desperate and diversified teams. Here it is also important to establish the relationship between self-efficacy and virtual teaming where team members are expected to have the ability and confidence in the activity they are doing with little or no guidance. Individual belief will play a major role in determining how successful he or she will be in a virtual team environment and would have positive effect on the overall performance of the team.

Social Identity Theory:

Social Identity Theory was developed by Tajfel and Turner in 1979. The theory was originally developed to understand the psychological basis of inter-group discrimination. Tajfel & Turner (1979) attempted to identify the minimal conditions that would lead members of one group to discriminate in favour of the in-group to which they belonged and against another out-group. Social identity theory suggests that individuals recognize their own membership in groups by defining the social boundaries surrounding particular groups, and then self categorizing themselves as either belonging to or not belonging those groups. In the Social Identity Theory, a person has not one, "personal self", but rather several selves that correspond to widening circles of group membership. Different social contexts may trigger an individual to think, feel and act on basis of his personal, family or national "level of self" (Tajfel & Turner, 1986). Apart from the "level of self", an individual has multiple "social identities". Social identity is the individual's self-concept derived from perceived membership of social groups (Hogg & Vaughan, 2002).

Social Identity Theory asserts that group membership creates in-group/ self-categorization and enhancement in ways that favour the in-group at the expense of the out-group. The examples (minimal group studies) of Tajfel & Turner (1986) showed that the mere act of individuals categorizing themselves as group members was sufficient to lead them to display in-group favouritism. After being categorized into a group, individuals seek to achieve positive self-esteem by positively differentiating their in-group from a corresponding out-group on some valued dimension. This quest for positive distinctiveness means that people's sense of who they are is defined in terms of 'we' rather than 'I'.

Classifying organizations as one kind of group, Ashforth and Mael (1989) made social

identity theory accessible to management research and provided practical implications of the theory to organizational behaviour phenomena. This is particularly important to the current research as the team collaboration is expected to be initiated and driven by organizational wide initiatives. "Team collaboration and identification will become important as part of process of social identification which is the extent to which in-group has been incorporated into the sense of self, and at the same time, that the self is experienced as an integral part of the in-group" (Brewer, 2001, pg. 21). All of this will play an important role when the team identification of the virtual teams are discussed and when the individuals have to choose to be part of the team culture where there will not be many face-to-face interactions. The main means of communication will be using technologies that make online collaboration possible.

Adaptive Structuration Theory:

DenSanctis and Poole (1994) proposed the Adaptive Structuration Theory (AST) as a viable approach for studying the role of advanced information technologies in organization change. AST examines the change process from two vantage points: (1) the types of structures that are provided by advanced technologies and (2) the structures that actually emerge in human action as people interact with these technologies. In their paper DeSanctis and Poole (1994) identified two major schools of thought about the role of technology in institutions and its behavioural and social effects. The first school of thought termed as "decision making" school is characterized by "hard line determinism, the belief that certain effects inevitably follow from the introduction of technology, or more moderate contingency views, which argue that situational factors interact with technology to cause outcomes" (1994, pg. 123). The second school of thought termed as "institutional school", in contrast, sees technology as an opportunity for change, rather than as a causal agent for change where in "the creation, design, and use of advanced technologies are inextricably bound up with the form and direction of the social order" (pg. 124). The focus of study hence emphasizes less on the structures within technology, and more on the social evolution of structures within human institutions.

The problem of the decision making school is that the research literature does not reveal "observed effects that do not hold up robustly across studies, and, even more disturbing,

there is often substantial variance in outcome measures within even one treatment of any given study" (pg. 124). The institutional school on the other hand "underplays the role of technology in organizational change... ignoring the potency of advanced technologies for shaping interaction and thus bringing about organizational change" (pg. 124). They however suggested that "there is no doubt that technology properties and contextual contingencies can play critical roles in the outcomes of advanced information technology use. The difficulty is that; there are no clear-cut patterns indicating that some technology properties or contingencies consistently lead to either positive or negative outcomes" (pg. 124).

The propositions for the AST theory came from an integrative perspective of both the aforementioned theories. The duality in this case come from the structure (Orlikowski 1992) whereby there is an interplay between the types of structures that are inherent to advanced technologies (and, hence, anticipated by designers and sponsors) and the structures that emerge in human action as people interact with these technologies. Between the two schools of thought from above, DeSanctis & Poole (1994) identified a "social technology" perspective that embodies "soft line" determinism - "the view that technology has structures in its own right but that social practices moderate their effects on behaviour" (pg. 125). The proposal of AST considers "the mutual influence of technology and social process" according to DeSanctis & Poole (1994).

AST provides a model that describes the interplay between advanced information technologies, social structures, and human interaction. Consistent with structuration theory, AST focuses on *social structures,* rules and resources provided by technologies and institutions as the basis for human activity. Social structures serve as templates for planning and accomplishing tasks. The social structures embedded in technology were characterized in terms of concepts of structural features -"specific types of rules and resources, or capabilities, offered by the system" and spirit - "the general intent with regards to values and goals underlying a given set of structural features" (1994, pg. 126).

The AST theory provides valuable inputs into the importance of considering not only the technological features of the advanced information systems but also the social structures and organizational paradigms for proposing any new technological uptakes into organizations. The current research project intends to use this theory as a guide to

address some of the challenges faced while implementing new and upcoming collaboration tools into organizations. It aims to do this by considering not only the structural features but also the spirit of the technology.

METHODOLOGY

The Merriam-Webster online dictionary defines methodology as a body of methods, rules, and postulates employed by a discipline (Methodology, 2009). This postulation might include a particular procedure or a general set of procedures. It goes further and describes it as "the analysis of the principles or procedures of inquiry in a particular field" (Methodology, 2009), in the current case information management. Based on this definition, the current section is intended to explain the methods and procedures used to collect and analyze the data for doing the research.

The underlying methodology for the project was constructivism (e.g., Guba and Lincoln, 1998; Schwandt, 2000; Czarniawska, 2003). The aim of the project was to perform a cross-team study on how the new generation of collaboration & social computing technologies can help in establishing the uptake of multicultural virtual teams. A constructivist approach was seen as appropriate because it would allow the researcher to consult with a range of practitioners with previous or current virtual team experience and use their accounts to build the understanding. It did not seek the one "correct" answer but was tolerant of multiple perspectives.

The current research topic will have both social and organizational implications and requires close attention to how employees with virtual teaming experience envisage using the collaboration technologies for bettering collaboration. We need to understand if they believe better technology choices will better the way they work and produce better outcomes.

Quality

The quality of the research was maintained by a number of means as outlined below

- The research was conducted after obtaining an ethical clearance from the Victoria University, Wellington.

- All the interviews were conducted face-to-face.

- A review of the transcripts by the participants ensured any corrections to the original material and opinions.

- The transcription process ensured that all the data and opinions of the participants was captured

Participants & Interview Process

Participants from the researcher's current organization and one of its business partners with previous and/or present virtual team experience were invited to participate in interviews to test the relevance and practical usage of the proposed benefits from the literature. Interviews scheduled were used for data collection from all the volunteers who took up on author's request. Semi-structured interviews were chosen as the primary research method because the intention was for people to freely express their own ideas within a general framework of inquiry set by the researcher. The questionnaire used in the interview process used open ended questions with a view to obtain as much input as possible. The questionnaire provided an opportunity for further probing, based on the inputs collected and the inputs perceived.

Collection of data

The method employed for data collection was through participant interviews. Interviewees were asked for permission for the interviews to be tape-recorded and all participants agreed to this. All the interviews were tape-recorded and fully transcribed. All interview transcripts will be securely stored for two years and then electronically wiped.

There were two different participant samples for the project. The first set consisted of 6 people who were/are team members of virtual teams. The second set consisted of 5 people and mostly consisted managerial and supervisory staff involved in virtual team projects. The first sample set was intended to provide input based on their direct exposure to collaborative technologies into virtual teams. This sample set was intended to provide

the practical issues in developing and implementing the new technology suites. Examples of team members used in this sample include developers, testers and business analysts. The second sample set was intended to provide a "bigger picture" of issues involved by getting input from project and senior managers involved in driving the virtual teams to collaborate. This sample set was intended to provide inputs around how to get the buy-in and/or how to avoid pitfalls in making virtual collaboration teams a success in the organization.

Data Analysis

Thematic analysis was used to make sense of the interview data. Gifford (1998) suggests that thematic analysis involves uncovering the common patterns or threads within a complete set of data. "Themes are often identified not by the specific content items in a set of data but by the more general concepts that emerge and give the set of data meaning." (Gifford, 1998, pg. 546). Thematic analysis was used to uncover how one person responds to different sets of questions and how the same question is answered by multiple participants. Thematic analysis was intended to uncover the varying degrees of similarities and differences in the responses from participants. It helped in establishing the connections between different responses and in identifying explanations for any of these connections. Several rounds of coding and categorization of the interview data was employed which lead to the development of themes around project's research question.

Initial stages of analysis – Coding the data gathered

As indicated above, the overall analytical approach followed the conventions of thematic analysis, where the intention was to produce a series of codes representing various salient features identified in the textual data. The coding process was done manually with the initial set of codes derived from the research interests and the question driving the research. Coding was done with the intention of reducing the data into more manageable chunks and to be able to dissect the text into a series of segments (Attride-Stirling, 2001). Additional codes were generated and/or identified after the reading and re-reading of the

transcripts and the original set was modified and/or appended to accordingly. The coded text was initially stored in a database and later ported to a spreadsheet.

Fifteen codes were derived from the transcribed data based on 1) special theoretical interests driving the research, namely virtual teaming, organizational culture and collaborative technological initiatives, and 2) recurrent issues from the discussions regarding these aspects (Attride-Stirling, 2001). These two aspects were combined when deriving the finite set of codes from the transcripts. The preference was given to the set of codes; based on their presence at a global scale. It was made sure that these codes were individual enough to avoid redundancy. The entire transcript material was then classified and re-organized according to these codes. The emphasis was at a conceptual level and a given quotation could have been classified under more than one code.

Generation of categories and themes

Using thematic analysis (Attride-Stirling, 2001), the codes were grouped into various clusters and each code's individual transcripts were re-read. Salient list of issues discussed in the interview process were tracked alongside the codes. By reading the text segments in the context of the codes and the issues discussed lead to the identification of nodes/containers that made sense of the data. These containers/nodes were maintained along with both the research material collected, the generated codes, and were useful to keep track of researcher's thoughts on the material. These nodes were used to capture the basic/general themes which outlined the salient, common and/or significant features at this stage and will eventually be extracted into various thematic categories. The initial set of 15 codes and around 150 text segments were reduced to about 23 basic themes. These themes were identified by using the constructivist methodological approach as indicated above which focuses on themes that were common across all the interviewees. As this methodology dictates, the researcher was more interested in the commonality of the themes across the transcripts as oppose to the overall explanatory value of the themes.

The theoretical research conducted into various aspects contributed to deriving these themes as well. It was the intention to focus attention on the most popular and common

themes, which were the specific interest of this study. The series of the themes generated were further refined by re-reading the text segments for each code. Any amendments thus identified were incorporated back into the material by maintaining the overall integrity of the data. The result of the coding, issue tracking & basic theme generation processes is outlined in APPENDIX A.

Each basic theme was subjected to a more detailed manual analysis by the researcher, which led to the formation of more specific categories that led to the identification of organizing and global themes. These organizing themes were identified based on the clusters of basic themes which are further refined to identify the global themes. The claim of the global theme is that it encapsulates the main point in the text.

The coding and then hierarchical analysis of the themes allowed the researcher to analyze the text segments at different levels of specificity. Broad higher order themes help provide a general overview of the direction of the transcript, while the detailed lower order themes were intended to enable finer distinctions to be made. Even though the basic themes were intended to explore the data and to compare the similarities and differences in the data sets, they might destroy the bigger picture. The organizing and global themes were intended to help depict the categorization and relationships between the basic nodes, something that is important in maintaining the overall perspective. During the time of generating these themes, the codes were maintained, still to be meaningful, with regards to the data as well as the overall theme categorization.

Constructing the networks

The 23 basic themes identified were grouped into 6 broader groupings which were based on the related conceptual content. In each group, the themes were now re-assembled at the basic theme level, again on the basis of conceptual correspondence. These groupings were interpreted as the organizing themes and the underlying issues shared across the basic themes were made explicit by the names of these organizing themes. Another grouping process of organizing themes based on the three broader conceptual contents resulted in the identification and derivation of 3 global themes. APPENDIX B summarizes the categorization of the themes from basic to organizing to global that formed the basis for the thematic networks which are explored in detail in the later sections.

Demographics of Participants

Qualitative analysis of the demographic data was done on a total of 12 participants with an average age of 35 years. The ethnic origin of 7 participants was New Zealand; 3 participants interviewed were from India, 1 from South Africa and 1 from Ireland. All of the participants are currently based in NZ and are working directly or indirectly [contracted to] for the Researchers working organization. The majority of the participants [10] confirmed that they have been using media like mails and chatting before getting involved in virtual projects. Majority of them [11] also used various forms of media in their personal life to communicate with friends & family. The smallest team size, the participants were involved in comprised of just 2 members and the largest team had more than 300 members. These team sizes occasionally included both the co-located & virtual teams as it was deemed hard by some participants to separate them both. A key thing to note is that majority of the participants [8] noted that the average team size was around 10, but the rest of the samples collected consisted more than 100 team members, which partially skewed the results.

The demographics were collected in order to demonstrate the level of participant experience in virtual teams. These results were not analyzed using any statistical tools in-order to keep the focus of the research on qualitative means. By looking at the key demographics collected, the various team sizes participants were involved in, it was assumed that the participant's collective experience represent a typical sample data set of virtual teams. Due to the research time frames and the availability of the volunteers, the participation was only sought from researcher's parent organization; a wider industry sample was deemed out of scope for this research.

Next Steps

The next few sections of the report outline and elaborate the final thematic networks. Separate sections were used to cover a global theme and it's associated organizing and basic themes. These sections were intended to address the initial research objectives and

the research question: "How can new generation of collaboration & social computing technologies help in establishing the uptake of multicultural virtual teams?" The sections to follow will each be addressing the technological, personal and cultural imperatives of collaboration in establishing the uptake of multicultural virtual teams.

RESEARCH ANALYSIS

The following sub sections of this section and their related themes & network diagrams are more concerned with identifying the enablers and barriers in the areas of interest rather than drawing direct conclusions about the strength and generalizability of the discussed views. The later chapter however use these thematic networks to provide another layer of abstraction and conceptualization and does provide some key recommendations to the organizations embarking on similar initiatives.

The aim of the following sections and the arguments presented is not to conclude the outcome but more to provide direction, plus stimulate discussion and debate about a new way of collaboration in virtual teams. Any quotes from the interviewees are "written in smaller font surrounded by double quotation marks" to indicate that these are not researchers own words but the words of the interviewees. For each section a summary of the data within each global theme is presented.

The following three sections explore the thematic networks in detail. The network diagrams in each of these sections, has been used only as a tool. The focus is predominantly on the interpretation of the network at a higher degree. Each section aims to explore and describe the network in detail allowing for the patterns in the texts to emerge.

The technological imperatives of collaboration in establishing the uptake of multicultural virtual teams

The global theme to be elaborated and discussed in detail in this section is "Technical Imperatives". This comprises of a single thematic network with two organizing themes and

eight basic themes. This network represents the exploration of participant conceptualizations of technical imperatives in the context of a broader discussion of uptake of these in a multicultural virtual team. Figure 2 below depicts the thematic network for exploration that follows.

```
┌─────────────────────────┐                    ┌─────────────────────────┐
│ Working together        │                    │ Time zone related issues│
│ collectively to         │                    └─────────────────────────┘
│ generate ideas & process│
└─────────────────────────┘
                                          ┌─────────────────────────┐
┌─────────────────────────┐               │ Constant communication  │
│ Integration results in  │               │ is the key to VT success│
│ better standardization  │               └─────────────────────────┘
└─────────────────────────┘
                    ⬭ Seamless
                      integration

                    ┌──────────────┐
                    │ Technological │
                    │ imperatives   │
                    └──────────────┘

                    ⬭ Technical
                      integration

┌─────────────────────────┐               ┌─────────────────────────┐
│ Better uptake of        │               │ Newer technologies enable│
│ technologies needs      │               │ better & faster         │
│ formalization           │               │ interaction and stimulate│
└─────────────────────────┘               │ culture change          │
                                          └─────────────────────────┘
       ┌─────────────────────────┐
       │ Uptake of technologies  │        ┌─────────────────────────┐
       │ needs direction from top│        │ Technologies that use   │
       └─────────────────────────┘        │ visual means are better │
                                          │ than the traditional    │
                                          │ ones like voice & email │
                                          └─────────────────────────┘
```
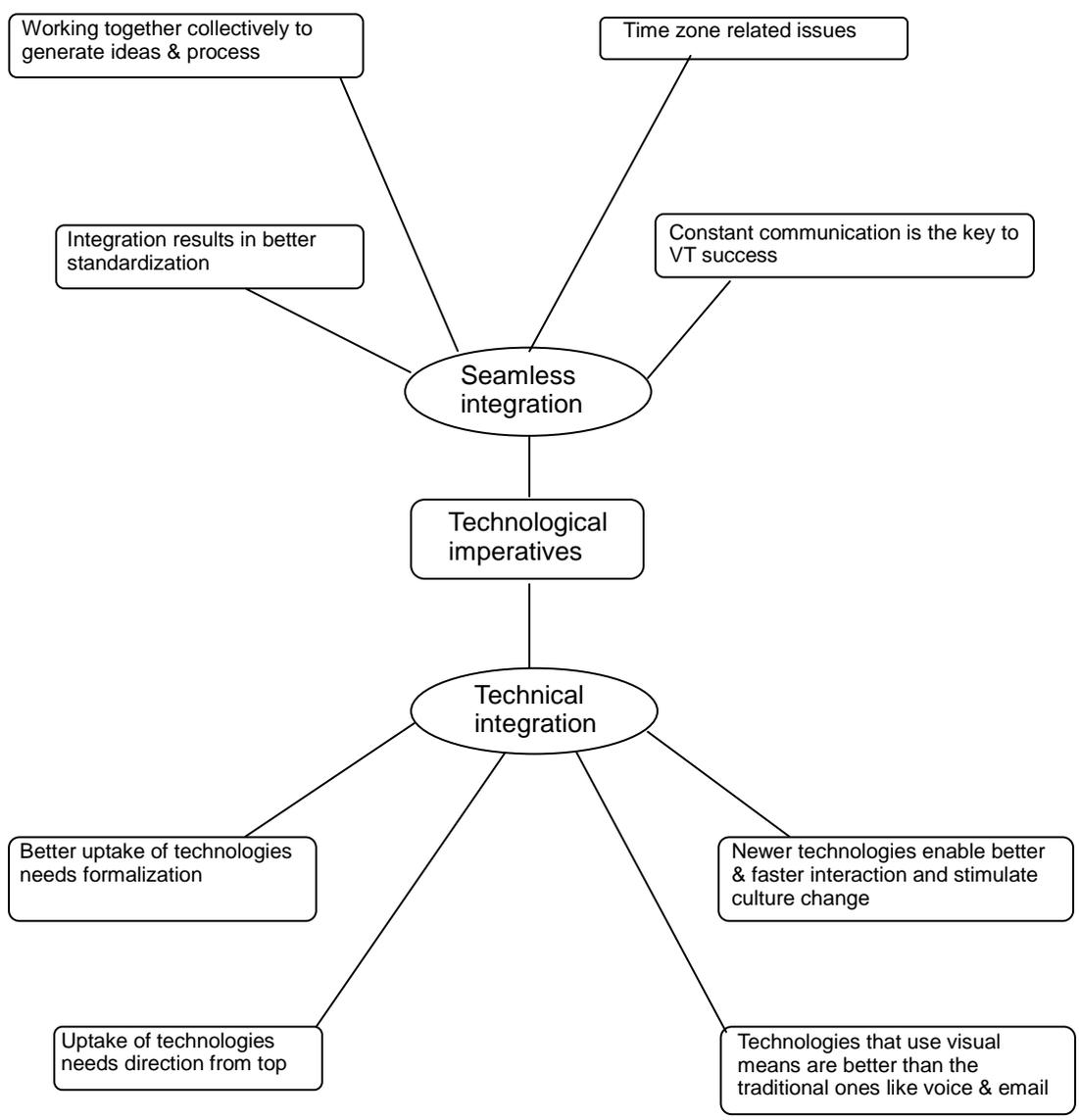
Figure 2: Thematic network for 'Technical Imperatives'

The discussion surrounding the technical imperatives of collaboration highlighted two separate themes revolving around the integration aspects of technology and the need for a seamless flow of information and data. The thematic network represents the key themes on which the technological imperatives were based: seamless integration and technical integration. The separate characteristics of these two are an end-to-end integration need for enabling and encouraging collaboration and the necessity for the technologies to work. In this theme the need for technology came as the fundamental characteristic for collaboration.

Organizing theme: Seamless integration: This organizing theme pertains to the requirement of the technology to work seamlessly from end-to-end. If the organization doesn't or can't ascertain the fundamental technological components necessary for virtual collaboration then there will always be a conflict in the means of communication and the flow of information. The tools used for communication in virtual teams need to have common features to be able to be used across the teams. If the tools used across various geographically dispersed entities of a virtual team can't 'talk' to each other then there is something fundamentally wrong in virtual team communication. The way in which the tools used by virtual team members integrate in different parts of the team will provide a valuable directive for bettering standardization of tools across the whole organization. So if the team members in virtual teams manage to integrate the tools on all aspects, then that enables the organization to implement a certain element of standardization in its virtual team processes. Some of the participant thoughts on standardization and problem resolution are outlined below:

"… if we can virtualize, these services across those different teams/groups, then you don't have different standards, you don't have different service level agreements… they all are same, metrics are all the same and when you do roll out changes, changes are same across the group. You can get this kind of virtualization across the team." [Participant E]

"… So the main criteria are we can discuss how we can implement as a whole when we implement something, and if we get some problem, just collaborate for resolution. The groups that are located in various places resemble a carbon copy of each other... in this case if we don't know where the problem lies if we have a larger problem." [Participant D]

Alongside the standardization of the technologies there is the necessity for the people on the virtual teams to be able to communicate effectively and efficiently. Even when the

technologies are doing what they are supposed to do; it is up to the people involved to make sure the virtual teaming works. If there is a plain functional split between teams then they may not be able to achieve things together and the overarching principle of collaboration won't be met. It is when people are able to work on tasks and/or deliverables together to achieve a common set of goals that collaboration is at its maximum. Not only the tasks but the process of generating new ideas and the routines to achieve these tasks could be the same across the team members in various places. Talking about the collaboration initiatives and their understanding of collaboration this is what a couple of participants said:

"Collaboration comes when 2 people in virtual teams who are not in one physical location have to work on a task with the same idea and the same process, so there is interaction between teams. So if there is plain functional split between teams, saying you do this and we do this, then it is not really collaborate, collaborate is when the result has to be physically delivered by the team or they act together on a certain process." [Participant A]

"Basically working with other teams whether locally or internationally to produce software applications, primarily designing these software apps, providing the testing & support and work on implementations & implementation plans and later provide post deployment and production support." [Participant G]

Another crucial factor for achieving seamless integration is to make time zones work for the team. The time factors around establishing and running virtual teams needs proper consideration in-order to avoid 'overruns' into each other time schedules. In the absence of proper time scheduling, there will always be a conflict around which part of the team works after hours to accommodate for the rest of the teams demands. If there are multiple teams based in multiple time zones then managing the time factors becomes that much more complex. To be able to effectively manage time zones firstly, there need to be a understanding across the team with regards to each others time schedules and expectations, secondly the flow of information on who receives what and when need to be tailored based on where the teams are located, for e.g. basing the team administration for gathering the outputs from the rest of the team could be based out of NZ or Australia because they start their days before everyone else and they could make the information available for others. The following outlines some of participant comments on the importance of making time zones work and some practical problems they faced:

"At Deutsche we were running… it trades in NZ, so that's mid night London time, its 9 PM in London but it is 9'o clock in the morning here and then you running through until 6o'clock in the evening, San

Francisco time which is Saturday morning in London, so if you are trying to run that, it makes quite extensive demands on what you need to base it out of London. What we did was… we had a team in Adelaide who, either side was good for them. Kicking off on a Monday morning was fine, when San Francisco was finishing it was middle of the morning for them, so it work fine." [Participant G]

"The advantages I suppose are time differences, you can correspond by email, I can send an email get in, in the morning and I got responses that are actually quite a good advantage, you can actually make it work for you." [Participant F]

"...technology cannot defeat time zones. You can make time zones work for you and they can be a killer. You will find depending on which side of the time zone you are it could be used for you advantage or it could be used for your disadvantage.
...you can work either way, that's one thing that people don't get… You can expect the people to work your time zone but is not realistic overtime… my opinion any way." [Participant G]

The final contributing factor that needs due consideration to perform seamless integration is communication and related aspects. Apart from keeping an open mode/channel of communication in virtual teaming, it is also important to keep the communication constant and progressive. If the chosen mode of communication could mimic the co-located team based communication as much as possible then that would help in negating the effects of time zones, language barriers etc. A certain amount of time is essential to establish and progress the uptake of communication across team members as any number of factors could impair both the parties obtaining a common understanding of the subject. Hence while dealing with virtual team members it is crucial to consider the factors like lose of context & meaning. It takes time & practice to bring people to a certain level where the information is effectively exchanged by both parties. The following are the thoughts of a couple of participants on issues surrounding culture based communication, avoiding certain behaviours and visual references:

"You find that, if you are talking to somebody from your own background, you think they are going to understand certain things, and they don't... necessarily. This is something that you just have to keep in mind, when you are communicating with people from other cultures.
Also, even more important in that scenario is not to be afraid to say, I don't understand. If you are saying something and you are spending a lot of effort setting something up, and the team member say yes, yes, yes and then they don't understand what's happening, then it's just going to cause problems down the line." [Participant A]

"I found it quite difficult to communicate some times, especially visually showing sometime what you are trying to do." [Participant G]

Organizing theme: Technical Integration: This organizing theme highlights that technical integration of tools are essential not only for establishing virtual teams but also for the smooth running of day to day operations. Considering all the implementation aspects and technical features of technologies can be overwhelming at times but the fundamentals

necessary for making sure the technologies are right for the team requirements is the same across the teams. These features are independent of what a particular tools offers or can achieve.

One of main themes to consider for technical integration is the uptake itself. If the tools are not properly formalized and/or standardized across the various departments then there won't be consensus around how to work together or interpret the outputs. Apart from formalization there is the issue of work priorities. There will always be a conflict with the local work priorities with what's needed in virtual teaming.

So, in-order to make sure there is no loss of uptake due to technologies not integrating, there needs to be a degree amount of formalization for both the technical and admin aspects of virtual teaming. This is best achieved by providing a certain amount of direction from the top [senior management]. If the employees can chose what they want to work with and how they want to work, then there will be segregation not only in the tools chosen but also in the commitment and progression of technology within individual departments. In order to negate this management could ensure the standardization, which will result in technologies getting embedded into the teams and long lasting. This might also help in achieving a certain amount of progression between technical integration to people integration. The importance of formalization, uptake and commitment was described by a few participants as follows:

"...it becomes somewhat like a repository, which needs to be administrated a bit, 2 or 3 people needs to be in charge of it kind of thing... just to keep track of what updates have been done. This is just to strip through some entries that are not 100% correct and things that are getting old may need to be renewed and things like that. Just needs a bit of a looking after and maintenance." [Participant A]

"The hard thing is however, you get a lot of people who are very active, users of those tools... it's hard to get people to use them and update them and modify them and especially in the earlier projects the technology wasn't that good, some years ago, the technologies like Wiki were just coming out and they were a bit clunky..." [Participant J]

"... as if you don't commit to it, you can allocate resources to do different things locally, so you got to agree to doing them in a virtual teams and the local guys precedence might takeover, even though it is not in the best interests of the company, so that is the difficult part.
…so there is all sorts of different things you can put in place but it will be difficult if the teams aren't committed to using them, you start with a hiss and a roar but don't stick to it. So you got to make them stickable, so make the commitment upfront, start using them and make it long lasting so that, it's not a one-off kind of event, if you know what I mean. So these things, you have to somehow embed into the society of the team." [Participant E]

Traditional means of communication within virtual teams relied heavily on mailing and

chatting due to their easy availability and cost factors. These modes of communication were not that much different to what co-located teams used for their communication. Even though chatting offered some distinct advantages like being able to spell and cut & paste, there was still a loss of expression. Voice chatting reduced this to some extent by providing a means to talk to each other in a more cost effective way. In a traditional sense this helped a lot with virtual team communication, however one of the main issues with not being able to see people is the loss of visual references like body language and expression. In the recent years however, the cheaper and general availability of video conferencing and video chat helped to improve this. Now it is a well accepted that being able to provide visual clues is indeed very powerful for virtual team collaboration and organizations actively pursuing virtual teaming cannot perceive it without these visual means. The following couple of comments from participants describe the usefulness of visual conferencing and its advantages:

"The video conferencing, I found very useful just for communication issues. If there is a issue to be resolved, if there is a lot of back & forth communication, it's much quicker & easier to resolve it that way than with a long email trail that goes back & forth." [Participant A]

"What worked really well at World Bank was video conferencing, we had video conferencing team meetings every week and if there are issues to be discussed by the whole team then we would setup a video conference.
You probably need to use video conference more than what we did but that was in the day when video conferencing was very expensive, now we can pretty much run a team meeting as if you have the team meeting running here… just by making the Skype running." [Participant G]

Even though text, voice and video based communications have their place in virtual teaming they are not usually associated with the collaboration in teams. This is because the interaction used by these technologies is sequential and being able to collaborate effectively means being able to 'work together' seamlessly. A good example of collaboration is where and how the team maintains its documentation. If it is just a word document that someone creates and passes around for comments and amendments then it is not necessarily seamlessly integration. However if there is a possibility to maintain all the documentation in one place, where people can go look for things, change each others work without physically exchanging stuff then that will bring in a whole new dimension of collaboration. This is something the collaboration technologies provide in abundance. Not only the ability to improve a piece of work together but also features like searching, quoting each other, providing instant feedback etc. These technologies not only enable faster, cheaper and better way to interact but also stimulates a different way of work culture as

people will start to 'work together' as oppose to 'work with' each other. The need for a repository, tracking information in a Wiki and its feature are described in participants own words below:

"...what is really helpful is having a team repository, something that somewhere the whole team knows, this is where to go and look for things, something like a Wiki or file system where the team collaborates on things and knows where to pick things from." [Participant A]

"Wikis are indispensable. We use them here, it's a culture change, people find it hard to adapt, it's a completely different way of working." [Participant A]

"We used Wikis a lot and Wikis are crucial. You would start off with basic design concepts and then have the evolution of the design, have the comments made on the design, who made the decisions, what the discussion was and all these were captured very very simply through Wikis and you would cut & paste IM messages into the Wiki." [Participant G]

"We can use it as a library, if we get stuck somewhere while developing something, we can search for it and get the necessary help. If someone else posts an idea related to the issue we can use it as a solution. We can concentrate on the problems we are facing... we can maintain data... post it... for future reference." [Participant K]

Summary of thematic network 'Technical Imperatives':

This thematic network elaborated on the technological imperatives associated with collaboration in virtual teams and the various underlying factors. The technology based associations in here were represented by 1) how well the integration aspects work in virtual teams and 2) how well the tools and techniques are implemented to support the collaboration process. The central theme is that technologies themselves should enable the virtual teams to collaborate seamlessly by providing a more intrinsic and integrated approach to people, process and work routines.

Seamless integration in the network elaborated on various basic themes necessary for making sure that integration is embedded into the routines like standardization, formalization, making time zones work and the need for constant communication. It established the factors necessary for making sure the integration takes place like the process for generating new ideas, the work ethos and routines and the time for uptake of communication between team members. The second concept dealt directly with the necessity for the tools to work across the teams and established that some of the factors

contributing to this are direction from management, advantages of visual means of communication and how effective collaboration can be achieved by using the new technologies.

The personal imperatives of collaboration in establishing the uptake of multicultural virtual teams

This section discusses the global theme "Personal Imperatives" and its related sub themes. This thematic network is comprised of two organizing themes and seven basic themes. This network elaborates on the result from the participant discussions surrounding various personal factors in the context of multicultural virtual teaming. Figure 3 depicts the thematic network and is then followed by an explorative description.
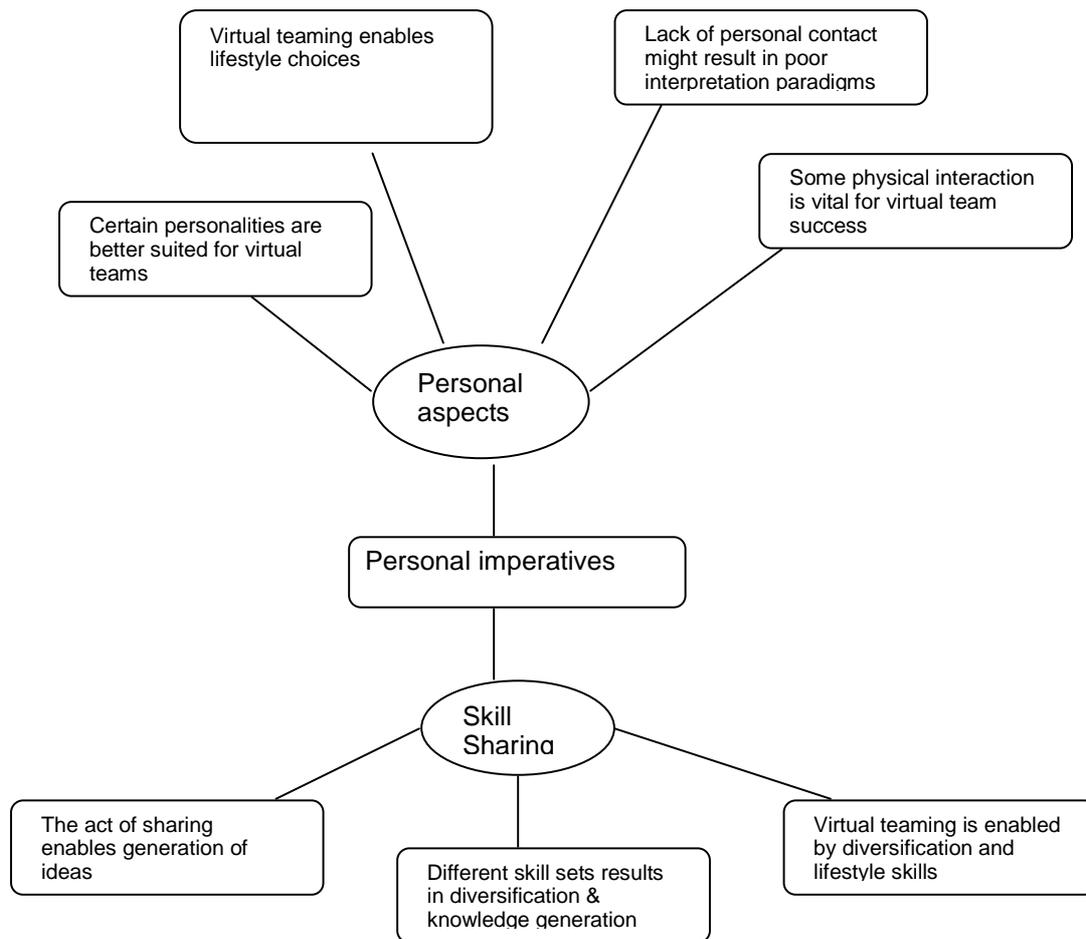
Figure 3: Thematic network for 'personal Imperatives'

The two individual strands identified around personal imperatives pertain to the need to share the skills and expertise between team members and individual personal aspects of people involved. The above thematic network hence represents the key themes as: personal aspects and skill sharing aspects. These organizing themes provide a basis for exploring the physical and personality based aspects of individuals suited for virtual teaming on one side and the necessity for skill sharing and its various enablers on the other. The fundamental characteristic of this thematic network has been identified as the need for diversity and personality in virtual teaming.

Organizing theme: Personal aspects: One of the fundamental characteristics of any individual is his/her personality. So it is prudent to assume the personal traits of individual

have an impact on how they perceive virtual teaming and based on this analogy virtual teaming may suit some personalities better than the others. The individuals in virtual teams tend to be more independent and need lesser supervision and hand holding. There are also aspects surrounding anonymity that might suit some personalities. Some people associate a certain degree of freedom and power to virtuality. Another aspect of personality that might tend towards preferring virtual teaming is the introverted nature of the individuals. People who are more introverted who shy away from lots of personal presence and interaction might tend towards working in virtual teams. So, people who are more Ok with not have a physical contact or people who are more willing to maintain anonymity could suit virtual teams better than the people who strive on personal interaction. Talking about power associated with anonymity and spreading the level of control this is what a couple participants said:

"I think you get more power to express yourself and in fact being anonymous is probably quite powerful. You can be a lot stroppier in an email; it's quite harder to say it to someone's face, so I think you get a lot more power potentially." [Participant J]

"Lot of ways, it removes… I use the word bullying, where someone can walk into a meeting and have a big presence, they might be a big person or a loud person or whatever, that can be taken away in virtual teams, so you spread the level of control across that." [Participant I]

The next basic theme with respect to the personal preferences points out that virtual teaming enables lifestyle choices and work-life balance initiatives. It might suit people who want more flexibility with their work arrangements and who doesn't have a set schedule plan to work. This is also an enabler for people who have to travel long distances for work or for people who moved places but still want to work with their old establishments. Parts of the discussions held with participants also points out that productivity has links to comfort. If people are in the surroundings where they are more comfortable then it might enable them to be more productive which will ultimately result in organizational productiveness. While discussing lifestyle issues, flexibility and work-life balance, a couple of participants expressed their opinion as below:

"More flexibility. The ability to adapt new technology, those that are more willing to adopt new technology take it on a lot easier and have a more flexible approach to work, as oppose to you know, kind of 9-5... You have to have your own kind of space." [Participant E]

"If the virtual team is a better way of life for them... What I mean by that is, they can work from home for instance. They can be closer to home rather than having to travel a long way. Actually being with the family during the week, rather than having to fly to different city and be there for a week, which I have

seen lots in the UK for instance. That definitely is a big positive factor." [Participant A]

The next two themes point out that certain amount of personal contact is vital to virtual teaming and the lack of it might result in poor interpretation patterns. During personal contact, the facial expressions, the body language, the infliction in voice, the emotional context, all help, in sender sending the information and the receiver receiving it. In virtual teams these characteristics could be lost either due to the unavailability of technological means or simply due to lack of personal contact. This might end up as a significant barrier to overall team productivity and output as it is essential for the communications to get across and at the same level.

In cases where the physical interaction is simply impossible, sharing of physical characteristics like a photo, hobbies or a simple bio data will help in improving the team dynamic. Where there is a possibility, there needs to be a certain degree of physical interaction between team members. It could be done as a team day where everyone comes together as a team or it could be done by parts of the team members going to the other side/site to meet the other members or it could be done by simply using technologies like video conferencing. The method used to bring people together is not important, however it is important for everyone in the team to be able to see the human face of the rest of the team in order to be goal and team orientated. The need for physical interaction and personal contact was expressed very well in the following comments:

"What might be helpful… and what I found frustrating working with IBM especially in Westpac is.. that we don't actually see the people, we can't put a face to them. So at least, if there is a photo of the person, where they work… that kind of thing… You just get a better understanding and a better feel for the other person than just a voice on the other side of the phone." [Participant A]

"People don't appreciate how much it matters to know what others look like and know what there reaction is, you loose so much by not seeing the visual references on the phone & email." [Participant G]

"I am personally not a big fan, that's purely because, saying something has emotion behind it. It has infliction in the voice; it has human traits, where as if you were to type exactly the same words, it may come out completely differently. It's about context and I have a problem with that, so where you are using collaborative tools where you are not verbally communicating, then …" [Participant I]

"The big one is that you don't get enough face-to-face time and you can't understand... when you are talking with somebody you can understand their facial expressions and see if the communicating messages are getting across." [Participant J]

"It mattered that face-to-face interaction is good for discussing issues and discussing things and

keeping a team feeling almost, you get to know the other people, it's not just the voice on the other side of the phone, I found that very helpful." [Participant A]

Organizing theme: Skill sharing: This organizing theme identifies that sharing of skills and knowledge is an essential ingredient of virtual teaming. The simple act of sharing enables generation of new ideas. Sharing of information with everyone in the team will lead to getting a collective opinion on a topic which can then be used to either refine the topic or to generate new ideas/initiatives. This is based on the fact that no one individual is as good as all of the team and in a virtual context there is an opportunity for individuals to collaborate simply by sharing information and services.

As virtual teams are comprised of individuals from various geographical locations, they all bring in certain amount of diversity & distinct knowledge to the team. There is also the diversity of the idea & knowledge sharing process and the lifestyle skills of individuals. Tapping into this diversity of the team will be the key to unfolding new initiatives and identifying new knowledge. Based on this analogy we can presume that the greater the diversity of the team the greater the number of ideas would be. The number of unique ideas generated due to the diversity can potentially be used for organizational advantage and competitiveness.

Collaboration technologies are in a unique position to facilitate the idea generation and capturing the diverse input from individuals. The skill sharing between individuals will be enabled by the collaboration which is further enabled by technologies working as a single cohesive functioning unit. Some of the advantages and the ability to share skills from team members are outlined in the following participant comments:

"...diversity... you get the whole different skill sets, different personalities, they can offer a different view of the things, offer different ideas and can get completely different perspectives. As oppose to sticking to the things, without actually changing anything, adding in that diversity you may end up doing it in completely different approach to the way you operate." [Participant E]

"The enablers are that you actually get a lot of lifestyle skills that you can actually mould together and can actually create a pretty awesome team. Everybody got different backgrounds and stuff and if you are all going in the same direction can bring along different skill sets." [Participant F]

"I think things like where you can have a meeting over lots of different locations where you can share a white board space or something, would be very beneficial going forward. It will help to bridge that gap a

bit more in having people in different locations. I think the big issues really are not being able to interact as much." [Participant C]

Summary of thematic network 'Personal Imperatives':

This thematic network elaborated on the personal imperatives associated with collaboration in virtual teams and its various underlying factors. The personality based associations in here were represented by 1) the individual aspects and knowledge of people and 2) the various advantages skill sharing brings to the collaboration process. The centrality of the theme is how individuals behave, work and collaborate and how their skill sets and diversity can enable virtual teams to work better.

The personal traits theme in the network elaborated on various basic themes necessary for individuals, their choices, how they interpret things and the importance of the physical contact in virtual collaboration. It established not only the success factors/enablers of individuality in virtual teams but also the importance of interpretation paradigms. These paradigms needs due diligence when there is a lack of personal contact. Some mitigations measures were discussed as well. The second node of the network dealt with skill sets of individuals and how they can help maximizing the output of the team by tapping into the diversity and lifestyle skills of individuals in the team.

The cultural imperatives of collaboration in establishing the uptake of multicultural virtual teams

This section discusses the global theme "Cultural Imperatives" and all its decedent sub themes. This thematic network is comprised of only one organizing theme and three basic themes for the cultural imperatives global theme. This thematic network concentrates only on the discussions from participants on various multi-cultural factors in the context of a virtual team setting. The aim of this network is to consider the common and intersecting cultural factors discussed both in the literature and by the participants. Even though culture is a very broad aspect for organizations, the scope of the current thematic network has been reduced based on the qualitative data analyzed. Figure 4 below depicts this thematic network, and is followed on by the descriptive exploration of the network.
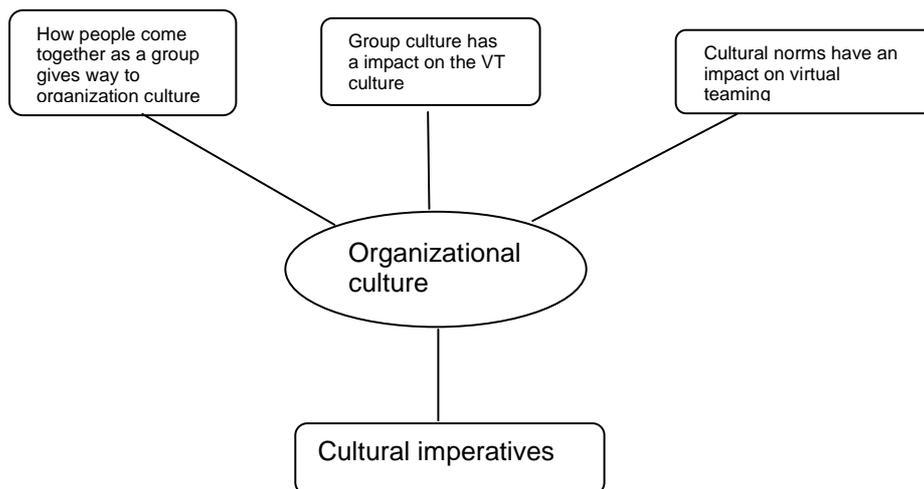
Figure 4: Thematic network for 'cultural Imperatives'

The single strand of data identified for cultural imperatives global theme pertains to the organizational culture aspects of individuals working together. The global theme for this network represents the overarching cultural perspectives of individuals and the key organizing theme for this network is based on organization culture and its dependencies. This organizing theme provides basis for exploring the group and normative behaviour of individuals working for an organization. The fundamental characteristic of this thematic

network has been identified as group thinking and group culture in virtual teaming. The other non organizational aspects of culture were not considered as part of this network due to scope and focus on group based culture.

Organizing theme: Organizational culture: One of the important components of how effective virtual teams are comes from the way people come and work together as a group. As seen from the literature above, authors like Schein already highlighted us to the importance of group and the care that needs to given while forming one. There is a great degree of consensus from the participants regarding the acceptance & openness of the organization towards its people and how it positively effects the overall group culture. The belief is how people come together as a group gives way to the company culture and is dictated by things like the freedom given to the people, how inclusive people feel working in the group, the empowerment given to the people, the transparency of policies and processes, the reward and recognition given to the people etc. To be able to provide this kind of atmosphere to the employees there must be a certain amount of scene setting or direction from the senior management. It is norms around how things are directed, employed, adopted and enhanced that collectively determine how effective and efficient the group culture is. Talking about group and organization culture and the importance of recognizing it and effectively dealing with it was expressed by a few participants as following:

"… I think it's a lot to do with what people think of their organization, what kind of freedom they are given to do their work and what kind of empowerment they are given, how people behave, what a companies goals and values are." [Participant H]

"How you bring in and introduce innovation vs. running your day to day operations, how do you manage change vs. running your day to day business and what kind of personalities are in those roles running those key leadership positions?" [Participant E]

"Organizational culture can be caused by the people you employ, you employ the people from the University you get a whole different culture, you employ the people from overseas you get a totally different culture, so the people you employ, the way you employ them, tools you give them... all combined is what I would deem as organizational culture. Basically it's how everyone thinks as a group and whatever tools you use will dictate a lot of your culture and how you do things." [Participant J]

"If the corporate culture is to take ownership and fix things, and to do things the right way, first time, then that's what get done. It goes all the way from the management to the last person and back up again. If that is the attitude then that's how it is going to work. If the attitude is find someone else that's going to deal with the problem then things aren't going to get done. They will just get passed around." [Participant A].

The next theme highlights that virtual team culture is actually a derivative of the overarching group culture and the group culture have an impact on virtual culture. Many participants highlighted that the cultural aspects of virtual teams are not that much different to the co located teams, in fact they both can be talked about in the same manner. What makes virtual teams different, however, is the physical separation of individuals and the tendency for wider cultural gap. Virtual teams also have a greater tendency towards 'us' and 'them' cultures due to the lack of regular face-to-face communication mechanisms. This is in-line with the propositions of the social identity theory. So, the norming part of the team formation plays a greater role in virtual teams than in co-located teams. It is crucial for the team culture, norms and functions to be defined and agreed before the actual uptake of the activities.

The final theme highlights the importance of being able to deal with the barriers as soon as they arrive and the impact of cultural norms in virtual teams. Cultural norms are the functional aspects of how geographically dispersed teams work and behave.
A number of participants also highlighted, that to be able to cultivate a successful group culture first organizations should overcome the barriers like the blame culture of certain individuals, lack of security for employee jobs, lack of training on cultural norms & issues, lack of ownership to fix any issues etc.

Apart from the above there is also the various relationships based cultural aspects that need consideration like being able to co-exist & evolve, the culture associated with the outsourced or vendor organization, accents & terminology etc. These are the aspects of organization that can't be impacted/changed by overarching organization culture. These aspects need to be respected and given due diligence as the common understanding of these is vital in forming a successful relationship with different parts of the team. While discussing the culture and the various barriers they faced some participants expressed their opinion as below:

"...I found the cultural differences challenging. I don't fully understand the Indian culture and the Indian ways of doing things so there are different ways they handle things, so I have to learn and evolve as I learn things to co-exist." [Participant F]

"The barriers are I think… in a virtual environment understanding the various cultures and be able to interpret what things mean... can be interpreted in many different ways and I think that's the greatest barrier, to be able to understand how that cultural aspect come into it." [Participant J]

"...when you are managing virtual teams, you have less of an impact on that culture, I suppose given

the circumstances, for offshore, they are vendor, they are different company, so they have their own culture within their own company, so we can't dictate that." [Participant F]

Summary of thematic network 'Cultural Imperatives':

This thematic network elaborated on the cultural imperatives associated with collaboration in virtual teams. The culture based associations in here were represented by the group of individuals belonging to an organization. The centrality of the theme is how a group of individuals come together to form an organizational culture and how this culture can better collaboration and work relationships.

The only theme in the network explored the group and organizational aspects associated with collaboration and discussed how coming together as a group is important for forging a good overarching culture. This is then built upon to identify that virtual team culture is actually a sub set of overarching organizational culture and needs to be understood, up-taken and directed in the same manner. The final basic theme noticed the importance of cultural norms in virtual teaming and some barriers and relationship based cultural issues that need consideration while forming the virtual teams.

IMPLICATIONS & FINDINGS

As indicated above, this section explores all three thematic networks together to draw another level of abstraction and conceptualization. It is intended to bring together the deductions from the summaries of thematic networks and the underlying theory to explore the significant themes, concepts and patterns from the text. This section also revisits the literature to draw parallels between the researched theory and the findings from the data analysis.

There was some strong support to the virtual team literature from the research perspective. Some of the main characteristics from the virtual team literature were re-iterated and emphasized again in the thematic networks which show the research has been fruitful in identifying the patterns. A good example of this was the team diversity aspect of virtual teaming, where it was identified as a salient feature in the literature and again as one of the central themes of the thematic network on personal imperatives. Some of the success factors identified by Jenny (2005) like the importance of team formation and the necessity for face-to-face communications especially in the early stages of the project were noticed in the analysis as well. The participants identified that the 'norming' process is a great enabler for virtual team success similar to the literature.

Apart from the above aspects of virtual teaming, collaboration was also supported in the research and some of the commonalities between what the literature proposed and what the participants emphasized on were knowledge sharing, interaction & immediacy. Knowledge sharing mechanism was envisaged by the participants as a non-obstructive and iterative mechanism of collecting, disseminating and sharing of knowledge and there was great consensus that collaborative technologies were ideally suited for this type of sharing. Both interaction & seamless integration came through as central themes of the technical imperatives thematic network and the participants perceived it to be the critical backbone for the uptake of the collaboration technologies in virtual teaming. Further to this, the analysis found support for knowledge sharing aspects and usage of leaner media in the collaboration technologies. This was in-line with the suggestions of Staples & Webster (2007) and Breu & Hemingway (2004) for further research.

All three thematic networks distinctly identified the various enablers and barriers of collaboration technologies in a multicultural context as perceived by the participants. However taken together these factors provide a framework to the uptake of these technologies in virtual teams. The technological imperatives, for instance are crucial to virtual teaming as they provide the framework on which the virtual team collaboration is based. If the technologies doesn't integrate properly, or provide means for working on tasks together, virtual teaming will not be able to achieve its full potential. Technology allows for personal interaction to develop in virtual teams and for individuals to be able to share their knowledge and experience. The technologies from the social computing space are especially useful in developing and maintaining that personal feel when people aren't co-located. In a way they support the diversity of the team members by enabling them to communicate in a collaborative manner. The collaborative technologies also support cultural & group norms as they allow for individuals to work from anywhere but by maintaining a group culture. They allow individuals to work as individuals but come together as a group with the rest of the team, both at the same time.

One of the fundamental findings of the current research was that technologies certainly help in the uptake of virtual teaming, however, the various people and cultural aspects need to be taken into account for establishing successful collaboration. This finding is inline with and in support of DenSanctis and Poole's (1994) AST. This finding highlights that it is important to consider the multitude of other social factors associated with collaboration when it comes to multicultural virtual teams. Implementing the technologies alone for instance, won't guarantee successful virtual team communication.

As identified by the participants and supported by the literature (e.g., McAfee, 2006a), establishing the collaborative technologies is an integral component of virtual team communication that has been largely ignored or taken for granted. This situation can be changed if management of these technological initiatives is brought into the foreground of virtual team thinking & practice. Hence, from the synthesis of interviews and a review of wider literature the following findings are proposed for the organizations embarking on these initiatives. These should be used as guidelines only as the intent is, not to propose a specific technology or initiative but to stress the importance of creating situations where collaboration is actively encouraged and up-taken.

Integration aspects need to be thought through

The aspects of integration in this case pertain to all three imperatives, the technical, the personal and the cultural. It is important to consider how all the processes and procedures pertaining to the imperatives will function and work. Technical integration aspects will need to establish the standardization & formalization of technologies in the organization. The technologies need to be mandated to start with and need to be adopted and evolved by all teams. Senior management should ensure everyone involved in virtual teaming are aware of this and policies should outline that this is the case.

The personal integration aspects pertain to how forthcoming individuals are in regards to personal communication and collaboration. People should be encouraged to work on tasks together which will further empower them to use collaboration tools. Collaboration technologies that enable individuals to change each others work instantly and technologies that capture instant feedback need to be employed to encourage this aspect. Organizations that experiment with various combinations of teams have a higher chance of success in finding the groups that work best. Some barriers to personal integration aspects are lack of management support, lack of enthusiasm from team members and knowledge on tools. To mitigate these organizations could look into appropriate coaching and training for individuals involved in these initiatives.

The cultural integration aspects pertain to how teams are formed by assembling individuals from different geographical locations, nationalities and languages and make them work as a single cohesive unit. Research participants highlighted that having people from completely different cultures in the same virtual team need to be thought through as there is greater possibility for conflict & misunderstanding in the communication. It becomes important for organizations to choose technologies that support differences in cultures, an example of this is to employ a tool that allows inputs in multiple languages but maintains the meta-data seamlessly. Terminology & measurement aspects need to be spelt out clearly and in the simplest language possible for everyone to understand.

Technology aspects needs to support seamless integration

This recommendation extends the technological integration aspects from above by outlining the importance of choosing technologies that work together. Some of main barriers for technical integration identified both in the literature and by the participants was the ability of the technologies to communicate with each other. If the technologies employed by individual teams doesn't have the common means of communication, and if there are additional overheads to interpret and understand the data received, then it discourages virtual teaming all together.

Technologies that work together will encourage only one set of standards & routines both at an individual team level and at the organization level. Collaboration suites of technologies are ideally suited here. In IT development for e.g. there are some open source tools that allows for web based repositories of source code which can be build as per local requirements. This allows for teams to pass the information without explicitly doing so. All this will result in productivity and to the bottom line of the organization.

People aspects needs due consideration in VT collaboration initiatives

As indicated above all the technological integration in the world is not going to help in virtual teaming if there are underlying people issues. The people aspects like suitability of individuals for virtual teaming, the independence and perceived empowerment individuals receive from virtual teaming, the adequacy of training given to individuals all need consideration while forming and norming virtual teams. Collaboration technologies are again in an ideal situation here, to encourage individuals to communicate effectively. They won't help if the people simply don't want to use them but they will help in encouraging independence, collaboration and training for motivated users who want to promote these aspects. The personal interaction aspects that were identified as crucial for virtual team success will be enabled by the collaboration technologies that bring in aspects of social computing and personality to the team processes. Another people aspect that is enabled by collaboration is sharing of the skill-sets. This could be done by simply promoting the document generation and audit trail processes as part of performing tasks. These aspects

will in turn encourage individuals to correct each others mistakes and promote sharing information and skills to resolve issues.

Another people aspect of collaborative technologies is diversity. This is the diversity individuals bring to their teams and the diversity that some times distinguishes one organization from another. By encouraging diversity and by promoting processes that encapsulate the diversified inputs from individuals, collaborative technologies are also suited for organizations looking for competitive advantage.

Virtual team culture needs to extend from the overarching group culture

As indicated in a number of places both while reviewing the literature and through the participant comments it is vital to establish virtual team culture as part of the overall corporate culture. This could include the same processes, policies, standards, toolsets and wherever possible cultural norms. The individual sub cultures & team norms could be different to the group norms but the idea is to encourage the individual level diversification that results in group level unification. This is easier said than done as every individual virtual team brings with it an additional level of complexity to the whole process.

Collaborative suite of technologies will help in mitigating the differences to a certain level by encouraging individuals to be individuals but allowing for integration at a higher level. This is again done by providing comprehensive audit trail & documentation process and by easing the development and building of complex applications.

This particular finding is supportive of social identity theory where team members tend to associate themselves with the group they are currently involved in. As identified by Ashforth and Mael (1989), it is important for the organization to provide group wide direction and initiative so that individual sub-groups can adopt and uptake the cultural norms. The importance is on establishing organizational wide norms in defining the culture and in establishing team collaboration processes.

Further Research

Further research on the aspects of collaborative technologies and virtual teaming could explore the individual technologies in detail, instead of the overarching framework. This will provide inputs into the aspects of individual technologies that work and the aspects that don't. Due to time constraints some miscellaneous themes found were not completely explored. Further research can concentrate on some of these like age aspects of team members in virtual teaming and the role of security in implementing collaborative technologies in organizations. The current thinking around social computing is still heavily based on the social interaction between individuals outside work. Further research could explore the social computing aspects alone by investigating the aspects of bringing social computing technologies into organizations. As indicated above, the current research didn't consider specific technology suites that are available under Enterprise 2.0. Further research can look into the marketplace to investigate the features provided by the various technology suites available and their suitability to organizations.

Future research might also benefit, with an increase in the number of participants. The current sample of participants was obtained from researcher's parent organization and one of the vendor organizations. This could be expanded out to multiple organizations. The current sample data does have participants from four different nationalities and geographies; however all of the participants are currently based in New Zealand. It could be expanded out to obtain sample data from participants that are located in different geographies. Various other factors around organization size, team size, cost etc. could be explored in greater detail as well.

The main intent and the expected audience of this research paper are information management practitioners that are interested in establishing and using the collaborative suite of technologies into their respective organizations. It is intended to provide an overarching framework and direction in using these technologies in the virtual computing space. It is also expected that the practitioners interested in these technologies will have some understanding of how these technologies work and how they are structured. This paper intends to provide all the background information and thinking and the various enablers and barriers of implementing these technologies. The expectation is that the

practitioners will then go into the marketplace and look into the various vendor offerings to see which features are provided by what tools and which features are important for their organizations before making a final purchase decision. Understanding the various people and cultural aspects of virtual teaming and collaboration might make the practitioners aware of the interdependencies and considerations that are usually ignored in the technologies stacks alone.

Limitations

The following are some of the broader limitations of the current research

- The participant experience. The current sample does have a lot of depth in terms of no. of years of participant experience both with co-located and virtual teams. However all the participants were chosen from the ICT sector. It could potentially be expanded out to other sectors that can benefit from virtual teaming.

- The research timeframe. The current research has been carried out based on university rules and regulations and completion period. Expanding the timeframe could benefit from obtaining more participation, expanding out to other geographies etc.

- Existing research on collaborative technologies. As collaborative technologies are relatively new technologies, there has been little academic research with respect to their viability. More research is definitely needed on the new generation of collaborative technologies and how they can better virtual teaming.

CONCLUSIONS

There is a strong perception both in the literature reviewed (e.g., McAfee 2006a, 2006b) and by the participant comments that collaboration technologies in virtual teams are an integral part of how these teams communicate and integrate. While the various imperatives around the collaboration are seen as important, how they come together for the benefit of the teams remains only in the background of virtual team thinking and practice. Not addressing the various technological, personal and culture aspects together might lead to a gap in the uptake of these imperatives in establishing virtual teams.

The present research paper's aim was to narrow the gap of this understanding by bringing these aspects together into a single research stream. Research on virtual team collaboration and its various contributing factors was undertaken in the researcher's parent organization in the ICT sector. The focus of the research was to bring together the impact of these factors by using both the existing literature and the collective experience of participants in the interviews.

The study found strong support for DenSanctis and Poole's, Adaptive Structuration Theory through the participants involved in the interview process. It found out that all of the technical, personal and cultural imperatives need to be considered in establishing the uptake of multicultural virtual teams and technology is only one of the enablers.

Rather than simply representing the views of interview participants, this study provided a constructivist view by amalgamating both the literature and the participant responses about how to better collaboration in virtual teams. The main outcome from this research was a list of proposed guidelines to organizations embarking on virtual team initiatives to make sense of all the factors that needs consideration. A secondary outcome of the research was the analytical analysis in which all the imperatives of collaboration were derived and elaborated. The findings included enablers like integration & inner workings of technologies and also the importance and due diligence required for people involved in virtual teaming.

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APPENDIX A

Table 2: Coding, Issue tracking & Theme generation

Codes	Issues Discussed	Basic Themes
Ideas/Skills	Face-to-face interaction, Keeping team feeling, Get to know people	The act of sharing enables generation of ideas
	Better knowledge, Multi-level knowledge	
	Disturbance, Can be lonely	Different skill sets results in diversification & knowledge generation
	Sharing space & content, Not being able to interact	
	Sharing ideas	Virtual teaming is enabled by diversification and lifestyle skills
	Diversity, Different approach, Skills, personalities	
	Lifestyle Skills, Direction, Skill sets	
Integration	Working remotely, Located disparately, Not in 1 physical location	
	Same ideas & process, Acting together	Working together collectively to generate ideas & process
	Working with other teams, Providing support	
	Instant communication, Imitate co-located teams	
	Web conferencing, Amount of interaction, Reduce discussion	Tools working together seamlessly
	Contiguous Flow, Tools working together	
	Team work	
	Cheap/Free/Easy to use, Accepted, Work better	
	Communication	
	Information flow, Organizing people	Integration results in better standardization
	Audit trail, Community editing	
	Implement as a whole, Carbon copy of each other	
	Same standards/metrics/SLAs, Virtualization	
	Working as a single unit, Services to the customer	
	Same time zones, Knowing each other	

	Different versions, Put it up for everyone	
	Availability of tools/environment., Access to everyone	
	Governance of a tool	
Uptake	Admin overhead, Looking after	
	Other Work priorities	
	Loss of interpretation	Better uptake of technologies need formalization
	Work standards, Right information	
	Different time zones/cultures, Level of commitment	
	Make it stackable, Embed into the team, Make it long lasting	Uptake of technologies need direction from top
	Making people use, Technology progression	
Interpretation	Personal Accountability, Writing makes people think more	
	Blame culture	Lack of personal contact might result in poor interpretation paradigms
	Facial expressions, Loss of expression in phone & video	
Technology	Team repository, Collaborate on things, Look for things	
	Chat: Tricky stuff, like spelling; Chat: Language Issues	Technologies that use visual means are better than the traditional ones like voice & email
	Conference: Communication issues	
	Video conf for team meetings	
	Video conf for team meetings, Cost with conf, coming down	
	Wikis: Culture change, Different way of working	Newer technologies enable better & faster interaction and stimulate culture change
	Tech for better interactions	
	Technology maturity, Method flexibility	
	Technology as a enabler, Speeds up adoption	
	Distributed systems & teams, Tech/components in different places	
	Tools: For creating Forums, IP related with questions	
	Wider range of skills	

	Speed	
	Technology misuse	
Cost	Recession, Cost cutting but still reliable	
	Cost: bring people together, Time factor	Virtual teaming might provide a positive cost benefit to the org
	Access to cheaper work force	
Repository	Repository for policies, procedures, standards etc.	
	Team repository, Collaborate on things, Look for things	Repositories inherently stimulates collaboration
	Review board, Commenting on development	
	Wikis: capturing history, Capture IM messages	
	Recordable, Auditable	
	Using it as Library, Future reference, Search function	
Culture	Tools are multilingual	
	People's perception, Freedom for people, Empowering people, Goals & values	
	How inclusive people are, Accepting everyone as they are	
	Transparency, Company DR strategies	How people come together as a group gives way to organization culture
	Accountability at the top, Making it happen	
	Innovation vs. day to day ops, Change vs. day to day bus, Personalities of leaders	
	Reward & recognition	
	Similar backgrounds, Work ethos, Organization rules	
	Direction from the top, From bottom- Convincing Senior Mgmt	
	People you employ, Tools given to people, Thinking as a group	
	Peoples willingness for virtual environment	
	Training for cult issues Online tools	
	Passing the problem to others	

	Blame culture	
	Job security, Rumours re closure	Group culture has a impact on the VT culture
	Being able to report changes, Use of technologies by cultures	
	Working with a team, Balancing a team	
	Us and them, Communication means	
	Norming the strategy, Timing of the recruitment of VT members, TM recruitment	
	Escapism	
	Team behaviour & interaction	
	Cultural knowledge, Lack of body language interpretation	
	Learn & evolve to co-exist	Cultural norms have an impact on virtual teaming
	Less impact, Vendor culture and their own norms	
	Accents & terminology.	
	Interpret what things mean in diff cultures	
Lifestyle	Work life balance, Being close to family	
	Flexibility towards adopting Tech, Own space	Virtual teaming enables lifestyle choices
	Comfort leads to productivity	
Time zones	Flexibility in basing virtual teams, Making time zones work	Time zone related issues
	Local timings/conditions	
	Ability to follow sun	
	Making time zones work for you	
	Making time zones work	
	Realistic expectation of time zones	
	Longer to get answers, Time taken for walkthroughs	
	Working for someone else's times	
Personality	Preference towards anonymity	
	Remove bullying, Even spread of control	Certain personalities are better suited for virtual teams
	Anonymity allows for expression	
	Anonymity allows for power	

Interaction	Seeing the people, Better feel for the person [e.g. Photo]	
	Seeing people, Having a Team day	
	Lose of context by not seeing visual references	Some physical interaction is vital for virtual team success
	Have to go onsite, Get the buy-in	
	Product not meeting requirements, Product failure	
	Interpreting tones, Body language, Actual reaction	
	Different view of formality, Us & them between co-located & virtual teams	
	Gender based bias	
	Learning to cope, Personal preference	
	Lack of personal contact	
	Less personal, Exclude part of the team	
	Lack of emotion, Inflection of voice, Human traits, Lack of context	
	Facial expressions	
Security	Job security, Org attitude towards virtual teams	Virtual teaming and security
Communication	Mutual understanding	
	Understanding across cultures	
	Saying I don't understand, Putting the hand up	
	Problems with mail/phone	Constant communication is the key to VT success
	Working odd hours	
	Showing visual references	
Age	Understanding of tech Reluctance to try	Virtual teaming and age

APPENDIX B

Table 3: Categorization of themes

Basic Themes	Organizing Themes	Global Themes
Working together collectively to generate ideas & process	Seamless integration	Technological imperatives
Tools working together seamlessly		
Integration results in better standardization		
Time zone related issues		
Constant communication is the key to VT success		
Better uptake of technologies need formalization	Technical integration	
Uptake of technologies need direction from top		
Technologies that use visual means are better than the traditional ones like voice & email		
Newer technologies enable better & faster interaction and stimulate culture change		
Repositories inherently stimulates collaboration		
How people come together as a group gives way to organization culture	Organizational culture	Cultural imperatives
Group culture has a impact on the VT culture		
Cultural norms have an impact on virtual teaming		
Virtual teaming enables lifestyle choices	Personal aspects	Personal imperatives
Lack of personal contact might result in poor interpretation paradigms		
Certain personalities are better suited for virtual teams		
Some physical interaction is vital for virtual team success		
The act of sharing enables generation of ideas	Skill Sharing	
Different skill sets results in diversification & knowledge generation		
Virtual teaming is enabled by diversification and lifestyle skills		
Virtual teaming might provide a positive cost benefit to the org	Miscellaneous	
Virtual teaming and security		
Virtual teaming and age		