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**FACULTY OF GRADUATE AND
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**Impact of Proximity and Management Interventions on Knowledge Transfer in Technology-based
Mergers and Acquisitions**

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**TELFER SCHOOL OF MANAGEMENT
UNIVERSITY OF OTTAWA**

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THESIS

MASTER OF SCIENCE IN MANAGEMENT

CHEN DONG LIN

SUPERVISORS: DR. AJAX PERSAUD

DR. SAMIA CHREIM AND DR. SCOTT ENSIGN

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Abstract

The present study proposes a conceptual framework for investigation of how various dimensions of proximity (i.e. geographical, cognitive, organizational) and management interventions influence knowledge transfer and innovation in technology M&A. This research objective is achieved through a qualitative multiple case study, which included three M&A cases involving technology-based companies. Evidence supports the links between various dimensions of proximity and knowledge transfer, and subsequently, between knowledge transfer and innovation. The study also confirms the importance of management interventions, especially in retaining key employees to preserve and transfer knowledge. The study contributes to the literature by illuminating the relationship between various dimensions of proximity and M&A knowledge transfer, which so far has not been well researched and established by prior studies, and by providing a new perspective to view cognitive proximity. In addition, it provides directions for managerial practices to select M&A partners and to manage post-M&A knowledge transfer.

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1. Introduction

Recent figures indicate mergers and acquisitions (M&A) involving Canadian firms are recovering strongly from a dip caused by the latest banking and financial crisis (“FP Crosbie”, 2010). In the past decade, the total value of M&A in Canada has seen a significant growth. Data compiled by FP Crosbie showed that in 2007 the total value of M&A involving Canadian firms reached \$370-billion, an all-time high (2008). Meanwhile M&A have become an increasingly important means to acquire necessary knowledge resources to enhance firms’ innovative capabilities (Ranft and Lord, 2002). The principal objective of this study is to understand knowledge transfer in cases of technology-based M&A. More specifically, this study proposes a conceptual framework and empirical examination of how various dimensions of proximity (geographical, cognitive, organizational) and management interventions impact knowledge transfer and innovation in technology M&A.

Attending to technology-based firms’ knowledge and capabilities is important. Technology-based industries are of strategic importance for a nation’s economy. Prior studies have suggested that innovation is a key driver, both to national economic growth and competitiveness (Audretsch, 1995; Feldman 1999; Lundvall et al., 2002). There is consensus that these industries are crucial to innovation, especially to breakthrough innovations. Moreover, technology-based firms, such as software companies, have theoretically unlimited potential in growth and economic rent generation. These firms rely heavily on human capital instead of the availability of natural resources. They generate relatively higher economic rent and are less vulnerable to competition from lower wage countries than are (low-tech) manufacturing firms.

There are strong theoretical arguments suggesting a positive relationship between M&A and innovative performance. However, the empirical evidence indicates a mixed impact of M&A on firm innovation. For example, M&A is cited to have a positive impact on innovation based on case study evidence of Cisco Systems (Tsai and Hsieh, 2006) and Johnson & Johnson (Barrett, 2002). On the other hand, researchers such as Hagedoorn and Duysters (2000), Hitt et al. (1991, 1996) and Man and Duysters (2005) found a negative relationship between M&A and innovative performance. Prabhu et al. (2005) thus raised an interesting question: “Why does M&A activity work for some, but not for others”? One explanation for the equivocal findings is that the current research findings tend to be based on aggregated data – including M&A activity across different industries and settings – and as a result, positive impacts could have been cancelled out by negative ones (Prabhu et al., 2005). Given the lack of clarity, further scholarly investigation is required to identify factors that contribute to post-M&A performance (King et al., 2004) and to better understand knowledge transfer and innovation following a merger or an acquisition (Fernandes, 2007; Hagedoorn and Duysters, 2000).

Technology M&A has a unique potential to yield superior innovative performance by combining leading-edge technological knowledge found in two companies (Ahuja and Katila, 2001).

Previous studies by Zander and Kogut (1995) and by Arrow (1969), Kuznets (1966) and Schumpeter (1942) – as cited by Ensign (2009) – have showed that knowledge flow is positively associated with innovative performance. But transferring knowledge, especially the tacit technological knowledge, is not always easy. Proximity between firms is argued to play a big role in the process of knowledge transfer (Boschma, 2005); however, the impact of proximity has yet to be investigated in depth in M&A settings.

Proximity, in the context of M&A, refers to the similarity in various aspects such as location, knowledge base, practice, and culture, between two firms involved in M&A. Traditionally academic studies have looked at the impact of geographical proximity on knowledge transfer between universities and industries (e.g. Acs et al., 1992; Jaffe, 1996; Torre and Gilly, 2000; Varga, 2000). More recently, geographical proximity has also been suggested to have an impact on knowledge transfer within a single organization (Argote, 1999; Kane et al., 2005; Zander and Kogut 1995) and between industrial organizations (Ambos and Ambos, 2009; Boschma, 2005; Jasimuddin, 2007). However, there are different dimensions to proximity – such as geographical, cognitive and organizational – as Boschma (2005) has argued. Our understanding of how these different dimensions affect knowledge transfer is incomplete. This study will initiate research on this topic in the context of technology-based firms that have engaged in merger or acquisition. M&A activity in the technology-based industries is significant and growing, thus the current study is timely in terms of providing empirical evidence on this topic.

Furthermore, in the current literature, the role of management in knowledge transfer and value creation is well recognized. Management can determine how firms are integrated and can therefore influence the success of knowledge transfer (Hitt et al. 1991; Haspeslagh and Jemison, 1991). In addition, it can put in place measures to retain key employees so that the acquiring firm's knowledge is preserved and transferred (Ranft and Lord, 2002; Ranft, 2006). It can also help to shape the conditions, under which knowledge transfer takes place. When proximity dimensions exert a negative influence on knowledge transfer and innovation, such as alienating cultural practices (Brannen and Peterson, 2009), management can intervene to mitigate the negative impact.

Given the above, the present study proposes a conceptual framework and undertakes an empirical investigation of three cases of technology-based M&A. The aim is to examine how various proximity dimensions and management interventions influence knowledge transfer and innovation in post-M&A technology-based companies.

The remainder of this thesis is organized as follows. The next chapter provides a review of relevant literature and proposes a conceptual framework to guide the empirical study. Chapter 3 outlines the methodology used. This is followed by an intra-case analysis for each of the three cases studied. The Discussion compares the themes from the three cases and links them to extant literature. The Conclusion addresses the contributions of the study as well as the limitations and directions for future research.

2. Review of related literature

The review of literature attends to relevant aspects of the concept of knowledge and knowledge transfer and describes prior research and theories relevant to M&A knowledge transfer and innovation. In addition, it provides the key theoretical underpinning of the current study and proposes a conceptual framework to guide the empirical work.

2.1 Understanding the concept of knowledge and the emergence of the knowledge economy

The concept of the knowledge economy arose in the 1970s, with Peter Drucker (1969) suggesting 'the knowledge worker' as someone using his or her knowledge on a particular matter to make a living rather than doing physical labour. Then, he went on to suggest the knowledge economy or the next economy, which is a type of economy primarily driven by knowledge. In this new type of economy, labour and capital are no longer the dominant factors behind the economic activity; knowledge becomes increasingly relevant too. As Powell and Snellman (2004) put it, "The key component of a knowledge economy is a greater reliance on intellectual capabilities than on physical inputs or natural resources". According to Kogut (2000), knowledge as significant intangible assets that a firm possesses is an important source of competitive advantage and therefore firm value. This view is shared by other researchers, such as Prahalad and Hamel (1990).

As a result of the economic development in the last few decades, knowledge intensive firms emerged; along with them came the concept of knowledge management. Knowledge management is defined by Quintas et al. (1997) as "the process of critically managing knowledge to meet existing needs, to identify and exploit existing and acquired knowledge assets and to develop new opportunities". According to the knowledge-based view, firms that pursue competitive advantage over their peers need to gain critical new technological knowledge and capabilities; however, many firms are no longer capable of creating all required knowledge and capabilities on their own due to today's fast-changing business environment. The access to external sources of knowledge is thus crucial for the innovative performance of firms (OECD, 2000).

In order to gain access to new technological knowledge and capabilities, firms could employ an organic strategy, which is, developing new technological knowledge by using in-house R&D activities – learning by doing. Firms could also form strategic alliances, which can take the form of joint ventures, licensing, co-development, or outsourcing of particular R&D functions. Furthermore, firms could get involved in mergers and acquisitions. The three options are often referred to as the make or buy decision; the first two strategies represent the make-decision, while the latter represents the buy-decision. The in-house strategy is not always possible. For example, it might take too long to develop a technology. Desired technology might also be too risky or not cost-effective to be developed in-house. The other two strategies entail a considerable degree of knowledge transfer and interaction, especially in the event of M&A.

Although all three strategies to acquire new technological assets are subject to failure, M&A have a very high failure rate (Agrawal and Jaffe, 2000; Haspeslagh and Jemison, 1991; Man and Duysters, 2005).

2.1.1 Conceptualization of knowledge

Knowledge, which is the key notion behind the aforementioned concepts such as knowledge economy and knowledge management, has always been associated with an increased ability. For example, the Latin maxim, “scientia potentia est,” which was popularized by English philosopher Sir. Baron, implies that one’s potential increases as more knowledge is gained. However, knowledge has also been subject to debate among western philosophers for centuries (Aune, 2008). Western epistemology – a branch of philosophy that studies the theory of knowledge – is yet to determine what exactly knowledge is, in spite of the fact that many philosophers have spent their lives studying and trying to define it (Fagin et al., 2003). This implies that knowledge is difficult to conceptualize.

According to Aune (2008), difficulties around defining knowledge are associated with the ambiguity of knowledge. This ambiguity arises because knowledge has at least three main principal meanings, which are related to learned abilities, acquaintance or familiarity with certain things, and facts gathered by study, observation or experiences. In addition, knowledge is often deeply ingrained in organizations and individuals, so one can be unaware of its existence (Ambrosini and Bowman, 2001). Furthermore, knowledge can be viewed from different perspectives. For example, it can be seen as a state of mind, a process or a capability (Alavi and Leidner, 2001). As a result of the ambiguous and multifaceted nature of knowledge, it does not have a generally agreed-upon definition. Instead, scholars tend to view knowledge based on their background and individual understandings. Thus, there are numerous definitions of knowledge used in this field of studies. (See appendix 1 for a list of knowledge definitions used by leading scholars in the field of knowledge studies.)

2.1.2 Dimensions of knowledge

More recently, instead of studying what knowledge is, research interests have shifted to the study of the various dimensions of knowledge (Fagin et al., 2003). However, the complexity of knowledge does not end there. In the current literature, there is not just one approach that has been proposed for categorizing knowledge types, but a number of different approaches. The most commonly used approach in organizational knowledge studies is the “dichotomy of tacit and explicit knowledge,” introduced by Polanyi (1966) and popularized by Nonaka in his paper “The Knowledge-Creating Company” (1991). (See appendix 2 for different dimensions of knowledge.)

“Tacit knowledge,” a concept coined by Polanyi, is personal, non-codifiable and context specific knowledge. He argues that, “we know more than we can tell” (1966, p. 4), implying that although we might do well in certain activities, we may not be able to articulate how they are done. Explicit knowledge, on the other hand, can be articulated and is easily coded and stored.

Nonaka (1994) argues that tacit knowledge is often context-dependent and socially embedded. He believes that tacit knowledge contains cognitive understanding and practical skills specific to a context. In addition, knowledge could be held collectively by a group of employees in a firm, rather than by an individual who develops and possesses it. The more context-dependent and embedded the knowledge is, the harder it is for others to imitate, making it more likely to create competitive advantage (Grant, 1996; Nonaka, 1994).

Due to these characteristics of tacit knowledge, Grant (1996) argues that it is more important than explicit knowledge. He believes that firms which are able to transfer and integrate tacit knowledge will outperform their peers. However, Alavi and Leidner (2001) contest this view. According to them, tacit and explicit knowledge types are 'mutually dependent and reinforce the quality of the knowledge', because knowledge contains both explicit information and implicit know-how (Nonaka, 1991).

2.1.3 Knowledge transfer and its measures

In order to leverage knowledge to its fullest, it must be identified, shared and spread. It is argued that a knowledge-based firm's growth rate is dependent on the speed at which knowledge is replicated by a large number of employees within a firm (Kogut and Zander, 1992). The replication of knowledge within a firm entails sharing, transferring and internalizing knowledge within or between multiple corporate units. But knowledge transfer would be inefficient if the knowledge was specialized, tacit knowledge, which is non-tradable (Gupta and Govindarajan, 2000), unless it is codified (Albino et al., 2001).

According to current management research, while there are many factors that have been suggested to affect knowledge transfer and knowledge sharing, such as reputation (Ensign, 2009; Osterloh and Frey, 2000), the size of the knowledge base (Ahuja and Katila, 2001), and absorptive capacity (Prabhu et al., 2005; Tsai, 2001), the tacitness of the knowledge is the most widely cited barrier to knowledge transfer (Alavi and Leidner, 2001). Specialized tacit knowledge that an individual or a group develops in a specific area is personal, context specific and hard to replicate. Transferring this type of knowledge would require the codification of it, as well as a good understanding of the context.

The codification of knowledge poses two key challenges: the cost of codification and the cost of negative externalities, such as imitation and spill-over of knowledge by competitors. The codification of tacit knowledge entails conversions of personal, context-specific and socially embedded knowledge to explicit knowledge, which is meaningful to the recipients of the knowledge. This conversion costs time, effort and money (Ranft and Lord, 2002; Zollo and Singh, 2004). In addition, new knowledge is created consistently, which makes it impossible to codify it all in a timely manner. The codification of tacit knowledge to ensure a quick replication could lead to potential imitation by and spill-over to competitors, which could eventually hurt the competitive position of the firm that holds the knowledge initially.

On the research side, one of the key challenges involving knowledge transfer studies is the question of how to measure the transfer. In the literature, there are two ways to measure it, both of which capture the change in knowledge and the change in a firm's performance related to the knowledge transfer. The first approach is especially problematic because there is still an ongoing debate about whether or not knowledge can be measured directly (Liebowitz and Wright, 1999). In addition, a large chunk of knowledge is tacit, including the new knowledge created as a result of knowledge transfer.

Moreover, there are multiple repositories for knowledge (individual, structural, cultural, and procedural), and knowledge transfer could have an impact on one or more of them, which makes it hard to capture all of its effects at different levels (Rich, 1997). Furthermore, when measuring knowledge transfer, assumptions are made. It is assumed that the impact of knowledge is identifiable and that it is possible to assess the impact of knowledge flow on a particular outcome. In reality, however, knowledge could have multiple effects. Therefore, measuring one of them would not provide a good picture of the value of the knowledge under study (Mandell and Sauter, 1984; Rich, 1997).

Knowledge transfer can be measured indirectly by its outcome (Davenport and Prusak, 1998). For example, research suggests that patents, new products developed and introduced, customer retention, and process innovation are good proxies for the effect of knowledge transfer. The key issue in using performance measurements is that it is hard to control other factors that affect the outcome, but it is still much easier than measuring the change in knowledge (Rich, 1997).

Although there is no consensus on the relative importance of each knowledge type, it is agreed upon that tacit knowledge is harder to transfer and replicate. Given the crucial importance of the transfer of tacit knowledge for innovative performance and for firms' competitive positions, this study attempts to gain insights on how it takes place, and on its impact in the context of M&A.

2.2 The literature on M&A

2.2.1 Financial impact of M&A

M&A have become an increasingly popular means by which to acquire new technological assets (Ranft and Lord, 2000), but they are subject to failure. Prior studies on M&A concluded that M&A have a very high failure rate, which is generally reflected in the financial performance of merging and acquiring firms. In a study of 700 large mergers, it was concluded that as many as 83% failed to yield a positive financial return (Mergerstat, 2000). Similar conclusions were drawn by a number of other researchers (among others: Agrawal and Jaffe, 2000; Haspeslagh and Jemison, 1991; Man and Duysters, 2005). A meta-analysis of post-acquisition performance by King et al. (2004) examined 33 empirical studies, reflecting a total sample size of 5060 M&A, and concluded that M&A activity has no significant effect (even a modest negative effect) on the acquiring firm's financial performance. The high failure rate and a lack of a positive effect imply that in general M&A do not create value for the acquiring companies' shareholders.

According to Agrawal and Jaffe (2000), acquiring firms' values tend to decline after M&A. On the other hand, the target's shareholders seemed to realize a consistent and significant gain from M&A in terms of higher (abnormal) returns (Bruner, 2002). Prior studies have suggested a list of key causes for the high failure rate, such as: overvaluation of targets that led to overpayment, poor integration and implementation, cultural conflicts and culture incompatibilities. It is also important to note that previous M&A studies tend to evaluate M&A performance by using accounting-based metrics, such as changes in return on equity, return on assets, profitability ratios, and market return-based metrics, (changes in market share performance.) A few used other metrics, such as patent counts (Ahuja and Katila, 2001) and change in patent authorship, (Puranam and Srikanth, 2007). Thus, in the current literature, M&A success is often linked with financial performance.

2.2.2 M&A research on innovation and knowledge transfer

The findings from prior empirical research on the impact of M&A on innovative performance are at best mixed, with some studies reporting no impact, while others report some impact. For example, Man and Duysters (2005) reviewed 15 large-scale empirical studies on the innovation of M&A, and concluded that mergers and acquisitions have a neutral or a slightly negative impact on innovation, which seemed to confirm Jensen's suggestion that M&A are a placebo for innovation (1988). Similarly, Hitt et al. (1990) found the amount of resources allocated to M&A affects managerial commitment to innovation. The time and energy that senior managers devote to M&A distract from their focus on innovation, which impacts the new firm's innovative performance.

A different study by Hitt et al. (1991) on the relationship between M&A and innovative performance concluded that M&A activities have negative effects on R&D input and output. They measured the changes in R&D input in terms of the amount of R&D investment prior to

and after M&A, relative to the average industry R&D intensity. They found that M&A seem to replace and reduce acquiring firms' investment in R&D. They also measured the changes in R&D output - patent intensity – by comparing them to the ratio of patents granted and sales. The two studies suggested that the acquisition strategy is negatively related to innovation (Hitt et al., 1990, 1991). These studies suggested that due to these negative relationships, the acquiring firm's amount of innovation may decline over time.

However, a study by Prabhu et al. (2005) showed that technology M&A might work well for firms seeking external innovation sources. They suggested that a firm with a deep internal knowledge would be able to create innovation by acquiring external knowledge. Depth is referred as “the amount of within-field knowledge possessed by the acquiring firm”. A high depth of knowledge allows for better management and leverage of external knowledge, thus helping enhance a firm's ability to innovate. This is consistent with the notion of absorptive capacity, which is critical to a firm's innovative capacity. It entails a firm's ability to acquire, assimilate and apply new, external knowledge in order to extract economic benefits from it (Cohen and Leventhal, 1990). Other studies by Ahuja and Katila (2001) and Cloudt, Hagedoorn and Kranenburg (2006) suggest that technology M&A could contribute to a firms' innovation, when technological relatedness is accounted for.

Prabhu et al. suggested that the majority of empirical studies done to date have focused on M&A in the aggregate, and thus overlooked the differences between them. Thus, a different research approach should be taken to examine the tactic of combining firms' characteristics which may influence their capacity to exploit external innovation sources.

Previous research has also suggested that a number of attributes might enhance the probability of successful M&A, when success is defined by increased innovative performance. Firms with moderate similarity in terms of knowledge bases are more likely to experience positive innovative performance post-M&A (Ahuja and Katila, 2001; Cloudt et al., 2006; Hagedoorn and Duysters, 2002; Prabhu et al., 2005). Dissimilar knowledge bases would make it harder for firms to integrate their technological assets, whereas too much similarity could reduce knowledge synergies and result in fewer knowledge combinations. The size of a firm's knowledge base is another often-cited attribute. Ahuja and Katila's (2001) study found that the absolute size of the acquired knowledge base is positively related to innovative performance. They argued that the larger each firm's knowledge base, the more technology recombination possibilities there are. They also asserted that the absolute size of the acquired knowledge base increases the external knowledge that the acquiring firm would be able to access and leverage. A later replication of the study confirmed this finding (Cloudt et al., 2006).

Researchers from the organizational behaviour discipline have repeatedly emphasized the importance of post-M&A integration. Ranft and Lord (2000, 2002) stressed the importance of human capital in the transfer of knowledge in technology M&A settings. Poorly managed M&A often result in the loss of key employees, and hence the loss of their knowledge and skills, which

are the most important factors in post-M&A innovative performance. Bannert and Tschirky (2004) claimed that post-M&A integration is the key factor in determining the success or failure of M&A. Man and Duysters (2005) agreed that an effective integration has a soothing effect, but argued that no research has yet shown that sound integration can guarantee success. In other words, a well managed M&A is likely to outperform a poorly managed one, but its success is not determined by integration, at least not entirely.

Puranam and Srikanth (2007) also agree that post-M&A integration plays a key role in realizing the effects of the M&A. They have found that when the acquiring firm is intending to leverage the target's existing knowledge (i.e. what target's employees know), a structural integration is desirable. The integration would enhance the acquiring firm's innovative capabilities. But if the acquiring firm intends to leverage the target's capacity to innovate, then a structural integration – which is associated with a loss of autonomy – would negatively impact the outcome, due to the likelihood that highly talented employees would become demotivated and eventually leave the firm, and thus cause harm to the target's potential to innovate. Hence, they argue that if the acquiring firm wishes to keep the acquired firm's innovative capabilities, it should leave it autonomous.

An earlier study by Graebner (2004) suggested that in general the trade-off between integration and autonomy holds, but in certain circumstances the acquired firm's managers are in the position to influence the outcome. Graebner (2004) claimed that if managers from the acquired firm exercise their influence promptly, the disruptive impact of a loss of autonomy on the acquired firm's routines can be mitigated. In addition, if the acquired firm's managers are placed in important cross-functional positions, unexpected M&A values can be created. When given adequate incentive, acquired managers can leverage their knowledge about the acquired firm to identify new innovative opportunities and thus help to foster innovative performance in the new firm.

When looking at specific firms, some studies found a strong positive link between M&A and innovation. Some companies, like Cisco Systems (Tsai and Hsieh, 2006), are even solely reliant on M&A to gain necessary technologies. "Cisco Systems does not engage in R&D; it adopts the strategy of merging with those technology corporations that Cisco Systems needs (Tsai and Hsieh, 2006)." This positive link implies that M&A could work out for the acquiring or newly created firm, post-M&A. Determinants of success therefore include the characteristics of the acquiring firm in question. Johnson and Johnson's strong innovation record too is attributed to its ability to identify good M&A targets and manage them better than other firms (Barrett, 2002).

Prabhu et al. (2005) even contested the usefulness of researching M&A implications for innovation in general, because M&A activity could have positive, neutral or negative effects on the performance depending on the firm at hand. So the question to ask is not whether M&A is good or bad for knowledge transfer and innovation in general. Instead studies should focus on the factors that influence the outcome.

2.2.3 Technology M&A and its characteristics

Due to the increasing trend of M&A with the intent of acquiring new technologies and capabilities in the late 1990s, Ahuja and Katila (2001) proposed an interesting approach to look at M&A activity. They split acquisition activity into technology and non-technology acquisitions. Technology acquisitions involve acquisitions in which technology is a significant component of the acquired firm's assets. This categorization helps researchers effectively discriminate non-technology acquisitions (cases that are unlikely to enhance their innovation capability) from technology acquisitions. Technology acquisitions mean that the acquiring firm absorbs the other firm's technological assets. This process extends the acquiring firm's knowledge base and innovation output by gaining economies of scale and scope in R&D, and by accelerating product development processes (helped by getting access to new knowledge and technology), as well as the potential to recombine technologies (Ahuja and Katila, 2001). Non-technology acquisitions, by definition, do not involve any substantial technological component, and consequently do not significantly increase the innovation of the acquiring firm.

Another key characteristic of technology M&A is the tacitness of technological knowledge, which is discussed above. Technological knowledge refers to the proven technologies as well as skills and knowledge associated with them. The integration of tacit knowledge is of utmost importance, but also the hardest part of any technology M&A. Tacitness of knowledge complicates the process because this type of knowledge is hard to articulate and requires direct experience to understand and to apply, and thus is hard to transfer. In contrast, codified knowledge is that which can be precisely articulated, written and transferred; context specific tacit knowledge also tends to be socially embedded. Tacit knowledge is often accumulated over the years by employees in a specialized environment. It is precisely these characteristics of tacit knowledge that add the most value to firms' sustainable competitive advantage. Prahalad and Hamel's (1990) concept of core competence highlighted the importance of constantly outperforming competitors. It is not sufficient for a firm to do better than its competitors; rather it needs to have the ability to constantly develop superior products & technologies. This core competence can only be gained by developing unique knowledge and technologies that are hard to imitate and firm specific. For this reason, knowledge which can be transferred readily, such as codified knowledge, will add less value than tacit knowledge to a firm's competitive advantage. This is, however, not to suggest that codified knowledge is not valuable or important.

Transferring tacit knowledge requires social capital such as trust, and social similarity (Boschma, 1999). The effectiveness of knowledge interaction is therefore associated with the quality of social interaction and communication. Environments, such as shared social and cultural norms and values, will enhance trust and the willingness to cooperate. The ability to form and maintain effective social relations are therefore a key to gaining core competences (Amin and Wilkinson, 1999). Nonaka and Takeuchi (1995) suggested that tacit knowledge could be made explicit through intensive communications: externalization. The most effective method of externalization is through face-to-face communication (Mehrabian, 1971: 40), because this mode of interaction

scores the highest in terms of richness of media. A message in such a setting can be shared interactively with linguistic expressions as well as body language. Additionally, feedback and clarifications can be received to ensure accuracy and understanding. Thus, the possibility of misinterpretation of meaning is minimized when communication takes the face-to-face form. For these reasons, face-to-face communication is the best method to externalize tacit knowledge.

Since technology M&A rely heavily on knowledge transfer to enhance post-M&A innovative performance, acquirers need to facilitate the process so it is successful. In other words, success in knowledge transfer is a proximate for post-M&A innovative performance. The importance of knowledge transfer does however come at a big price. As discussed above, knowledge transfer is a challenging part of M&A activity due to the tacitness of technological knowledge. On top of the tacit characteristics of technological knowledge, a lack of proximity between firms often undermines this process (Boschma, 2005). The impact of the various dimensions of proximity is, however, subject to influences of the top management, i.e. management's strategic and integration plans and executions thereof. For example, if top management believes the geographical distance would affect the M&A outcome, it could try to avoid selecting a target that is located at relatively large distance. If the avoidance is not favourable for the firm's strategy, management could still try to minimize the effect by providing means by which knowledge transfer is possible and effective.

2.3 Proximity

Traditionally, proximity has been a major focus of many academic studies on knowledge transfer between universities and industries (e.g. Acs et al., 1992; Jaffe, 1996; Torre and Gilly, 2000; Varga, 2000). More recently two streams of knowledge transfer studies posited the importance of proximity in knowledge transfer. Scholars like Argote (1999) Kane et al. (2005), and Zander and Kogut (1995), have suggested that proximity has a large impact on knowledge transfer within a single organization; while Ambos and Ambos (2009), Bosch (2005) and Jasimuddin (2007) have implied the proximity impact on knowledge transfer between organizations. Although the impact of proximity on M&A knowledge transfer has not been adequately studied in the literature, it is assumed to be relevant. According to Ranft and Lord (2002), knowledge transfer in the M&A setting is a hybrid form of intra- and inter-organizational knowledge transfer, therefore proximity impact on M&A knowledge transfer needs to be examined.

Proximity in the context of M&A refers to the similarity regarding several aspects, (e.g. location, practice, culture, knowledge base) between two firms involved in M&A activity. There are three key dimensions of proximity: geographical, cognitive, and organizational proximity. Geographical proximity is defined as the physical closeness, either in the relative or absolute sense, between firms. Cognitive proximity in general refers to the extent to which firms share the same reference and knowledge (Boschma, 2005). Organizational proximity refers to the extent to which firms share organizational arrangements, such as hierarchy, routine and rules (Boschma

2005). Organizational proximity could be further divided into two sub-categories, cultural and structural.

2.3.1 Geographical proximity

Physical closeness between firms provides the possibility for participants to have frequent face-to-face communication, which is crucial to the transfer of tacit knowledge. Although the availability of advanced communication tools and fast transportation has eliminated some communication barriers, it cannot replace the social presence of participants. Social interaction between two firms is particularly relevant in the case of tacit knowledge transfer. This implies that long geographical distance is less cost-effective and to some extent hinders the communication. Caimcross (1997) argued that, with the emergence of ICT and faster transportation modes, the distance has died, suggesting that geographical distance is no longer relevant. Desrochers (2001) disagreed and argued that distance does still matter. He suggested that close geographical proximity is still the best way to ensure effective communications regardless of modern communication channels and transportation. Rallet and Torre (1999) claimed that the development and use of ICT could facilitate to some extent the transfer of technological knowledge, but that it is impossible to completely eliminate the natural barriers formed by geographical distance. They presented four arguments to support their view. First, it is more cost effective to exchange tacit knowledge than trying to codify it before transferring. The cost of codification of knowledge increases with the degree of tacitness. Second, the fast speed of knowledge creation in science and technology makes it impossible to codify all knowledge immediately. Third, it is not sufficient to possess only tacit or codified knowledge in knowledge-intensive firms; tacit and codified knowledge are complementary in nature. Finally, sharing by using modern technologies and tools requires common practices that are tacit.

The practice of frequent direct interaction between individuals and firms, even for Silicon Valley firms that have access to the most sophisticated communication, suggests the importance of being located close to each other – clustering. Biotech clusters in San Francisco and Boston, are other examples which prove the importance of geographical proximity. Clustering also casts doubt on the argument that geographical distance is less relevant to new knowledge based industries (Desrochers, 2001). *Ceteris paribus*, knowledge transfer would go more smoothly between two firms located closely than at a larger distance. For the aforementioned reasons, geographical proximity matters in technology integration and transfer.

2.3.2 Cognitive Proximity

Cognitive proximity in general refers to the extent to which firms share the same reference and knowledge (Boschma, 2005); however, complementarity in technological knowledge and capabilities is also important in determining cognitive proximity. Perez and Soete (1988) argued that firms need to have some shared knowledge in order to understand the technological knowledge of partners. That is to say that the cognitive proximity should be close enough for firms to understand and to act on the new knowledge. The effective transfer of knowledge

requires an absorptive capacity, which is determined by the environment and past experience, to value, assimilate, and apply the new knowledge (Cohen and Levinthal, 1990). By having a partial common knowledge base, the firm's ability to learn new knowledge increases. A cognitive proximity which is too small could lead to an inability to communicate and understand the new knowledge. Too much cognitive proximity, however, reduces the learning potential, e.g. limits sources of novelty, and causes a competence trap where a firm no longer develops necessary technological assets that conform to market developments (Man and Duysters, 2005).

Moreover, Chaudhuri (2004) found that technical incompatibility often slows down product development. The research findings of Breschi et al. (2003) suggested that firms develop new technologies related to their existing knowledge bases. In their research on how firms in six major industrialized countries (France, Germany, Italy, Japan, UK, and US) expand their technologies, they found a coherent pattern of technology expansion. Technology portfolios are often clustered around a group of technologies that have a common or complementary knowledge base. Furthermore, it is found that a moderate level of similarity between two firms knowledge base is positively related to innovation (Ahuja and Katila, 2001; Cloudt, Hagedoorn and Kranenburg, 2006; Man and Duyster, 2005; Prabhu et al., 2005).

2.3.3 Organizational proximity

Organizational proximity refers to the extent to which firms share organizational arrangements, such as hierarchy, routine and rules. Organizational proximity is an overarching concept that could be further divided into two sub-groups, cultural and structural proximity. Structural aspects pertain to how firms are regulated at the macro level, such as structure, systems, hierarchy and power. Cultural aspects are related to elements such as language, common habits, established practices or rules that regulate the relations, and interactions between individuals and groups (Boschma, 2005). Organizational proximity minimizes uncertainty and increases the effectiveness of coordination, and consequently facilitates knowledge transfer (Boschma, 2005). Organizational proximity has been used in different areas of administrative science. Some scholars such as Monge et al. (1985) used organizational proximity to refer to physical proximity between co-workers. In M&A studies, the most similar concept to organizational proximity is organizational fit. According to Datta (1991), organizational fit is the level of compatibility in management styles and organizational systems between the acquiring and the acquired firms. It is argued that organizational fit is one major determinant of post-M&A integration (Jemison and Sitkin, 1986). Blanc and Sierra (1999) claimed that there is a need for close organizational proximity in order to build trust and initiate the transfer process. On the contrary, too little organizational proximity could cause a lack of trust and commitment, miscommunication, goal misalignment and culture conflicts. As a consequence, knowledge transfer would become undermined. Boschma (2005) asserted that organizational proximity provides stable conditions and a consistent environment, which in turn enhances trust and facilitates coordination, and therefore, would work in favour of knowledge transfer. Uncertainty and confusion will be reduced when firms share similarity in organizational arrangements (Boschma, 2005).

Stahl and Voigt (2008) claimed that cultural distance can create major barriers to integration, but suggested that different cultural dimensions have different effects. For example, a difference in the language spoken would not have the same impact on communication as a difference in number of hours worked. Research has yet to sort out these differences. In addition, there is a distinction between the national and organizational culture. They are both parts of a given institution, but have different effects on knowledge transfer. A difference in national culture is believed to have a greater impact on knowledge transfer and integration than that at the organizational level (Stahl and Voigt, 2008). A small proximity would likely lead to cultural clash, which is by far the number one post-M&A integration problem. Hofstede (1980) suggested that the costs of cross cultural interaction increases with cultural differences, while others suggested cultural differences to be a source of cultural risk for M&A (David and Singh, 1994). Low morale and motivation are often the result of cultural distance. Therefore, cultural similarity would ease integration (Capron, 1999) and enhance performance (Jemison and Sitkin, 1986). Like cultural differences, structural differences between firms might be an obstacle to the integration (James et al., 1998). For example, it would be easier for firms that have rigid hierarchical structure to work with other hierarchical firms than with flexible organizations, such as in the case of biotech and pharmaceuticals (Schweizer, 2005). Since organizational process built over time is hard to change overnight, organizational fit should be carefully addressed prior to engaging in M&A.

2.4 Management interventions

Management interventions were suggested to be a major determinant of successful M&A (Haspeslagh and Jemison, 1991). Post-M&A, it is often the acquiring firm's senior managers who decide how to integrate the firms and therefore influence the success of knowledge transfer (Hitt et al. 1991; Haspeslagh and Jemison, 1991). They can implement appropriate integration strategies, such as appointing an integration manager and an integration team (Ashkenas and Francis, 2000; Buono, 2003; Tetenbaum, 1999) and committing resources to enable employees to overcome the change (Buono, 2003; Haspeslagh and Jemison, 1991; Schuler and Jackson, 2001). In addition, management can intervene when proximity dimensions exert a negative influence on knowledge transfer and innovation, such as alienating cultural practices (Brannen and Peterson, 2009) in order to mitigate the negative impact. Moreover, managers can intervene to prevent key employees, such as senior technical employees and capable managers, from leaving the firm. The retention of key employees is important in preserving technology-based firms' stocks of knowledge and capabilities, especially talented employees (Ranft and Lord, 2000; Ranft, 2006).

2.5 Typology of Innovation

In the literature, there are many different typologies of innovation, but for technological innovation, the dichotomy of "incremental and radical innovation" is most used. The origin of this dichotomy is hard to determine (Scooco, 2006), because many authors have used similar terms to suggest the same typology, such as Porter's continuous and discontinuous technological

change (1986), Tushman and Anderson's incremental and breakthrough innovations (1986), and Christensen's sustaining and disruptive innovation (1997).

Micheal Porter (1986) used continuity and discontinuity in technology to single out the impact of a technological change on an established firm's competitive advantage. He suggested that in the event of an incremental change in technology, there is likely little change in terms of the competitive landscape in the existing industry leadership. On the contrary, when a technological discontinuity occurs, outside firms - often small, flexible firms that lead the change - can eliminate many of the first-movers' advantages. As a result, a technological discontinuity often leads to a shift in the competitive position of a firm. Similarly, Tushman and Anderson (1986) proposed that throughout a product's life cycle, there would be a long period of incremental changes in technology, followed by technological discontinuities. Those discontinuities could either be competence-enhancing or competence-destroying for firms. Competence-enhancing discontinuities have a dramatic impact on the price - performance relationship for products, and would reinforce the industry leader's position. Competence-destroying discontinuities, on the other hand, tend to disrupt the existing dominant industry structure, rendering obsolete market leaders with outdated, legacy technologies.

Christensen (1997) introduced the terms "sustaining" and "disruptive" innovation. "Sustaining innovation" is referred to as the change in a product or particular technology's performance in established firms without having a large-scale impact on the state of technological development. Disruptive innovation has radical impacts on technological development, but tends to appear less attractive to mainstream customers, due to its dramatic changes in design. He described how disk drive designs evolved from 14-inch to 8-inch disks. Initially, the dominant design of the disk was at 14-inch, but then new firms introduced technologically advanced disk design in the 8-inch size, which was viewed as inferior. As a result these disks were sold to the lower-end market at a much lower price, but they soon gained a large share of the market and forced out the existing 14-inch disk design, including the dominant market players. Christensen suggested that despite the capability of dominant firms to introduce disruptive innovation, they often want to be able to stay in the current market position until there is a clear signal for a change in customers' needs.

The present study looks at innovative performance on the basis of the change in incremental and radical innovation. The distinction between incremental and radical innovation is made based on the extent to which the innovation impacts the current state of technological development. Incremental innovation involves an improvement of an existing product or process by exploiting existing technological knowledge and capabilities within a firm (Leifer et al., 2000). This type of innovation increases the firm's competence, and thus it is competence-enhancing. Radical innovation, on the other hand, involves the development of a new product or process that can transform the marketplace by exploring new technological opportunities (Leifer et al., 2000, p.5). This type of innovation requires capabilities and knowledge that are completely new to the firm (Scocco, 2006), thus it is competence-destroying.

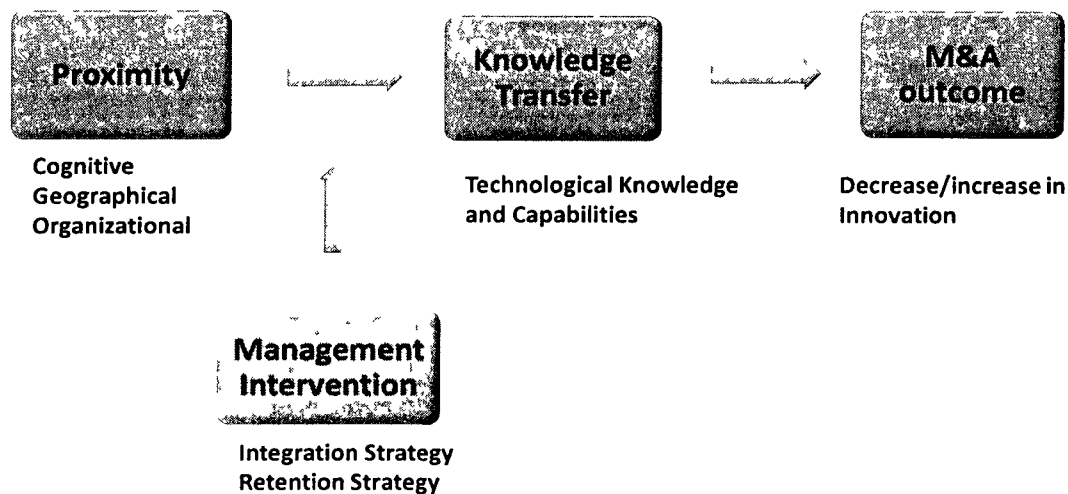
2.6 Research objective and research questions

The research objective is to investigate how various proximity dimensions and management interventions influence knowledge transfer and innovation in post-M&A technology-based companies. From the absorptive capacity theory perspective, to be innovative and to stay competitive, firms need the ability to acquire, incorporate and apply new knowledge from which they may extract economic benefits (Cohen and Leventhal, 1990). In technology M&A, the acquiring firm has access to a source of external knowledge but has yet to incorporate and apply it. Departing from this position, the following two central research questions are formulated to help address the research objective

- How do various dimensions of proximity influence knowledge transfer and innovation?
- How do management interventions help resolve difficulties associated with proximity factors and facilitate integration and retention of key employees?

Based on the above review of the literature, a conceptual framework is established to help guide the research (see Figure 2.4: Knowledge transfer in technology M&A), so that an in-depth understanding of the impact of proximity dimensions and management interventions on knowledge transfer and innovation in technology M&A can be gained.

Figure 2.4 Knowledge transfer in technology M&A



In short, the model indicates that proximity dimensions could have an influence (positive or negative) on knowledge transfer, and the influence in turn could be subject to interventions by the new company's management (here the "new company" refers to the combined entity, and "new management" refers to the acquirer's management that has the upper hand in the new entity). In addition, new management could also put forward strategies to influence integration and the retention of key employees, which are associated with the success of knowledge transfer. Finally, it is assumed that the more knowledge is transferred, the higher the likelihood that the innovative performance will increase, as indicated in prior studies (see Zander and Kogut, 1995; Arrow, 1969).

3. Research design and methodology

The following section elaborates on how and why the current research design was chosen, and how the cases were identified and recruited, as well as how data were collected. In addition, it provides detailed explanations of data analysis and measures that were taken to ensure the quality of the study.

3.1 Qualitative research rationale

This is an exploratory study that aims to shed light on the impact of proximity on knowledge transfer and innovation in the M&A context. It seeks to contribute to theory development in this area of studies. A qualitative research design is appropriate given the study's exploratory nature and the complex setting of M&A activity. Qualitative research design is useful to explore such a complex phenomenon, which requires detailed understanding (Creswell, 2007; Miles and Huberman, 1994). Qualitative research allows researchers to gain insights on how the phenomenon takes place, and permits them to determine factors that have a significant influence on the outcome (Miles and Huberman, 1994). Although quantitative research can be used to test a proposed relationship, it cannot provide in-depth understanding and it tends to obscure some crucial information that researchers are looking for (Tellis, 1997). Thus, a complex phenomenon such as M&A activity could not be sufficiently examined by using statistical model without gaining some detailed understanding prior to that.

3.2 Research design

The research objective of investigating how various proximity dimensions and management interventions influence knowledge transfer and innovation in technology M&A is achieved through a qualitative multiple case study. Case study is appropriate when the phenomenon under study can be identified as a case and has clear identifiable boundaries (Creswell, 2007, p. 75). It is especially appropriate when M&A is the subject, because it requires detailed, contextual and often sensitive data (Schweizer, 2005). The present study included three M&A cases.

According to Eisenhardt and Graebner (2007), multiple case studies offer advantages that single case studies do not. For example, multiple case studies allow for the comparison across the cases to examine if findings are consistent throughout the cases or they only occur in a single case. In addition, the analytical power of the research increases when more than one case is included. The inclusion of more cases is also helpful to generate findings that are based on varied empirical evidence (Eisenhardt and Graebner, 2007). As a result, multiple case studies tend to produce more robust findings than single case studies (Eisenhardt and Graebner, 2007; Tellis, 1997; Yin, 2003). In multiple case studies, it is important to ensure a replication logic by treating each of the cases as a separate case (Yin, 2003). In other words, for each case, every step and procedure in the research must be carried out independently without interference from other cases, so that the replication effect in the study is achieved.

3.3 Case selection

Three M&A cases were selected and included based on the following criteria:

1. The target firm had to be a technology-based firm, which had been acquired by or merged with another technology-based firm. Technology M&A, regardless of the underlying motive, would likely result in superior innovative performance, due to a large technological component that is involved (Ahuja and Katila, 2001). In other words, in technology M&A, even if a technology-based firm is acquired for other motives than technology e.g. market expansion, there would still be a unique potential to innovate. Similarly to Ranft and Lord (2002), technology-based industries for this study's purpose were those identified as belonging to biotechnology, computer equipment, computer software, computer services, electronics, and telecommunications industries.

2. Given the underlying argument that technology-based M&A would yield superior innovation by combining the technological knowledge and capabilities, companies in the selected M&A cases had to have the intention to integrate and to have taken significant steps in integration.

3. M&A that took place in the last two or three years were preferred, because it takes time for integration and knowledge transfer to occur, which then allows for the observation of the impact of proximity and management interventions on knowledge transfer and innovation.

4. Preference was given to M&A involving a Canadian firm, because firms in Canada in general would be more accessible for the researcher.

To identify eligible M&A cases, 'Financial Post Crosbie Mergers & Acquisitions in Canada Database' was consulted. From the database, a number of twenty five cases were selected that met all the inclusion criteria. Most of these cases were from industries such as biotechnology, computer software and service, telecommunications and communications equipment. Contacts were sought by phone, email and through the University of Ottawa's network to invite individuals from the identified firms to participate. Despite numerous attempts, only two of the contacted firms accepted to participate in the study. The rest declined to talk about the issues primarily due to the sensitivity of M&A. It was said that numerous approvals were required for employees to disclose information concerning M&A. A third case included in the study was an acquisition that occurred in 2002, which was longer than the preferred time range of two or three years. Otherwise the case met all other criteria. To increase the analytical power, a decision was made to include it. To counteract the possible shortcoming emanating from the passage of time and loss of memory, interviews were sought with three key individuals and findings were corroborated across the interviews. See 'table 4.3: Inclusion Criteria' for details on how each of the cases met the inclusion criteria. The company names used in this thesis are pseudonyms to conceal the participating companies' identities.

Table 3.3: Inclusion Criteria

	Technology M&A	Integration	Transaction date (two or three years prior to study)	Canadian involvement
CanSoft/GiantSoft	Yes	Yes	Yes	Yes
FutureTech/BrightTech	Yes	Yes	No. but negative effects mitigated	Yes

MajCom/NextCom	Yes	Yes	Yes	Yes
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3.4 Data collection

Various sources of data can be used in case studies (Creswell, 2007; Yin, 2003). Using different sources of data allows for triangulation and enhances the trustworthiness of the findings (Creswell, 2007; Stake, 1995; Yin, 2003). In the present study, in-depth interviews and public documentation were the most important data sources that were obtainable. There were efforts made to obtain internal reports related to the M&A deals, but they were unsuccessful.

The actual data collected were influenced by Yin's analysis strategy of 'relying on existing literature for case studies', which entails the use of a preliminary research framework to prioritize what is to be collected and analyzed according to the literature (2003, p. 111). This was useful for the researcher to stay focused on elements incorporated in the research framework, as suggested by the literature.

The first interviewee in each case was recruited by telephone and through the University of Ottawa's network. After the first interview, the snowballing technique was used to recruit additional interviewees, where an interviewee was asked to refer to others – who were also involved in the acquisition integration and who could speak about knowledge transfer – for an interview. For each of the cases, three to five in-depth interviews were conducted with key individuals from both firms who were involved in the deal, such as executives, lead technological employees, and integration managers. (There were five interviews conducted at CanSoft/GiantSoft, three at FutureTech/BrightTech, and five at MajCom/NextCom.) The inclusion of various people from each side allowed for gathering individuals' viewpoints and experiences, thereby fostering the understanding of each merger or acquisition in the study. According to Tellis, this is especially important to case studies, which are 'multi-perspectival analyses' that include views from several relevant actors or groups of actors involved in the phenomenon in question (1997).

An interview protocol was used to guide the interviews. The interviews were semi-structured to provide room for probing (Patton, 2002). The interview protocol contained questions pertaining to the research objectives and was divided into five major parts: 1) Background information about the deal and the involvement of the interviewee in it; 2) The role of management in integration and knowledge transfer; 3) The role of proximity dimensions in knowledge transfer; 4) The change in innovative performance after knowledge transfer; and 5) Ending question to request referrals from interviewee. The interviews lasted between 45 minutes to one hour and were digitally recorded and transcribed with the consent of the interviewees. Some interviewees were contacted again to provide additional information.

Given its qualitative nature, this study relies primarily on interview data. This also applies to the collection of knowledge transfer data. thus the study used a self-reporting approach in the interviews to help determine the degree of knowledge transfer that has taken place. Interviewees were asked to identify how knowledge transfer took place and what factors facilitated or

hindered it. In addition, interviewees were asked to identify instances where there was a change in innovative performance as a result of the M&A.

To help identify changes in innovation, four questions were asked concerning the impact on the new firm's ability to innovate, such as speed of development (faster), enhancement of existing technology or products (better), new advanced technology and products (superior), and the number of technology and products developed (more). They were also free to suggest other changes unrelated to the four questions. To help determine what kind of innovation each change was, interviewees were consulted. Their views and their descriptions of changes and associated impacts on the firm provided key insights that helped to determine what type of innovation a particular change was, according to the definition of innovation provided by Leifer et al., (2000).

Public documentation, such as the firm's M&A press releases and annual reports, and third party reports (industry journals, general media news reports), provided other relevant data. There were two main purposes of this type of data. First, documentation was used, in complement to interviews, to create a profile of both of the firms involved in the M&A. Second, evidence from documentation served as a basis to probe for the case specific issues.

3.5 Data analysis

Analysis consists of two processes: within-case and cross-case analysis (Yin, 2003). The within-case analysis treats each firm as a separate case, whereas the cross-case analysis identifies similarities and differences among the cases. Empirical evidence of multiple cases would strengthen the findings (Eisenhardt and Graebner, 2007).

Within-case analysis: While analyzing the data, the literature was disregarded to hear what was conveyed by the interviewees (Creswell, 2007, p. 151). The interview transcripts were initially scanned to form clusters of data around the individual elements of the research framework (such as proximity dimensions, knowledge transfer, management interventions, and innovation). Then the data in each of the themes were studied and coded based on their characteristics, such as by nature (positive, negative or neutral impact), by type (intervention, termination etc.) or by binary outcome (success or failure/increase or decrease). Emergent factors that showed their importance in the interviews were carefully analyzed and incorporated in the model. For example, the retention of key employees was such an emergent factor. This element was not originally included in the theoretical framework, but interview data pointed to the importance of retention in understanding knowledge transfer, so it was subsequently added. Creswell (2007, p. 151) encourages researchers to be open-minded in the analysis so that new relevant information can be attended to.

The analytical themes were used to understand the dynamics in each of the cases. This was followed by a write up of individual case reports that contained descriptions of the case background and context, proximity dimensions and management interventions, and their

associations with the outcomes. When all within-case reports were written, the case report structure was readjusted to ensure consistency across case presentations (Creswell, 2007, p. 152).

Cross-case analysis: In this stage of analysis, attempts were made to determine whether or not any of the findings applied beyond a specific case (Miles and Huberman, 1994, p. 173). It is important to understand if a particular finding is consistent across cases or is just a one-time phenomenon (Eisenhardt, 1991; Eisenhardt and Graebner, 2007). As recommended by Miles and Huberman (1994), tabular arrangements were used to summarize and contrast the findings from the three cases. Key themes were compared to identify similarities and differences across the cases. This helps strengthen the rigor of the study findings (Eisenhardt and Graebner, 2007). The cross case findings were then compared with the current literature to confirm if the findings were supported in the literature. When findings were not supported, alternative explanations were sought. This comparison process helps to increase confidence in the findings (Eisenhardt, 1989).

3.6 Representation

Since data displays are essential to help the reader to build his/her own interpretations of the issues and to draw conclusions, there are various data display methods used throughout the paper. The main types of data displays used are: tables containing characteristics of each of the cases as well as comparative tables summarizing important themes in the cross-case analysis; figures/graphs; and representative verbatim quotations to enhance the overall understanding of the case. A table of cases' characteristics provides a clear view as to the industries in which they are active, size of the firms, transaction date etc. The analysis results are presented theme by theme, augmented by quotations and tables.

3.7 Quality of research

This study addresses four criteria of quality assurance for qualitative research as suggested by Miles and Huberman (1994, p. 278). These criteria are: objectivity, reliability, credibility and transferability.

Objectivity evaluates if the study is designed and conducted objectively and in an unbiased way. Objectivity was attained by disclosing each of the research steps explicitly throughout the thesis, so that the reader can follow the processes occurring in this research. In addition, by providing descriptions or details of how the study findings are derived helps enhance the study's objectivity.

Reliability is concerned with the consistency of data collection techniques used and how stable the steps are in the data collection process. This study used the same method and approach for data collection for all cases, with an interview protocol to ensure consistency. As discussed above, the interview protocol, which is suggested to be a major component in ensuring the study's reliability (Yin, 1994), is formulated based on the research questions and research objectives. Interviews are structured the same way with the same set of open questions and there was room in each of the interviews for probing, so new or more in depth information would surface.

Credibility refers to whether the findings are plausible and make sense to the reader. Several recommendations made by Miles and Huberman (1994, p. 279) are used in this study. For example, detailed description of the cases are written and provided. The study paid attention to internal coherence in each interview and triangulated across interviews. Whenever any incoherence occurred, efforts were made to seek an explanation. Ideally, it would be helpful to also triangulate between the interviews and data extracted from internal documents, but the latter were not available.

Transferability is related to the generalizable potential that the study findings have. This study aims to contribute to the development of a theory, not to generate findings that are generalizable to a large population. As noted by Yin (2003), qualitative case study research design does not offer statistical generalization; rather it allows generalization at the analytical level. At this level of generalization, the case study findings are compared with extant theories to confirm and expand theories (p. 32-33). Further, clear descriptions for each case are provided so that future researchers can decide themselves whether or not the findings would be transferable to their research sites.

4. Within-case analysis

The following section provides general background to each of the cases. In addition, a within-case analysis will be discussed. The within-case analysis treats each acquisition or merger as a separate case and is intended to determine the relationships among various factors, and to bring to light important factors from each interview.

4.1 Introduction to the cases

Three M&A cases involving three Canadian technology-based firms were studied. All three cases had an international component as they were either acquired by or merged with a foreign company. Case one involves the acquisition of CanSoft, a software developing company based in Canada, by the US-based GiantSoft in 2007 (see Table 4.1: case description). The acquisition motive was mainly to acquire CanSoft's technological knowledge and capabilities. Case two involves the acquisition of FutureTech by the British-based BrightTech. The acquisition was completed in 2002. By acquiring the Canadian FutureTech, the acquirer was hoping to become one of the largest players in the telecommunications sector in which it was active. The motives for this acquisition were to gain access to the market and to acquire technological knowledge and capabilities of the acquiree. Case three was a merger between a Canadian telecommunications equipment maker and one of its competitors from the US. The merger was de-facto an acquisition, in which MajCom acquired its counterpart, NextCom. The merger took place in 2007. The key motive behind it was to expand market presences in the US so to increase revenues.

Table 4.1: Case descriptions

	M&A type	M&A motive	Industry	Employee base	Deal year
CanSoft by the US GiantSoft	Acquisition	Knowledge and capabilities acquisition	Computer Software	Acquirer: more than 100,000 Acquiree: 5000	2007
FutureTech by the British BrightTech	Acquisition	Market expansion, and knowledge and capabilities acquisition	Tele-communication	Acquirer: 1000 Acquiree: 1500	2002
MajCom with the US NextCom	Merger	Market expansion	Tele-communication	MajCom:1500 NextCom:2000	2007

In the within-case analysis, the following items will be addressed: **Profile**, outlining the circumstances that led to the merger or acquisition in the first place and the motivations behind the deal; **Integration and Integration Strategy**, describing how the companies were integrated to provide a favourable condition for knowledge transfer; **Retention Strategy**, evaluating the strategy used to retain key employees; **Proximity dimensions**, discussing three proximity dimensions and their impacts on knowledge transfer; and the **Outcome**, highlighting the results of the M&A on the basis of change in innovative performance.

4.2 Acquisition of CanSoft by GiantSoft

Profile: The following case is based on five interviews (see table 4.2.1: Interviewee Profile) with three employees at the acquiree, CanSoft and two employees at the acquirer, GiantSoft. The acquisition took place in 2007 as a result of a friendly takeover bid initiated by the acquirer. Prior to the acquisition, the two companies worked as partners for a dozen years (this will be discussed in more details under “cognitive proximity”). GiantSoft was a large multinational company headquartered in the US and was a business technology solution provider, offering hardware and software, as well as services. The takeover target on the other hand was a successful software development company based in Canada and was active in more than 100 countries. CanSoft was a market leader in a consolidating market segment that provided software solutions to enterprises, in particular decision-making support tools for senior managers. Due to the ever-increasing demand for such technology solutions, this market segment had a substantial growth potential.

Table 4.2.1: Interviewee Profile

Interviewee	Pre-M&A Function	Notes
GiantSoft (GS1)	Integration Manager	Responsible for the integration of CanSoft’s products and their respective Development teams into the relevant product portfolio of GiantSoft’s.
GS2	Executive	Responsible for GiantSoft’s M&A activity and for the worldwide integration of CanSoft and GiantSoft.
CanSoft 1 (CS1)	Senior Training Specialist	Responsible for delivering training.
CS2	Executive	Responsible for CanSoft’s M&A activity prior to the acquisition, and was involved in negotiating the deal.
CS3	CEO	CanSoft’s CEO until the acquisition then became the General Manager for the new division.

The acquirer sought to take advantage of this market potential, but on its own it had too small a presence and limited capability in this particular segment, so acquiring external knowledge and capabilities was one reason for this acquisition. Another reason for the acquisition was the vibrant M&A activity in this segment mainly by GiantSoft’s competitors. In the six months prior to the acquisition, two of GiantSoft’s key competitors had separately acquired two of the segment’s large dominant, standalone companies.

CS3: “In the space of 12 months, 75 percent of the market share was purchased by three different companies; three big companies acquired two of our big competitors and GiantSoft acquired us.”

GiantSoft was worried that CanSoft might be the next target to be bought. As a result of that, GiantSoft would be in a severely disadvantageous competitive position. The competitors’ increased market share and stocks of technological knowledge would easily shut GiantSoft out of this lucrative segment, that was too big a chance to take. Thus, a strategic acquisition, as it was seen by GiantSoft, would create a win-win situation for both firms. Apart from the imminent threat of exclusion from this promising market, to the acquirer, CanSoft offered a critical set of

domain-specific technological knowledge and capabilities that GiantSoft was unable to develop internally within a short period of time. GiantSoft's own software division had a presence and a customer base in this market, but it lacked knowledge and capabilities to extend its technological reach to the corporate end-user, senior managers (for whom the software applications were for). Therefore the acquisition of CanSoft's technological knowledge and capabilities would fill in GiantSoft's gap and help it to extend its technological reach. In addition, after the acquisition, CanSoft's technological knowledge and capabilities could be built into GiantSoft's own products to increase revenues, and there would also be a potential for economies of scale and scope in R&D.

GS1: "They have very strong mature domain expertise that could transform the marketplace and that can increase the value of our portfolio."

GS2: "One of the reasons why we did the acquisition is their domain expertise that we lack."

For CanSoft, it was also a challenging time to survive as an independent company in a consolidating market environment. After its major competitors were acquired by established companies, an independent CanSoft would not only experience disadvantages in terms of securing sources for R&D expenditures, but it would also experience a diminished appeal to customers. As in other business technology markets, customers had showed an increased preference for one single service/product supplier who could offer a complete portfolio of technological solutions, therefore reduce customers' need to deal with multiple suppliers. The combination of these two factors would mean a deterioration of CanSoft's ability to sustain its competitive edge. In addition, after the acquisition, CanSoft would gain access to the cutting-edge R&D knowledge base of GiantSoft to develop more superior products and technology. Furthermore, it would also lead to more stable, long-term funding to support new product development. Prior to the acquisition, CanSoft, as a relatively small independent company, lacked funding to acquire additional capabilities that were vital to its technological expansion. But after the acquisition, this lack of buying power was no longer a concern, as GiantSoft was willing to invest to help CanSoft developing or acquiring external knowledge and capabilities. According to Interviewee CS3, the General Manager, "GiantSoft was investing heavily in us, because this was an important new area for GiantSoft, which was part of the acquisition plan."

Integration: According to the Integration Manager (interviewee GS1), three levels of integration can be distinguished: integration of operations, integration of product and technology, and integration of people. Operational integration is primarily concerned with synchronizing two sets of systems and networks in order to enable product standardization and cross sale – offering each other's product portfolio to their respective customers. As a result of the acquisition, GiantSoft became more incentivized to sell hardware loaded with CanSoft's software. The integration of operations allowed for an increase in the combined revenues, but that would not significantly increase technological innovations, such as incremental or radical innovation.

Innovations come primarily from integrating people and technological knowledge and capability. This integration process involved connecting people from both companies to enable knowledge

transfer, so that new technological opportunities were identified and exploited. As a result of the integration, two sets of leading-edge but complementary technological knowledge and capabilities would be brought together to create superior products and to push forward to the next generation, disruptive technology.

Integration Strategy: The expertise in integration and strategy of the acquirer is seen to have a direct impact on the level of integration achieved. The acquirer gained extensive expertise and experience in integration from its previous M&A and was perceived to have mastered the 'Art of Integration'. GiantSoft derived from its experience a suitable approach as to what needs to be done and how it should be done, for integrating CanSoft into GiantSoft.

GS2: "We apply the tools that we've built over a number of years, the collective experience, and wisdom; then we figure out what the right approach is for that particular acquisition."

Leadership: To start with, certain senior executives from both organizations were held accountable for the integration for two years in an effort to assure their commitments. Their influences helped shape the outcome. An example given by interviewee GS1 that demonstrated the importance of leadership was that, when a senior manager from CanSoft said to his subordinates, "I don't want any of you standing in the way of GiantSoft leveraging our products; I want them used everywhere!" people would stop resisting and follow his words. In addition, having executives from CanSoft being responsible for the integration showed that CanSoft was a participant in the acquisition, not a victim, which helped CanSoft's employees to be committed and open-minded throughout the integration.

GS2: "I think having senior people involved is important because of their ability to influence others. We had people who are very, very senior in the company assigned to making sure this was successful and that makes a big difference."

The objectives of the acquisition were set prior to integration and were detailed in the integration plan, as a result of due diligence and integration planning. Then the strategy was to focus on supporting and achieving the objectives, with the responsible executives in charge and the integration plan serving as the principle guidance throughout the integration. The integration plan was then implemented by an integration team composed of senior employees from both organizations. The purposes of the team were twofold: to put in place plans to attain the business objectives of acquiring CanSoft, and to facilitate a smooth integration of CanSoft into GiantSoft. The integration team played a big role in retaining people and in making people feel comfortable during the transition, which is important in building close working relationships and transferring knowledge.

CS2: "The integration plan prepares people; if you don't have that plan, you run the risk that people will spend a lot of time spinning the wheels and not being effective enough or being productive."

The integration team was further broken down to sub-teams to take care of each of the work streams that needed to be integrated. The sub-teams, also composed of people from both organizations, were responsible for taking steps to identify potential issues, such as discrepancies

between the two companies' operations and processes as well as human conflicts, and steps to deal with them promptly.

GS2: "We had every discipline in the business covered, with multiple people per discipline. We had at least ten GiantSoft executives assigned to the integration."

During the integration, CanSoft's key employees were encouraged to connect with their counterparts at GiantSoft around the world, primarily by travel, to build working relationships. Establishing connection and building relationships were important to knowledge transfer, which was done through two routes, formal and informal. The formal route included setting common product and technical objectives for the technical employees from both firms and subsequently enabling them to achieve these objectives. GiantSoft had an established process for doing knowledge transfer through the formal route. For example, it would create technical communities around key technologies to be led by distinguished engineers. These distinguished people would take the lead in identifying and exploiting new trends in key areas.

GS2: "(For the formal process), step one is finding the product and the technical objectives around things that align to what we're trying to do. Step two is setting the goals and objectives clearly for the technical community, e.g. setting a platform release date to meet the customer expectations."

The informal route of knowledge transfer happens more spontaneously when technical employees from both firms meet face-to-face, which might result in opportunities to leverage each other's knowledge and capabilities. Throughout the integration, management actively encouraged people to meet in person with their counterparts on sites so they can develop close working relationships and thus enhance knowledge transfer.

CS1: "It was encouraged for people to meet in person, if at all possible. And if it just wasn't possible, (it was encouraged) to do the best you could and connect with the people you needed to connect with."

GS2: "We invested pretty heavily in getting GiantSoft people physically out to sites to meet people."

The product investment funnel was given as an example of how new technological opportunity came to be. It started with regular face-to-face meetings between two organizations' research teams to screen for potential opportunities based on their technological knowledge and capabilities. Once an opportunity was identified, a project team would be formed to assess the feasibility. If a project was found feasible, then the project would be officially launched to further research and develop a product.

CS2: "We call that the 'product investment funnel' and it's really taking it from possibility, through feasibility, to the actual product."

Retention Strategy: GiantSoft recognized the importance to retain key employees, because they would play a key role in knowledge transfer, which would eventually make the acquisition successful. GiantSoft realized that post-acquisition CanSoft could lose much of its human capital, especially key employees. These people are crucial to the business and to the success of the acquisition, but they could walk out the door at any time. In addition, the new company needed to retain key employees who had strong understanding of the products, technologies and

the market to preserve the knowledge. Therefore, retaining key people was given a priority. Furthermore, the departure of technical employees would almost always lead to a higher work load for the remaining employees, especially when vacancies cannot be filled immediately. For that reason, GiantSoft intended to retain as many employees as possible, with the exception of duplicate supporting positions, such as administrative and finance staff.

CS2: "At the end of the day our business is people...but people can walk out of the door tomorrow."

GS1: "Acquire a company and you acquire its culture, you acquire its people, you acquire the products and the technology, but frankly without the people you lose a very huge amount of the acquisition, so retention of people is very important."

To prevent key people - about five to ten percent of the employees - from leaving, they were identified and put under a retention plan. Most of these people were senior managers and senior engineers, who had acquired a lot of experience and knowledge of the business over the years. The retention bonus was given to them as an incentive to stay, at least for the period necessary to replace them, if they wanted to leave. There was also a temporary transition bonus for employees who would lose their jobs due to redundancies. There were also efforts made to find them a new position.

CS3: "Part of the process is to identify who the great people are, making sure they're on retention programs, making sure that they're incented to stay as long as it takes to get somebody else familiar with what they're doing."

CS3: "At the low end of the value chain, things are process-based; it's a matter of adapting different processes. But at the high end of the value chain, integration requires a fundamental understanding of the products, technologies and the market. There is nothing written down, so it is about keeping people with knowledge of the domain, key people in the organization that are the leaders of the various product groups doing integration."

Proximity Dimensions:

Geographic proximity is hard to define with global companies like the acquirer, as they often have multiple divisions with their respective head offices and regional offices, on top of the corporate headquarters. Difficulties arise around the question of which locations should be taken as the best measurement of distance/proximity. In this case, there were at least three possibilities: CanSoft's headquarters with GiantSoft's headquarters, GiantSoft's software division head office, or GiantSoft's Canadian general business head office. The measured proximity could vary considerably depending on the choice, but from a headquarters perspective, there is not a large distance. According to interviewee CS2, the distance between the two companies' headquarters is less than a one hour flight and twenty minutes drive from the airport. For CanSoft/GiantSoft, there was no clear evidence that geographic proximity impacted knowledge transfer. Several reasons might help explain it.

First of all, a consideration is whether or not a company is used to operating in a distributed manner. Global companies, like GiantSoft with numerous offices and R&D centres around the

world, are innately good at dealing with such geographical issues, as they are constantly exposed to similar challenges.

GS1: "You had two organizations that were used to working in a geographically distributed way. So it wasn't a challenge to have them working together in a geographically distributed way."

Second, GiantSoft has made it possible for employees, especially a core group employees and management, to travel, where lengthy discussions and face-to-face contacts were required. These people would spend time meeting their counterparts, making the connections to share and transfer knowledge. Where travel and face-to-face meetings were not possible, teleconferencing rooms and equipment for meetings were available to substitute them. One downside of such a substitution is that it is harder to develop a closer relationship.

GS2: "It also depends on the level of contention on the issue. So if you've got a highly difficult, highly emotional or contentious issue, face-to-face is always going to help get you through it faster, because it's just easier to interact with somebody and solve a problem looking across the table."

Third, GiantSoft has developed and invested in infrastructures around collaborative work environments, which enabled global cooperation. On day one, all CanSoft employees were given a brand new laptop, which had all necessary tools pre-configured to connect to GiantSoft, just like the rest of GiantSoft employees had. When there were common objectives established, these collaborative work environments would enable teams across the world to work towards attaining them. Large tasks could then be broken down into modules, so that various teams from different geographic areas could simultaneously contribute to the project and to be integrated at the end.

CS2: "The advantage of our collaborative work environments is that we could continue developing the technologies with several parallel streams but we have to keep in touch with each other to ensure that technologies can be integrated."

According to the Integration Manager there is one disadvantage to integrating two companies at a distance is that there is a strong tendency for a reversal of integration. It happens when the managerial focus is no longer present. Acquired firms tend to fall back to their original routines, thus becoming 'dis-integrated' again with the acquirer. This reversal would affect the sharing and transferring of knowledge. The issue could however be addressed by either delegating a permanent integration team, (the way it was done in this case), or by replacing the target's top management.

GS1: "As soon as you've done the integration, you take off and do whatever you want, and so they kind of go back in and they create for themselves a very insular group again."

In one of the executive's view (Interviewee CS3), in today's business environment, it is standard for global companies to operate in various locations; therefore geographic distance does not add complexity to cooperation such as knowledge transfer across the firm. However, from the case evidence, it could be argued that although distance does not complicate knowledge transfer as global companies are used to operating in a distributed environment, co-location would help ease knowledge transfer and has demonstrated some benefits. Given the importance of good working relationships to knowledge transfer, which is primarily done through people, co-location helped

in building and maintaining these relationships. In addition, co-location would be a cost saving, as it would reduce the necessity for expensive travelling.

CS1: "Video-conferencing or phone calls are used just to save on travel, because it can get expensive, very expensive."

Cognitive proximity: The two companies were similar in base knowledge, but differed considerably in domain expertise. They shared significant similarities in base technologies and practices, as they used common technologies and associated knowledge in the same software development disciplines (e.g. the same programming language and compilers). That resulted in similarity in product architecture, which in turn made the collaboration around knowledge transfer easier. In software industry, it is important to ensure that the same rules and principles were applied in order to have various product and technologies work together. As suggested, if there had been differences in architectures, collaboration would have been more difficult. It would have been necessary to reconcile and understand the differences before being able to leverage each other's knowledge and capabilities.

CS1: "As long as you are using technologies that are common in the industry ... integration of one product with another is much easier, because you can put your focus into actually having everything work together appropriately."

In addition, the two companies' product and technology were compatible with each other's as a result of their partnership prior to the acquisition. They had worked together for more than a dozen years, during which CanSoft's software was run on GiantSoft's hardware to create an appliance (as such a product is called). Moreover, CanSoft had always deliberately aligned certain standards with the big players in the industry and the acquirer was among them. That has also contributed to their cognitive proximity. The compatibility of technologies and alignment in standard allowed the new company to bring together their strengths to create improve existing products and to bring out new product based on their technological knowledge and capabilities.

CS1: "CanSoft had a long relationship with GiantSoft even before the merger - our software has basically always run on their hardware systems."

CS3: "We looked at what the big guys were doing. We thought GiantSoft was a good company to align with so we chose certain standards of theirs."

While the two companies cooperated in certain areas, they had always focused on their respective fields of expertise; thus there was not much competition or co-development between them. As a result of that, both companies were able to develop their own domain expertise within the software industry, although different technological domain. Dissimilarities in domain expertise and their previous partnership made the acquisition a quick fit in terms of product and technology and thus minimized the amount of work required to integrate them. At the same time, dissimilarities in domain expertise increased the opportunity to create radical innovation.

GS2: "It's the application of that technology in the domain that differentiated them. The CanSoft team was looked at for that domain expertise. So clearly we valued it and they are the subject matter experts."

CS1: "There is an instant fit between our technologies and their technologies. And there wasn't a lot of work required to actually merge the two of them together, because of the fact that GiantSoft was buying technology that it didn't have, but the cogs of the wheel basically fit together beautifully."

GS1: "When the technology is different enough, you have more integration chances on the technology side."

Organizational proximity: From the interviews, two aspects of organizational proximity were identified - cultural and structural proximity. Cultural aspects are related to elements such as language, common habits, established practices or rules that regulate the relations and interactions between individuals and groups; whereas structural aspects pertain to how firms are regulated at the macro level, such as structure, systems, hierarchy, and power (Boschma, 2005).

Culture: At the national level, North American cultures were very similar, but there were slight differences between the two organizations. For example, Canadians were perceived to have a more family-oriented working attitude than Americans.

GS2: "CanSoft is a Canadian company and carried with it some cultural differences; the Canadian culture, just the mindset, the bias towards personal life and family..."

At the corporate level, one of the similarities was the similar collective mentality toward innovation, which is trying to innovate and lead the industry rather than following it.

CS1: "CanSoft is always known for being leading edge. We are not in the industry to follow other people; we are in the industry to lead. GiantSoft is the same thing."

On the other hand, the organizations differed in several respects, from employees' attire to working hours, to their educational background and entrepreneurial orientation. For example, CanSoft had more people with business degrees, while GiantSoft had more people with computer science and engineering degrees. In addition, CanSoft was more entrepreneurial than new ideas were more likely to be embraced and to result in projects. Moreover, there was the policy difference regarding the use of open-source technology. GiantSoft had a much stricter open-source policy, which resulted in the immediate elimination and replacement of all open sourced technologies from CanSoft's products. However these issues were identified in the due diligence process and addressed quickly after the acquisition.

GS2: "The CanSoft team had its roots more in a business culture than the rest of the software group, which has its roots in the technical culture."

CS2: "We were kind of the largest independent software company but had much entrepreneurial culture, especially in products. If people had a good idea, it was fostered and they were allowed to run with it."

The above-mentioned cultural differences did not have a substantial impact on knowledge transfer. The results might need to be credited to the measures taken by the management. Both before and after the acquisition, GiantSoft invested heavily in the cultural aspect of the integration. It implemented programs that assessed and promoted understanding of cultural differences and that helped to resolve conflicts quickly. For example, there were numerous

cultural assessments and presentations and programs which measured how the culture would be impacted by change and how to deal with these impacts.

CS2: "Culturally it's been amazing when people are focused on an idea of creating value; that's what they're focused on and cultural differences just step aside because you're still focused on that project. So we haven't experienced any negative impact from that perspective."

GS2: "We invested very heavily in understanding the cultural differences, the impact that our plans would have on the cultural differences and what those cultural differences would mean."

CS3: "Those resulted in action plans to address what we could address. So the whole process was about letting people get the stuff off their chest and identifying deficiencies in the process from people who saw it happening but maybe couldn't get their voice heard in the integration process."

Structure: There lacked a close proximity in structure due to a few significant structural differences. Some differences had a positive impact while others had a negative impact on knowledge transfer. In terms of positive differences, GiantSoft had a more structured product development process which CanSoft was planning to implement, and thus the acquisition had only accelerated the change. Another example of a positive difference was that GiantSoft had a centralized administrative structure, which reduced CanSoft's technical employees' administrative duties and allowed them to focus on their activity.

On the other hand, differences in the line of responsibility and size had a negative impact on knowledge transfer. GiantSoft as a large company – being about ten times larger than CanSoft and active in software, hardware and services – had a much more complex structure than CanSoft, which was primarily in the software business. GiantSoft also exhibited certain characteristics of large corporations, such as more checks and balances in its product development process. These are examples of how large firms operate differently compared with small ones. For CanSoft, it was a large change in structure; it was a shift from a structure with clearer lines of responsibility to a matrix that required some adjustments and slowed down the speed at which decisions were made.

GS2: "Taking an organization that is self-contained and then helping those people understand how to succeed inside a highly matrix-managed organization, takes time."

CS1: "I look at our company intranet and I look at the GiantSoft intranet – it was like going from our own little system, to the World Wide Web!"

The large difference in size and structure posed three key challenges for knowledge transfer. First, it was hard for CanSoft employees to connect to their counterparts at GiantSoft. In some cases, lots of phone calls were needed to find the right person to talk to, which was detrimental to knowledge transfer. Some people would just give up or delay contacting people they needed to speak with.

CS1: "Over the two year process that we have actually had, a lot of people said 'This company is too big for me' and they left. People just don't like change."

Second, being acquired by GiantSoft, which had more rigid and robust structure and systems, meant a loss of flexibility and speed to CanSoft. The sudden increase of size affected the lead

time (from the initial idea to commercialisation of a product) in product developments, because there were more steps to go through than before. CanSoft was no longer able to make quick decisions to initiate projects.

GS2: “They are working on a larger scale, are more robust and they are hard to change. So in a smaller company like CanSoft, things are more flexible and can be changed easier.”

CS3: “In a smaller company, a lot of knowledge transfer was done very informally. You didn't have to worry about people in different geographies, and sometimes, even if you do, it was easy to get them together. You didn't have to worry about certain processes that are normal for a very big company.”

Third, within the large GiantSoft, it was hard to create awareness of CanSoft's technological knowledge. Colleagues from other parts of GiantSoft were often not aware of what CanSoft did. This limited CanSoft's knowledge being leveraged in other parts of GiantSoft and limited CanSoft's legitimacy within GiantSoft. CanSoft's management proactively shifted its people into GiantSoft and went out to deliver presentations to create awareness, which helped.

CS2: “One of the biggest challenges we have as a company within GiantSoft is creating awareness around what our products can do; a number of people are surprised like, ‘In addition to business intelligence you guys do financial stuff too?’”

Outcome: For this acquisition, the integration was deemed to be successful by both organizations; CanSoft was “seamlessly integrated” into GiantSoft as stated by interviewee CS1. The once small partner that helped to optimize GiantSoft's products had become the leading unit of one of the software sectors within GiantSoft's Software Group. The new CanSoft is now in the process of pushing the technological boundaries to expand and lead in the development of disruptive technologies in its field. This is an example of how the merger had created and is creating radical innovation.

GS1: “We're transforming the Software Group and CanSoft is the head of that. CanSoft was the launch pad for us to do that, so it was absolutely 100 per cent successful!”

As a result of the acquisition, GiantSoft successfully retained the majority of CanSoft's employees. Although some technical employees left the company, few of CanSoft's key employees were lost. The successful retention of these employees have helped ease the integration and knowledge transfer and consequently contributed to the overall success of the acquisition.

The successful integration of CanSoft and the subsequent knowledge transfer between the organizations led to both incremental and radical innovations in a number of different ways (see Table 4.2.2: Acquisition Outcome). First of all, there is the incremental innovation resulting from the integration by combining and enhancing existing product and technology. After the acquisition, the two organizations had access to each other's knowledge and capabilities which enabled them to learn and to improve their products. For example, CanSoft started to ship its products working on GiantSoft's servers, and that was never

done before. That was only possible because of GiantSoft's system expertise and skills that became accessible.

CS3: "We now ship our product working on one of their servers, which we had never done before. We were only able to do that with access to the hardware and the skills, so that's a new thing."

Table 4.2.2: Acquisition Outcome

Outcome	Attained	Explanation
Incremental innovation	Yes	Incremental innovation by optimizing and recombining product and technology, leveraging unused knowledge and accelerating development speed.
Radical innovation	Yes	Radical innovation by exploring new technological opportunity and gaining additional capabilities.

Also, CanSoft gained access to GiantSoft's research capabilities such as R&D labs, research technologies, and Intellectual Property Rights (IPRs), which accelerated its development progress for certain forward-looking concepts, and reduced project expenses that contributed to profitability. In some cases, CanSoft no longer needed to acquire licenses or develop technologies to create large solutions. It was also able to commercialize research technology coming from GiantSoft's R&D lab to bring out products to the market. The access to GiantSoft's technological knowledge base contributed to CanSoft's ability to a) exploit existing knowledge and capabilities of GiantSoft, and b) to explore new technological opportunities, this is an example of radical innovation.

CS3: "(We had) access to technologies, which we otherwise would have to license from other companies, to combine with our products to make a bigger solution."

CS3: "We've introduced new solutions, such as a banking solution, as a result of GiantSoft's expertise in that area. So there's been a whole bunch of areas that we've been able to leverage GiantSoft."

CS3: "We are just on the verge of launching a whole new product around social networking capabilities, which came about as a result of some research technology of GiantSoft that we're commercializing."

Moreover, being part of GiantSoft, CanSoft expanded its thought process around big technological concepts and leveraged GiantSoft's brand to undertake and participate in large projects that were not feasible due to a lack of credibility as a small firm. With the backing of the GiantSoft brand, it has now given them the credibility and capability to take on transformational initiatives and turn them into "a massive push forward into the next generation of software" as interviewee GS1 stated. Although this change in CanSoft's credibility partly resulted from a change of perception, it helped the company to better utilize its capabilities to innovate.

CS2: "So those large and truly transformational initiatives ... we just would not have the resources to either create on our own or even, in some cases, participate in."

Finally, CanSoft enjoyed GiantSoft's monetary investment to expand technological capabilities. For example, following the acquisition, GiantSoft acquired a third technology company for more than a billion US dollars to be integrated into CanSoft. With the size of CanSoft, such an undertaking would have been unthinkable, at least within the foreseeable future. In the view of

interviewee GS1, this acquisition added to CanSoft a whole new capability in an adjacent technology area.

4.3 Acquisition of FutureTech by BrightTech

Profile: Three employees were interviewed for the following case. This case involves the acquisition of Canada-based FutureTech by BrightTech from the UK. The acquisition took place in 2002 following the infamous high-tech bubble. FutureTech was a subsidiary created by GrandFuture on the run-up to the bubble by pooling together a number of optical components units, including some externally acquired. Optical components, at the time, were seen as the backbone to the future super-fast internet traffic and so the business boomed. The market grew rapidly at a double digit rate and GrandFuture's optical component business was expected to generate billions in revenues. But when the bubble burst, FutureTech was hit hard as the market for optical components collapsed. The market size declined more than 80%. To return to profitability, GrandFuture needed to restructure its vertically integrated business model, because FutureTech was losing money and GrandFuture no longer wished to keep it. After a failed attempt to split off the unit, FutureTech was put up for sale, as part of the restructuring plan. Prior to the sale, FutureTech's revenues were primarily generated by internal transactions, i.e. the majority of FutureTech's products were purchased by GrandFuture. Interviewee FT1 (See: Table 4.3.1 Interviewee Profile) stated that "GrandFuture wanted to get rid of the FutureTech business because it was losing money and also they had decided that they no longer wished to be vertically integrated".

Table 4.3.1: Interviewee Profile

Interviewee	Pre-M&A Function	Notes
BrightTech 1 (BT1)	Product Manager	Involved in post-M&A integration process and knowledge transfer
FutureTech 1 (FT1)	Executive	Responsible for the integration of R&D teams
FT2	R&D employee	Worked for FutureTech and stayed after the acquisition

BrightTech, an equally hard-hit optical component supplier, agreed to purchase FutureTech. BrightTech was a company that designed and manufactured high performance optical internet communications products. As part of the deal, GrandFuture retained a minority stake in the new BrightTech. The companies also agreed to continue some business relationships after the acquisition, such as a supply agreement of optical products to GrandFuture for a number of years.

The reasons for BrightTech to acquire FutureTech were that it was active in the same business and that it had already acquired one of its competitors six months earlier. Technologically, FutureTech's technologies were more mature than BrightTech's, and thus, acquiring proven technologies possessed by FutureTech was a less cost-intensive and time consuming avenue to gain new technological knowledge and capabilities. But more importantly, BrightTech hoped to strengthen its market position and to diversify its product portfolio. By acquiring and combining

FutureTech's knowledge and capabilities with its own, the BrightTech was expecting to become a major player in the industry segment, offering a full range of products from components to complete systems. The combination would also yield synergies in operations, i.e. cutting operating costs, and in R&D.

BT1: "By adding FutureTech to our existing operations, substantial synergies between our R&D and the FutureTech research facility could be realized."

Integration: BrightTech's new management, composed of senior managers from FutureTech and BrightTech, discussed various issues around the integration, both prior and after the deal. The issues discussed were around how to integrate FutureTech into BrightTech, what the potentials were, and what issues might surface during the integration. Consequently, the results of these discussions were put together in create an integration plan, which would provide clear methodologies for doing the integration.

FT1: "Basically we had the integration plans ready to go on the day the deal was announced."

FutureTech had three key facilities: the package and material facility in the UK, the manufacturing facility and a designing facility in Canada. The integration plan included a decision to close the manufacturing facility in Canada and to transfer all the products, including the manufacturing machines and tools, to the UK. This transfer was a key part to integration and posed one of the major challenges for BrightTech, which involved transferring all manufacturing technologies and all the associated know-how, as well as all the products previously manufactured in Canada. For the knowledge transfer, BrightTech needed to retain senior/experienced employees at the manufacturing facility in Canada. As part of the integration plan, it was management's intention to retain with a significant bonus all R&D employees at the designing facility and most of the manufacturing employees - some of them on a temporary basis - to do the knowledge transfer. The quality of manufactured products at the new manufacturing facility in the UK would be constantly compared to the original standard at FutureTech to ensure that all steps were correctly performed and criteria were met. The manufacturing facility could only be closed, once the transfer was completed, because after the closure, the experienced employees and the associated technological knowledge would be irreversibly lost. The designing facility in Canada was kept intact; however the facility would no longer be interacting with a nearby manufacturing facility, as it would be closed. Instead it would be cooperating over a large distance with the new facility in the UK.

In sum, the knowledge transfer from FutureTech to BrightTech involved three main categories of GrandFuture's assets: R&D employees, manufacturing facility and its associated know-how, and existing product and technology. The transfer of these assets was primarily done by the transfer of FutureTech's employees, who had the technical knowledge and experience.

FT1: "So the major part of integration was done, in the first instance, around the transfer of that manufacturing technology and all the associated know-how from Canada to the UK."

Integration Strategy: The new management team at BrightTech played an important role in ensuring that the integration would proceed smoothly and the knowledge would be successfully transferred. They set up a detailed integration plan earlier on that considered factors such as what the process would look like, what the potential and challenges would be, and what roles individuals would play.

FT1: "We sat down with them talking about how the business will be integrated and what their roles will be before the deal was announced."

In the first six months, there was an integration manager responsible for the total integration, who assigned the integration teams composed of senior people from both sides. The individual teams with their respective leaders bore the responsibilities for the integration of individual functions, such as technology and manufacturing. They were also there to help promptly resolve issues and to monitor the integration progress.

FT1: "Afterwards, we set up a number of integration teams. We had someone who was responsible for the total integration of the two companies. We had five or six integration teams; each of those had a UK and a Canada leader."

Because the knowledge was transferred mainly by people who had all the know-how, therefore it was important to have them build close working relationships, especially when the knowledge is tacit in nature. Transferring tacit knowledge required extensive face-to-face contacts between the people who have the knowledge. Bad or hostile working relationships were suggested to hinder cooperation and knowledge transfer. To encourage cooperation and create a sense of belonging to a team, the management implemented a number of key measures. First of all, they used a 'one team approach' right from the beginning of the integration. The intention was to have the FutureTech identity disappear on the first day and to give FutureTech employees a new identity at BrightTech. Consequently, FutureTech people were given the BrightTech badge and had their email set up at BrightTech right after the acquisition. All working teams were structured in such a way that they were composed of people from both firms. That helped people teaming up and created a sense of belonging to a group.

FT1: "The whole concept was that FutureTech disappeared on day one. From day one we were all BrightTech. It was important that the management team gave them the BrightTech identity."

Second, although there was not any positive incentive in place for cooperation, people who did not work well with others would face the disincentive of being terminated. Third, partially to address the disadvantage for companies being thousands of miles away, frequent travel and face-to-face meetings were organized, along with a good intranet and conferencing facilities, to enhance the communications between two organizations. The availability of various communication channels in turn helped bring people together and build stronger relationships, while minimizing conflicts.

FT1: "There was no positive incentive for people to cooperate, but there was disincentive for those who didn't."

FT1: "It's by and large easier to work with someone you know... You can have a beer together and joke together; you have common interests, stuff like that. That's part of team building."

Retention Strategy: After the acquisition, the retention of R&D employees at the designing facility and the manufacturing employees in Canada was seen as critical for the success of the acquisition, because post-M&A knowledge transfer relied on these employees. In order to make the acquisition successful, the new firm had to retain the manufacturing people to transfer the manufacturing facility and the associating know-how from Canada to the UK, and to retain FutureTech's R&D employees to share and transfer knowledge with BrightTech's R&D center in the UK. At the manufacturing facility where most of FutureTech products were made, a lot of the know-how resided in employees who acquired it over time, therefore the new management team offered a significant financial incentive to retain them to transfer the manufacturing technology and the associating know-how. This financial incentive plan was also extended to the designing facility, where the employees were to be retained for the long term. The retention of R&D people was important, because the methods how products were developed were kept as trade secrets, therefore was little knowledge that was formally documented. As a result, the transfer of these people was the only way to transfer the R&D knowledge.

FT1: "The biggest factor for a successful knowledge transfer was the retention of people ... Retention for both the manufacturing team and the design team was done through a retention package."

FT2: "A lot of know-how was in people who developed a lot of experience over time. So when you transfer knowledge, people are extremely important."

Dimensions of proximity

Geographic proximity: There lacked a close geographic proximity, which was a disadvantage to the knowledge transfer between two companies' R&D teams, and the transfer of the manufacturing facility. The difference in time zones and the geographic distance of some 3000 miles between BrightTech and FutureTech formed a natural barrier to knowledge transfer. First of all, it hinders two firms' employees to develop close working relationships and building trust, which were important to knowledge transfer. Face-to-face contacts, in particular, were seen as very important to establishing trust and close working relationships, as such contacts made it easier for people to interact socially and develop a team spirit. Such merits made face-to-face contacts irreplaceable by other communication modes such as video conferencing. In addition, because the transfer of the manufacturing facility involved physical objects, it required technical people to travel to do the knowledge transfer.

FT1: "We had disadvantage in geographical distance; there is 3000 miles between the UK and Ottawa, which means you can't just hop in the car and get there in a reasonably short time..."

BT1: "For the knowledge transfer... the main thing is that you develop a relationship with people from the other end. Once you have built a relationship, you feel like you are on the same team and working toward the same goal."

FT2: "Regarding long distance communication, the difference is that you don't go out for coffee at the same time, which helps a lot to build a team."

The interviewees believed that geographic distance also affected tacit knowledge being transferred, because this type of knowledge held by people could only be learned and transferred

when they were physically present to see and to experience it. But when transferring other types of explicit knowledge, which could be more easily documented, geographic proximity is less of an issue. Therefore, when transferring explicit knowledge, the impact of a lack of geographic proximity could be mitigated to some extent by modern communication technologies, e.g. video conferencing tools. However these same tools would offer limited benefits to tacit knowledge transfer.

FT1: "A lot of info you can only transfer by being there talking and looking at things. It's difficult to do that on the phone. There is a limit to what you can do."

Being in different time zones would also work against the transfer of knowledge, because it prevented both sides from communicating effectively on a daily basis during regular business hours. But in this case there was a little overlap in time zones. The morning hours in the Canadian office overlapped with the afternoon in the UK. The little overlap was made good use of to hold conference calls either very early in Ottawa or quite late in the UK. If there had been no overlap at all, communication would have been even more challenging. Interviewees suggested that it would have been simpler in terms of communication, if there were more geographic proximity, i.e. if the firms were co-located.

FT1: "With five hours time difference it was ok. We have enough scope for overlap. If we were dealing with some further away place, for example China, then that would have been a challenge because there is no overlap."

The geographical impact is minimized mainly by travel complemented by having a good communication structure, such as intranet and conferencing facilities. BrightTech made it possible for employees to travel between the two locations. That was particularly important when transferring the manufacturing technologies and the associated knowledge from Canada to the UK. Senior people who were responsible for the transfer and integration travelled on a regular basis. Although travelling reduces the disadvantages of geographic distance, it was associated with high costs and little commitment from the employees as it is tiresome. In instances where travelling could be avoided, BrightTech made video conferencing facilities available to replace it, so employees from both sides could still communicate freely.

FT2: "Senior people travelled more often; they would go to the other side when there was a lack of knowledge."

FT1: "Trips had to be planned and they cost money, and you can't make the employees move from one country to the other. That inhibits you and is against you."

Cognitive proximity: When asked to describe to what extent the technological knowledge differed between the two companies, the interviewees indicated that there was not much difference. They believed that cognitively the two companies shared a lot of similarities. The companies' base knowledge was the same with common technologies and operating in the same technological field. Similarities in base knowledge helped ease the knowledge transfer, because the employees from both companies were able to communicate technological issues freely; they did not have to go over the basics. They were also very similar in terms of the employees' skills, training and experiences, although they were serving different types of customers. FutureTech

had more corporate customers, while BrightTech had more military contracts. Even though the skill sets were very similar, there were some complementary skills and strengths in various areas and there was not much overlap in product offerings. The overlap in skill sets and being active in the same technological area suggested that there was a little difference in domain expertise, which limited the new BrightTech's capability to develop and introduce substantially different product and technology (radical innovations). But the difference in technological strengths created possibility for the new BrightTech to take advantage of best sets of knowledge and capabilities to introduce new or technical enhanced products.

FT1: "The base technology was common. In other words, the people in Ottawa spoke the same language. They weren't trying to transfer knowledge that nobody understands."

BT1: "As to the base knowledge, the university degrees of the employees, and the amount of experience were very similar."

Interviewees suggested that it would have been very difficult to communicate if there had been little base cognitive proximity, i.e. not having the same base knowledge. In that case, it would have been hardly possible to transfer knowledge and to build close working relationships.

FT1: "They were ... not trying to get over the basics. So that helped. If there had been huge differences, it would have been very difficult."

Organizational proximity: There were two sub-dimensions to the organizational proximity identified in this merger: cultural and structural proximity.

Culture: In terms of cultural proximity, there were both similarities and differences at two different levels, national and corporate. The two companies shared lots of cultural similarity at the national level, because Canada and the UK are similar culturally; people speak the same language and share similar cultural values. At the corporate level, cultures diverged slightly more. Canadian corporate culture was seen to be more relaxed than the British. For example, working hours were more flexible in Canada.

FT1: "There are some differences, but culturally UK and Canada have some fairly strong similarities, and they spoke the same language."

Structure: The two companies differed more significantly in structure, such as reporting style, hierarchical structure, and role fulfillment of employees and managers. According to interview FT2, there is a lot of chain-of-command hierarchy in the UK, where employees always need permission from managers for doing something new. In the contrary, Canadian employees had more freedom to do what they needed to.

FT2: "In North America, reporting structure is very relaxed, whereas in Europe, it's more a chain-of-command."

Interviewees experienced some confusion and difficulties in communications because of the differences in organizational structures. For example, due to the difference in organizational charts, employees often did not know who the decision-maker was and who to talk to when they needed something. As a result of that, employees felt frustrated and product developments got delayed. Therefore, employees voiced in an employee survey that there is a need for a clear job

descriptions and an organisational chart, so people from different sides know who is doing what, and whom to turn to when needed. Interviewees noted that confusion also exists within any organization, but a close proximity between the two companies (e.g. similar organizational structure, and role and job descriptions) would have minimized occurrences of confusion and miscommunication.

Outcome: The new BrightTech gain access to FutureTech’s customers mainly in North America, as well as the knowledge and capability to serve them. The new company diversified its product and skills sets to serve a broad market and to increase revenues. It introduced new products without losing customers. The company has also successfully transferred all the products and technology, including the manufacturing facility from Canada to the UK. In terms of employees’ retention, it successfully retained most of the R&D employees and those working at the manufacturing facility for the short term. In the end, no significant turnover was experienced.

BT1: “That enabled us to create a large portfolio of products to serve a broader customer base.”

FT1: “We transferred successfully all the products we wanted to transfer to the UK and we started new products.”

As a result of the transfer of knowledge and capabilities, BrightTech’s capability to produce incremental innovation increased significantly but there lacked radical innovation (see Table 4.3.2: Acquisition Outcome). The new company doubled the number of highly qualified engineers and the stock of technologies, which diversified BrightTech’s expertise and technological skills. In addition, the significant number of patents and technological knowledge transferred accelerated the new product development processes at BrightTech. If BrightTech would have to develop certain new product and technology on its own, it would have been very time-consuming and costly. The integration of the in-house technologies with newly acquired technologies allowed for creating more mature and advanced products, which enhanced and expanded BrightTech’s product offering. For example, the new BrightTech brought out many technologically enhanced laser products, which were developed based on the technological knowledge and capabilities that were transferred from FutureTech.

FT1: “There was a lot of knowledge transfer interaction around the various products, which enhanced their functionalities.”

BT1: “The products and production technologies were all transferred. So that was what BrightTech was buying; BrightTech was buying the know-how and the product line.”

Table 4.3.2: Acquisition Outcome

Outcome	Attained?	Explanation
Incremental innovation	Yes	Incremental innovation by optimizing and recombining product and technology, and gaining technological knowledge.
Radical innovation	No	Radical innovation was not seen.

4.4 Merger between MajCom and NextCom

Profile: For the following case, five interviews were conducted with two employees from MajCom and three employees from NextCom (see: Table 4.4.1: Interviewee Profile). This case involves the acquisition of the US NextCom by the Canada-based MajCom, but officially the deal was dubbed as a merger of equals (henceforth a merger). It took place in 2007. Both MajCom and NextCom were companies active in the telecommunication market providing communication equipments. MajCom at the time was preparing itself to go public in an effort to raise capital for external (acquisition) and organic expansions. Near the end of its IPO preparations, an opportunity emerged to acquire/merge with NextCom, one of its competitors based in the US. NextCom was caught in an internal dispute on the company's future directions, where the founder wanted to take it private. MajCom saw a good fit in merging the companies that would allow it to eliminate a key competitor and to expand into the American market, which was the largest market in the world. However, MajCom later got involved in a proxy battle with the founder that it eventually won.

Table 4.4.1: Interviewee Profile

Interviewee	Pre-M&A Function	Notes
MajCom 1 (MC1)	CFO	Responsible for the integration
MC2	Senior R&D employee	Involved in the pre-merger and post-merger technical meetings
NextCom 1 (NC1)	Product Manager	Involved in the pre-merger and post-merger technical meetings
NC2	Software Development Manager	Involved in the project with priority resulted from the merger
NC3	Senior Technical Architect	Involved in the pre-merger and post-merger technical meetings

The main reason for MajCom to enter this merger was to gain a larger market share in the American market, not to acquire technologies. Traditionally, MajCom had been successful in the enterprise market space – market space for medium and large enterprises – and had about 40% of its sales in the US. NextCom, on the other hand, was stronger in the small business space and had a much stronger presence in the US with about 90% of its sales there. In spite of the differences in market focus and technical strengths, the two companies offered product portfolios to both of the market spaces. After the merger, the combined company became one of the largest players in the telecommunication market sector in which it was active. By merging with NextCom, MajCom could capitalize on NextCom's strong sales and service organization to expand its existing sales channels. Moreover, the merger would yield compelling operating synergies, as well as give the new company more bargaining power towards its stakeholders, such as manufacturers and customers.

MC1: we saw that NextCom was a very good strategic complement for MajCom.

MC1: "Merging with NextCom was a way to grow our distribution and representation to the market."

Integration: The combined company had three R&D centers (two NextCom R&D centers – in the US and in the EU – and a third R&D center at MajCom in Canada), and two major product lines, one for the small business space and another for the enterprise space. The integration however was mainly occurring between MajCom teams responsible for small business products and NextCom’s American R&D and product teams, which were likewise focused on small business products. MajCom’s intention was to integrate two small business portfolios based on different technology platforms and to keep MajCom’s own core product line for the enterprise space and NextCom’s EU business for the ‘very small business’ space, separate. This integration decision meant that small business product portfolios needed to be consolidated, and this included a decision to terminate one of NextCom’s two key projects to develop the next generation technology that would replace the current technology. The technology which stemmed from the terminated project was repurposed to be used for another product line. (For the remainder of the report, ‘terminated project’ and ‘continued project’ – the project that was integrated with MajCom – will be used to distinguish the two key developing areas at NextCom).

Integration Strategy: The integration discussions started long before the merger and involved senior managers and senior technical employees. Among these meetings, there were a number of pre-merger technical meetings. These early meetings were focused on finding a fit going forward between the two companies and on figuring out how product portfolios could merge. The meetings then resulted in a list of projects with top priority that needed to be accomplished after the merger. For example, the number one project resulting from the meetings was getting two systems and their respective applications to work together. After the merger, the same type of meetings continued but was expanded to a large group of employees. The purposes for them were to give more details to the integration plan and to operationalize the integration plan to attain objectives that were set.

NC1: “Pre-merger we had a number of face-to-face meetings, where the MajCom technical people (mostly managers) came down to NextCom.”

NC2: “There were some integration meetings prior to the merger, where the number one project was identified in terms of priority.”

The integration was formally led by the integration team. The team had about ten leaders from both organizations who were assigned by the Integration Manager, also the CFO of MajCom, to oversee the integration for every function. The role of these leaders was to put a number of employees to work towards an immediate action plan for each of the functions, with a key objective being to move the two companies onto one system and one process. The progress was tracked in a monthly conference call. In the R&D area, most integration decisions came from MajCom as to what needed to be done (noteworthy: usually in a merger, one party is more dominant than the other, like in the case of MajCom/NextCom (Haspeslagh and Jemison, 1991)). In NextCom interviewees’ view, early in the integration process, they were mostly told what to do to make MajCom successful, instead of consulting with them as to how they could contribute to the success of the new MajCom. That might have had an impact on how NextCom’s

knowledge was transferred and used. Upon the merger, the training centers on both sides were enabled to provide training on each other's products, so that technical employees from both sides understand how things work on the other end. It was believed that a good understanding of product and technology would allow for finding leverage points across the organization.

NC1: "It was an appropriate thing to do just to understand what's going on and where we might be able to leverage things."

Retention Strategy: Although the new company did not intend to retain NextCom's technical employees associated with the terminated project, it wished to retain the remaining technical employees (people associated with the continued project). The management team did not put in place a formal retention plan to retain NextCom's employees, but there were "stay" bonuses and stock grants offered after the merger to ensure a smooth transition. People who were going to lose their jobs were given stay bonuses until the integration was completed, while the rest of the work force at NextCom was offered a small stock grant. But some people who were deemed to be important were given a large stock grant, and were also more likely to be promoted.

MC1: "We offered stay bonuses to encourage them to stay and work with us, so that the transition was as clean as it could be, with a minimal amount of disruption."

NC2: "We definitely looked through the organization and tried to pick out the key individuals, and they got more stock grants than other people, or they might have gotten a promotion when others didn't."

Despite the bonuses and stock grants, many NextCom technical employees associated with the continued project left. Their departures came in two waves; one was a direct result of the merger and the other was the result of the economic conditions, where people were either laid off or departed voluntarily. Many of those who left feared that there might not be a future for them after the merger.

NC1: "I don't think the new MajCom did a very good job of retaining people ... we really had lost most of the people associated with the project that was killed."

NC3: "MajCom didn't know how to leverage the next generation technology and killed the project which resulted in senior developers leaving the firm, and subsequently, the team which dealt with the program was downsized."

When the economy entered the recession (during the integration), the new MajCom laid off people, but the subsequent recovery also led to the departure of employees due to the misunderstanding of the local labour market in the US by new management. It was suggested that MajCom's new management did not understand that the local labour market recovered much stronger than that market in Canada. Unlike the depressing Canadian labour market for technical people at the time, there were a lot more job opportunities in the areas surrounding NextCom. The market differences were communicated to new management, but management did not act until many people had left.

NC2: "New management didn't understand well the local labour market environment, which recovered quicker from the recession than that in Canada. It failed to deliver solutions to keep people and therefore quite a few people left."

NC2: “We’ve had a significant turnover rate in the last year or so; that’s something that we try to communicate to the executives in terms of the difference in the labour markets and salary etc. It took quite a few people leaving before they really kind of took it to heart. But now they have HR people who have come down here trying to learn more about the local market.”

In NextCom interviewees’ views, the losses of technical employees with a lot of knowledge and expertise hurt the new MajCom’s ability to work on the future and next generation variation of the merged products. It also hurt the ability to create other innovations due to the loss of people of medium level of seniority, who interviewee NC1 believed to be the most innovative people due to their experience and background. NC1 stated “they are ambitious and energetic and have come from different environments, and that tends to be where a lot of innovation is.” Now that the economic condition is improved and the local market situation is better understood, the retention issue is being addressed and is starting to develop in a positive way.

NC2: “Losing people and their technical knowledge that goes back 20 years would be a significant hole to fill in terms of releasing future products.”

NC3: “Key people that were here ten-plus years left with their knowledge, so the ability to create innovation based on what they knew was lost.”

Proximity Dimensions

Geographic proximity: There lacked a close geographic proximity due to a distance between the two organizations of about seven hours by air. The distance had an impact on knowledge transfer, despite the fact that the two firms had some global operations. For example MajCom had a large percentage of their revenue generated outside of its home-country, while NextCom had offices around the world and a subsidiary in the EU. Interviewees suggested that if there was a closer geographic proximity, i.e. co-location, knowledge transfer would have been easier and there would have been more fruitful collaboration, due to the availability of face-to-face contacts.

MC1: “It wasn’t new to us in terms of having the challenges of managing an international company, but is certainly more challenging than if all your people are down the hall.”

NC1: “Without face-to-face meetings I don’t think we would have been as successful. Modern technology, video conferencing - it’s still not the same. It’s better than a regular telephone call and certainly way better than emails, but to be in the same room, to go to dinner, go to lunch with the people - I think all those things really helped to strengthen the relationship.”

Several arguments were given to support the necessity of having face-to-face contacts in this case. First, when people meet face-to-face, they get to know each other and build good working relationships, which are beneficial to the sharing and transfer of knowledge. Face-to-face contacts would also make it much easier for people to accept and provide assistance than dealing with anonymous people, in which case they would naturally be more cautious. When requests come from anonymous coworkers, people might feel uneasy about them and be worried that they would try to steal their jobs.

NC1: “I very much appreciate that we were able to do those face-to-face meetings because I don’t think we could’ve made the progress we did without those face to face meetings and the relationships that came out of that. I want to underscore that getting to know the people on the

other side and getting to respect where they're coming from and that kind of stuff was hugely important in the success of the technology part of this."

NC3: "I happened to be one of the lucky ones who actually made my way over to Canada right after the merger, got to see people face-to-face and have closer communications, and even to this day I leverage this."

NC3: "It's difficult for someone to reach out to others while people on the other end don't know who he/she is. It's then human nature that people get their barriers up."

Second, face-to-face contacts would enhance detailed discussions such as complex product architecture meetings, due to the richness of the learning. In a face-to-face meeting, people could see each other and interact instantaneously. So far there is no technology that can provide this kind of collaborative environment.

NC1: "There are tools that allow you to interact, but it's not the same as just being able to walk up to the board and grab the marker and build on something somebody else said."

NC2: "Most of the knowledge sharing had to be done over the phone, or by sharing documents, things like that, which wasn't as efficient as having the ability to kind of go back and forth and have a discussion on the technical topic."

Third, there were certain products that had some physical aspect, which made physical presence more desirable, because working in the direct environment would be much easier and effective than shipping hardware back and forth between two remote locations for study purposes.

NC1: "You can ship hardware back and forth, and then work on it remotely, but it's not the same as being in that environment."

Finally, having the management meet with employees on both sides could help to build trust and resolve human issues, and thus ensure a collaborative effort. Employees would also like to get an update from the management team on the business and integration progress.

NC1: "Even when we weren't doing the technology sessions, management has gone back and forth and that helped to deal with trust and people issues."

MC1: "The people down there want to see the executives there talking to them and giving them an update on the business and walking the halls and saying, 'Hey, how's it going?'"

To mitigate geographic barriers, at the beginning it was possible for key technical people to travel, along with the management team. But when the economy slowed and entered the recession, travel was mostly cut and replaced by video-conferencing. Although video conferencing allowed people to see and interact with each other, it was not the same as face-to-face contacts. It did not provide as much interaction possibility as being face-to-face and neither did it help foster a close working relationship. As a result of the 'travel freeze', the benefits that could have been had from the collaboration were limited. Interviewee NC1 suggested it is not necessary to have all meetings face-to-face, but it is helpful to have some face-to-face meeting to transfer technological knowledge.

MC1: "Video conferencing is not the same as being live, but it's pretty close. So you have to use tools and technology to help reduce distance."

NC3: "The fact that we were not face to face was a big virtual obstacle. We have not had the benefit that we could have had. But I do believe that there were niches of teams talking to each other and making our technology more advanced, but not to its full capability."

The fact that there was an overlap in time zones helped people from the two organizations to have video conferences and email contacts. Interviewee NC3 suggested that if there was a large distance with no or less overlap in time zones, it would have been more challenging. In the case of the third R&D centre that is situated in Europe, cooperation between that centre and the other ones in North America would have been more challenging. But that centre had always been kept separate by being given a specific mandate, so there was not the necessity to have constant interactions, except making sure that there was no duplicate effort on similar product developments.

NC3: "The fact that we are two hours away in terms of time zone means that we can have fairly quick turnaround e-mail conversations and we can have video-conference where we can see each other face-to-face in high definition. Obviously you can't do that if you're 17 hours apart...The other R&D center is eight or nine hours off from us, so that's much harder to cooperate with."

Cognitive proximity: The two organizations shared a very close cognitive proximity, because prior to the merger they were close competitors to each other. They were both active in the same technical field offering similar products, although with a different focus. NextCom on the one hand had a better knowledge of the small business space and hence had developed a strong small business product portfolio. MajCom on the other hand was more successful in enterprise products.

MC1: "NextCom folks had a good knowledge of what a small business user needed, and the MajCom R&D people didn't understand that market that well, but had a better knowledge of what bigger customers needed."

In spite of different technical strengths for different market spaces, the two companies had a presence in each of the market spaces. The presence in the same market spaces limited the two companies' abilities to differentiate themselves in terms of domain expertise. Because it was a merger between two competing companies, there was a lot of overlap in product portfolios. During the integration, the overlapping product portfolios and technologies needed to be consolidated and merged, which included the termination of one of the two key NextCom developing areas working on the next generation technology to replace the current technology when it becomes obsolete. There is not a consensus on why the project, which was seen as technically advanced and interesting by interviewees from both organizations, was terminated. There was the suggestion that it was a business decision, which did not take into account any technical aspects. But there was also the belief that there might have been a lack of ability on the side of MajCom to properly understand and assess what that terminated project was and what it would mean for the market.

MC2: "From an R&D perspective, I think the terminated project was the best thing that NextCom brought to the merger and it was decided that we wouldn't go forward with that. We are not using the really interesting technology, instead we have gone forward with a product that's about 20 years old."

Even though there was a large proximity, minor differences existed in terminology usage and in how certain codes and files are stored. For example, the same technical term might mean different things to teams from both sides. The differences in the way codes and files are exchanged and stored had also caused frustration in the sharing and transfer of knowledge, but they have become more aligned, as there were efforts made to work toward common tools and processes.

NC2: "Some of the terms that we use on the product didn't mean the same thing for the two organizations. It's slightly challenging, so in general we tried to learn so that we can better communicate."

NC1: "At a high level, we've lined up the product development processes and combined terminology, but at a lower level we still use different tools."

Organizational proximity:

Culture: There was a lot of cultural proximity at the national level. American and Canadian cultures were very similar. They spoke the same language, which is English; French Canadians were not very significant to MajCom's work force. But minor differences existed too, such as relatively longer working hours in the US, and the perception that Americans work a little harder than Canadians. Overall, there were not a lot of issues related to cultural proximity at this level.

MC1: "The Canadian business culture and U.S. business culture, as well as rules and regulations, aren't all that different."

NC1: "I think we actually work harder, work more hours and are more dedicated. That's not so much of a slam on them. I think Canada has a little bit more of a laid back culture."

At the corporate level, there was less cultural proximity, due to a number of major differences. The cultural differences that might have had an impact on knowledge transfer were: a stricter product development process at NextCom, different views on the product life cycle, NextCom's family-like work environment, and a less participative culture at MajCom (exclusion of other teams).

The first difference was that, at NextCom, there was a management culture that was very strict in terms of meeting product milestones and release schedules, and in terms of changing the product design. In general NextCom did not tolerate any delay in product development process. MajCom on the other hand had a much more lenient approach, where slightly missing deadlines and technical milestones did not have any negative consequences. In addition, NextCom's product design phase tended to include a lot more technical details to minimize technical risks and the risk of delaying product release, but the extensive design approach made the process rigid and time consuming. For example, it was nearly impossible to add an additional feature to a product that has passed the design phase. In order to add such a feature, the process required that it go through a series of formal procedures that were time consuming and complex.

NC3: "NextCom was more aware of trying to be more efficient, trying to plan things out to the nth degree, like over-engineering things. Because you're trying to consider so many different things, it's going to take longer."

MC2: "NextCom people would do a lot of the development during the analysis/design stage which would de-risk their schedules ... so their schedules are much longer but they also have more predictability."

NextCom's culture of over-engineering and strict time commitment led it to be more conservative in terms of developing new products and technologies, in some cases less productive. After the merger, NextCom moved away from the strictness, which according to the interviewees was more preferable for producing a higher output.

A second difference was that NextCom had a view that every technology has a limited/finite life on its own; whereas MajCom viewed that each product and technology could be continually developed and enhanced. This difference in views on product life cycle created problems for the companies to work together. For example, at NextCom, products were developed according to their expected life-time, and thus there was no effort or money invested in anything beyond their life expectancy. Therefore when MajCom merged its 'long living' products with NextCom's products that were near the end of their life cycle, inevitably there were some technical problems that complicated collaboration.

NC1: "NextCom believed that there is a lifecycle of a product, whereas MajCom believed that existing products can be continuously evolved."

A third difference was that NextCom had more a family-like environment, where everybody knows everybody else, and people seemed to be more willing to help out if asked. At MajCom on the other hand, people appeared to be less willing or available to provide assistance when requested.

NC2: "If somebody asks for help, usually the other people would help out, even though they might have some other tasks they needed to be working on. But when we ask somebody in Canada for help, we might get a response of 'Well you need to get it on my to-do list before I'll look at it'."

MC2: "At NextCom, everyone seemed to know everyone. Some of the people at NextCom were often surprised that I didn't seem to know all the people who worked at MajCom."

A fourth and final difference was that, at MajCom, especially in certain product management teams, there was less of a participative culture. Often these teams would work independently in deciding how products were going to be like without consulting other teams. As a result of that, there were technical difficulties around new products that could have easily been avoided. It also created a perception that people from NextCom were excluded from some pre-development technical meetings. According to interviewee MC1, it was simply the way these teams worked; they not only excluded R&D teams from NextCom but also those at MajCom. There probably was not any intention to treat NextCom people differently.

NC1: "We also find that as new products are being planned, we tend to hear about it after the fact, as opposed to contributing to its design and its requirement."

NC1: "There have been numerous examples of...how new products were developed that would have been different if our needs were considered."

Other organizational proximity: Other than cultural proximity, there were differences in organizational proximity, which might have impacted knowledge transfer. One of the differences was related to the way how companies resolve technical difficulties. Since NextCom was active in the small business space, there was less leeway in solving certain technical problems, as it had to take into consideration the overall cost of its products and associating maintenance expenses. Sometimes it would sacrifice slightly the system security to deliver a product that would stay within the range of acceptable prices. MajCom on the other hand would not consider such a security compromise, which is deemed to be unacceptable. Instead it could simply add on some pieces of technology or tools to deal with the problems without worrying too much about the cost. Incompatibility in practises could make it difficult for people to cooperate and to understand each other.

NC2: “In the small business space NextCom couldn’t just add an extra piece of tool to our product offering, because the customer wouldn’t want to absorb the cost and maintenance associated with that.”

Outcome: The merger has been successful in terms of achieving the original intentions for the deal. It has led to the elimination of a key competitor for the new MajCom in the American market. It gained a stronger market footprint and access to strong sales and service organization, as well as the attractive service model of NextCom. But in terms of the retention of key people, it has not been very successful. It lost many technical employees associated with the continued project, who MajCom wanted to retain. The impact of the loss of technical employees was significant and might have hurt its ability to innovate.

The main sources of change in innovation as a result of the knowledge transfer were limited to incremental improvements of product, technology and research process by combining existing technological knowledge and capabilities (see Table 4.4.2: Acquisition Outcome). The incremental innovation was mainly related to the increase in development speed, a large technology pool to draw the best technology from, and a larger technical employee base. Post-merger, MajCom leveraged certain strengths of the two organizations to provide a stronger portfolio. It was able to select the best product and product features (that are not terminated) of the two organizations and enhance them before bringing them to the market. Interviewees suggested that, without the merger, MajCom would not have been able to introduce a new portfolio of such strengths so fast for the small business space. For example, the new MajCom could pick the best technology out of two and enhance it with state-of-the-art functionality. This way, MajCom was able to reinforce each other’s weaknesses with strengths to optimize its product portfolio.

MC1: “We’ve created new products; we’ve taken products that were kind of tired and just rejuvenated them with some new features and functionalities as opposed to starting it all from scratch.”

NC1: “We were able to create a combined portfolio out of the strengths of our products and use the complementary products from the other side to strengthen points in which we were weak. So,

I think it's given us a much fuller portfolio and stronger across the board ... I would say neither company could have gotten those capabilities introduced into their portfolios without the merger."

Table 4.4.2: Acquisition Outcome

Outcome	Attained	Explanation
Incremental innovation	Yes	Incremental innovation by optimizing and recombining product and technology and accelerating development speed.
Radical innovation	No	No significant change radical innovation was identified.

The merger helped accelerating the development speed. The new MajCom was able to bring new products to the market much faster. For example, the first merged product for small business was introduced to the market within a year of the merger, which was much faster than normally it would take.

MC2: "We were able to get new products up and running on their systems in one year or less, which is quite good... I think we're able to get product ... in a year, as opposed to three or four years as it would've been otherwise."

The merger also improved the collective technological strengths of the company. After the merger, there was a large technological knowledge base and a large technical employee base, which can work with different concepts and draw from more leverage points to create value. For example, some MajCom applications have been developed by NextCom people who were more familiar with a certain type of technology. The merger also provided an opportunity to learn from each other in dealing with technical problems.

NC3: "I don't think we probably benefited from a full capability perspective, but we definitely had groups of engineers working together with different concepts."

The merger did not resulted in radical innovation, e.g. break-through technologies, or leapfrogging technologies. This result is likely associated several reasons to be discussed below.

First reason, in the first two years following the merger, there wasn't really a need or intention to have different R&D teams cooperating on creating the next generation product and technology or other types of radical innovation. The focus was primarily on getting products and systems working together for the purpose of creating one common product portfolio for small businesses. In the words of interviewee NC3: "We're trying to do the things that their products were doing."

NC2: "Our R&D labs didn't necessarily have to cross populate, so to speak. I mean we're maintaining different products so I don't think it had a huge impact on innovation."

MC1: "All they're doing on that product line is catching up to the product line that we had prior to the acquisition."

Second reason, according to the interviewees, geographic distance between the companies was a barrier to a better knowledge transfer and sharing, especially when the economy landed in the recession, and the travel budget was cut and replaced by video conferencing and telephone. The unavailability of face-to-face contacts during the travel freeze inhibited a better integration and

cross-sharing of technological knowledge. A lack of organizational proximity also prevented knowledge from being effectively shared and leveraged. For example, certain technical teams at MajCom worked almost exclusively within their teams and thus shut out other participants, who might have contributed to their product developments.

Third reason, there was too much overlap in technologies and product portfolios as a result of little difference in domain expertise, which limited the complementary benefits from the merger. Although NextCom was more successful with small systems, MajCom wasn't new to this market segment; it had technical teams and product lines of its own. Therefore there weren't many complementary technologies and skill sets to allow for recombination of technologies. In addition, the merger created a situation where product lines needed to be consolidated or discontinued and the employees working on these products had to be shifted or eliminated.

Fourth reason, MajCom might not have fully understood NextCom's next generation technology, which was one of the two development areas at NextCom and which had been worked on for years, but was still in the development stage. Instead of collaborating on that project, MajCom decided to terminate it. The potential of the technology and the technical people associated with it were mostly lost. The resulting technology was scaled down only to be repurposed a year later. The termination of the project and the loss of most people associated with the project (on top of the loss of technical employees associated with the continued project) meant the new MajCom had lost about half of NextCom's technical capacity. The departure of a significant number of technical people had also contributed to an out-of-balance organization, where people of medium level seniority, who were believed to be most innovative, were missing.

5. Discussion

In this section, the themes drawn from the three cases will be compared and contrasted to identify similarities and differences across the cases. Subsequently these similarities and differences will be linked to extant literature to give rigor to the research findings (Eisenhardt, 1989; Eisenhardt and Graebner, 2007). Wherever it is appropriate, propositions will be made.

5.1 Proximity profile and impact on knowledge transfer

Since the case evidence from the within-case analysis confirmed the importance of proximity to knowledge transfer as incorporated in the research framework, it is logical to start a cross-case discussion by cross examining the proximity dimensions' roles in knowledge transfer.

5.1.1 Geographic proximity

The within-case analysis clearly revealed a relationship between geographical proximity and knowledge transfer. In general, the presence of a close geographical proximity was suggested to have a positive impact on knowledge transfer, and the lack thereof on the other hand would have a negative impact. But before assessing the impact of geographical proximity on knowledge transfer, it is relevant to understand how such transfer occurs, especially the transfer of technological knowledge, which tends to be socially complex and less codifiable. Knowledge transfer according to Ranft and Lord (2002) is "the acquisition and utilization of new sets of knowledge-base resources", such as technological knowledge and capabilities. Knowledge transfer in M&A takes place when technical employees – 'the agents of transfer' – from both companies cooperate to identify, share and spread the company specific technological knowledge and capabilities that can ultimately be leveraged across the new organization to create new or to improve existing product and technology.

From the case evidence, it is clear that for the collaboration around the transfer of the firm-specific knowledge and capabilities to be effective, employees from both organizations need to build trust and develop good working relationships. If companies are co-located, face-to-face contacts can happen more easily and naturally, which accelerates trust and relationships being built. In addition, when knowledge transfer involves physical objects, face-to-face contacts would enhance the richness in learning. On the other hand, if there is a lack of close geographical proximity, face-to-face contacts would have to be arranged by having people travel from one place to the other. This type of arrangement could be expensive to the company and burdensome to its employees. The need for such proximity could be lessened by using modern communication technologies and tools, such as video conferencing. The advantages of these tools are that they are usually cheaper and easier to organize, but there are also disadvantages. For example, although video conferencing permits people attending to see each other face-to-face, it cannot allow them to interact as they would in real life. In addition, people do not have the chance to develop and strengthen their relationships such as by going out for dinner etc.

This finding is in line with Rallet and Torre's (1999) conclusion that when transferring technological knowledge over a distance, it is necessary to have face-to-face contacts, which cannot be substituted despite the availability of modern communication tools. They argued that modern communications tools are helpful in mitigating the distance factor, but they cannot replace social presence that personal contacts provide. According to them, airplane expenses often take up most of the budget, when research and R&D teams cooperate over a long distance. However it is suggested by interviewees that not all contacts need to be face-to-face, as long as people could meet face-to-face frequently so relationships are built. Once sound working relationships are built, other modes of communications could be used to maintain them. This evidence supports Boschma's (2005) argument that no permanent co-location is required.

In the case of CanSoft/GiantSoft, the headquarters were about one and half hour away by air-transport and there was not much difference in time zones (see Table 5.1.1: Geographic Proximity and Its Impact). For them, the distance did not adversely impact knowledge transfer. The relatively shorter distance was overcome by making travel and video conferencing possible. It was suggested by CanSoft's CEO that large global companies like theirs are used to geographical challenges; therefore distance does not complicate the integration and knowledge transfer. However being a large globally distributed company does not make face-to-face contacts, which are necessary as discussed earlier, irrelevant or redundant. Face-to-face contacts are still required and important to knowledge transfer.

Table 5.1.1: Geographic Proximity and Its Impact

	Proximity	Interventions	Impact on knowledge transfer
CanSoft/ GiantSoft	1.5 hrs away, overlap in time zones [+ ¹]	Large global firms and employees were allowed to travel	Insignificant impact on knowledge transfer because of a large proximity, two firms were globally distributed and no significant involvement of physical objects
FutureTech /BrightTech	8 hrs away, little overlap in time zones [-]	Employees were allowed to travel and use conference facilities	Insignificant impact on knowledge transfer, which involved the transfer of an entire manufacturing facility; initial disadvantages of distance were well addressed by travel and other communication means
MajCom/ NextCom	7 hrs away, large overlap in time zones [-]	No travel, mainly used conference facilities to do knowledge transfer	Significant impact on knowledge transfer that involved physical objects; disadvantages of distance were not well addressed due primarily to a travel freeze

Compared to CanSoft/GiantSoft, evidence suggested that knowledge transfer in the other cases was more challenging due to the large distances between companies. For example, MajCom and

¹ The following symbols indicate the level of proximity based on my interpretation of the interviews. + / + / + / ± / - / - - (strongest: + + and weakest - -).

NextCom were about seven hours apart by air and had three hours in time-zone difference. The employees of the new MajCom appeared to not have coped well with the distance, and the impact was significant on knowledge transfer. The travel freeze imposed by the new management team did not help either. As indicated by interviewees at NextCom, the collaborative effort would have been more successful if there was not a distance or if there were more opportunities to meet MajCom employees. The fact that both of the companies had some global operations did not appear to reduce the importance of geographical proximity, as was suggested in the previous case. A suggestion could be made that large global companies like GiantSoft would have more experience in dealing with geographical distance and would be more aware of its impact on knowledge transfer, and thus more likely to intervene to ensure the availability of face-to-face contacts. In contrary, the new MajCom being a smaller company might have lacked resources and experience in dealing with M&A knowledge transfer and thus cut altogether the travel budget. For BrightTech/FutureTech the distance was even larger; the companies were about eight hours away and had little overlap in time zones. But the distance barrier was effectively diminished primarily by employee travel. As conveyed by the interviewees, despite the disadvantage of a large distance, there was not a significant geographical impact on knowledge transfer. A comparison of how new MajCom and new BrightTech dealt with distance suggests that geographical distance can be mitigated by travel on top of modern communications tool.

Despite Cairncross's (1997) claim in his book, "the Death of Distance", that distance is no longer relevant due to the advancement of modern communication technologies and improvement in transportation, the case evidence points clearly to the opposite, at least in terms of knowledge transfer. Drawing from the above evidence, it seems that geographical distance is still very much relevant. A close geographical proximity would serve well for the transfer of technological knowledge and capabilities. Small proximity without any intervention on the other hand would hinder cooperation on identifying and transferring knowledge, which is consistent with the argument made by Boschma (2005) that the larger the distance, the harder it is to transfer knowledge. In order to mitigate the impact of distance i.e. to reach the similar effects as when firms are closely located or co-located, the company would need to enable its employees to travel, which demands more resources such as a larger travel budget and commitment from employees to travel frequently. The company would also be required to provide modern communication tools, such as conferencing facilities, which are costly but otherwise not necessary. For long-distance communications, either through the telephone or video conferencing tools, the overlap in time zones plays a big role. The availability of an overlap in time zones makes it easier for people to talk on the phone or to see each other in a video conference.

5.1.2 Cognitive proximity

The case evidence points to two aspects of cognitive proximity: base knowledge and domain expertise. The distinction between base knowledge and domain expertise does not seem to have been well established by previous research. In the current literature, most of the studies are done

around the concept of the relatedness of technological knowledge and to a less extent the complementarity of technological knowledge.

In terms of the base knowledge component of cognitive proximity, interviewees suggested that to communicate effectively on technical issues, employees from both sides need to share the base knowledge; that is, they need to use common base technology and technical principles (e.g. the same programming language for software developing companies), or they need to be in the same or closely related industry. This is in line with the theory of absorptive capacity (Cohen and Levinthal, 1990), which posits that a minimum level of common knowledge is required for a company to communicate with and to absorb knowledge from another. If not, transfer and leverage of knowledge and capabilities would be impacted and impeded. Thus, sharing the base knowledge is important for an effective transfer of knowledge.

Domain expertise is the firm's knowledge and capabilities specific to a technological field. When two companies with dissimilar domain expertise merge there is likely more chance to explore new technological opportunities due to the availability of complementary knowledge and capabilities. The recent acquisition of 3Par by Hewlett-Packard that made the news was an example of a deal between two firms with dissimilar domain expertise. 3Par is a leading firm in the development of the so-called utility storage, which provides more efficient and cost-cutting corporate IT storage systems. Hewlett-Packard on the other hand is an information technology firm that is specialized in enterprise servers (for which data storage management is a key part). Hewlett-Packard wished to leverage 3Par's knowledge and capabilities on the one hand to strengthen its product offering, on the other to accelerate its capabilities to develop a new set of data management technologies². In addition, a combination of firms with dissimilar domain expertise would also reduce the need to terminate ongoing projects, existing product portfolios, and technical employees. That would in turn minimize the loss of firms' knowledge-based resources, such as human capital and the associated knowledge. Thus, having different domain expertise could be viewed as a positive factor in knowledge transfer and as a significant source of innovation, especially radical innovation, which is a disruptive outcome based on new technological knowledge and capabilities.

However, it should also be noted that there could be complementarities in M&A between firms in the same technological domain and between those in different domains. For example, firms in the same domain might still have knowledge and capabilities to complement each other, despite some overlap. This is commonly seen in all three cases, where the most advanced technology or capability was leveraged to create new or to enhance existing products or technology. That illustrated how the combination of two closely related companies leads to incremental innovation. On the other hand, differences in domain expertise could provide a much higher level of complementarity (and lower or no overlap) in knowledge and capabilities to the new company,

² HP News Release: HP to Acquire 3PAR <http://www.hp.com/hpinfo/newsroom/press/2010/100902b.html>

which could disrupt the existing technology development. Given the close cognitive proximity between firms in the same domain, it is arguable that the degree of complementarity in that case would be less than firms that are active in different domains. Consequently, combining firms with similar knowledge and capabilities would be more likely to result in incremental innovation; whereas combining firms with distinct and complementary domain expertise would more likely to lead to radical innovation, which is more difficult and time-consuming (Shrivastava, 1986).

For all three cases, cognitive proximity did not have any direct negative impact on knowledge transfer, such as inability to communicate technically, because there was a large overlap in base knowledge (see Table 5.1.2: Cognitive Proximity and Its Impact). Indirectly, the overlapping cognitive proximity in MajCom/NextCom affected knowledge preservation that was caused by some retention issues. Due to the overlapping skill sets and product lines, MajCom terminated a significant number of NextCom technical employees; more importantly, it failed to retain a significant number of technical employees who it wished to retain. These employees left voluntarily, because they perceived that there was no future for them in the new company. The loss of technical employees was significant and counted as much as one half of the NextCom's technical employee base. That was suggested to hurt the new MajCom's capacity to innovate.

Table 5.1.2: Cognitive Proximity and Its Impact

	Proximity	Impact on innovation
CanSoft/GiantSoft	Similar base knowledge, but different domain expertise[+]	The same base knowledge enabled employees to communicate technically with each other. The difference in domain expertise allowed the companies to explore new technological opportunities leading to radical innovation.
FutureTech/BrightTech	Similar base knowledge and quite similar domain expertise (corporate vs. military applications)[++]	The same base knowledge enabled employees to communicate technically with each other. The similarity in domain expertise allowed the companies to develop incremental innovation.
MajCom/NextCom	Similar base knowledge and quite similar domain expertise (enterprise vs. small business products) [++]	The same base knowledge enabled employees to communicate technically with each other. The similarity in domain expertise allowed the companies to develop incremental innovation.

With respect to innovation, in both MajCom/NextCom and BrightTech/FutureTech cases, the impact was mainly in terms of incremental innovation, since they shared a large cognitive proximity (namely being in the same domain) For example, BrightTech had more military applications while FutureTech had more corporate applications, and MajCom was focused on

enterprise products whereas NextCom's focus was on small business products. The individual focuses however were not different enough to yield complementary knowledge and capabilities that would allow for exploration of radically new technological opportunities. In the CanSoft/GiantSoft case, although the companies were both software companies, they were very different in terms of the domain where they were active. GiantSoft was acquiring technological knowledge and capabilities for an emerging field in the software industry, where it mainly lacked expertise and where CanSoft was a leading player. Hence there was a large difference in domain expertise to provide complementary knowledge and capabilities that the new GiantSoft could leverage to create radical innovation.

From the above discussion, three arguments could be made. First, it could be argued that for knowledge transfer to be effective, companies need to share at least a sufficient level of base knowledge, which enables them to communicate. Common base knowledge ensures that employees from both firms are 'on the same page'; in other words, they speak the same technical language, which is essential for an effective transfer of knowledge to take place. On the other hand, if firms were partnering with other firms that use different base knowledge, it could pose challenges in terms of communication, because people would not understand each other fully. Thus, M&A between firms with dissimilar base knowledge impacts and impedes the process of knowledge transfer. Following this logic, and based on the findings from this study, it is proposed:

Proposition 1. Similarity in base knowledge is positively associated with knowledge transfer.

Second, the data provided evidence that technology M&A increases the combined firms' output of incremental innovations. The findings are consistent with those of Makri et al. (2009), who found that the similar knowledge base between M&A partners is positively related to incremental innovation. Empirical evidence suggests that technologically-related M&A decrease the innovation lead-time (Gerpott, 1995; Hagedoorn and Duysters, 2002).

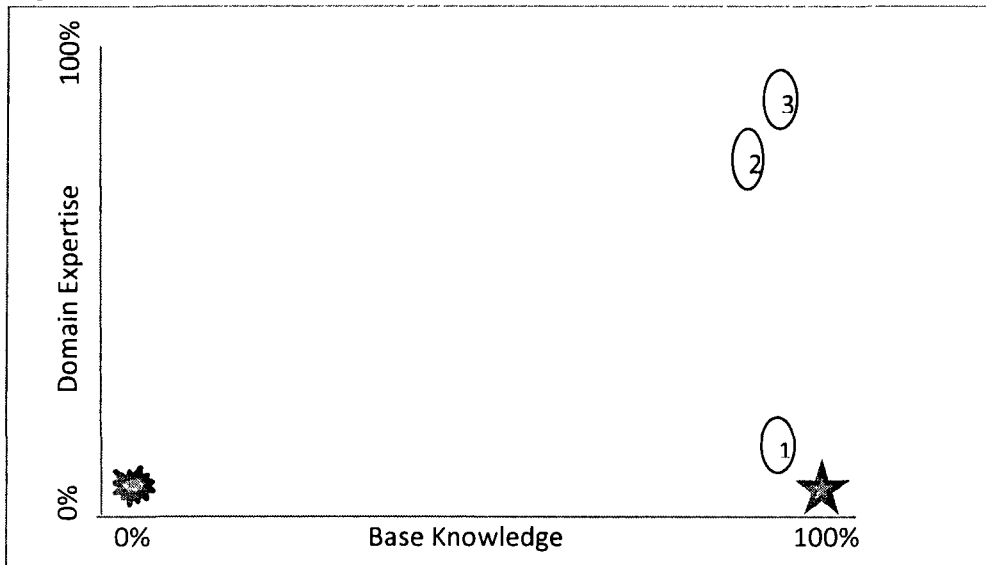
Proposition 2. Similarity in base knowledge is positively associated with incremental innovation.

Third, it could be suggested that having differences in domain expertise might lead to more opportunities for innovation. This is consistent with Nooteboom's (2000) suggestion that technological knowledge should not be too new to be understood, but also that it has to be new enough for the sake of learning. Possessing technological knowledge of different domains is important to radical innovation, because it allows for the cross-fertilization between two sets of technological capability (Leten et al., 2007) to explore new technological opportunities (Patel and Pavitt, 1997). However, if the technological capabilities are too similar, the benefits are limited. Hence, based on the above and on the findings from the CanSoft/GiantSoft case, it can be proposed that:

Proposition 3. Dissimilarity in domain expertise is positively associated with radical innovation.

To present the above point more clearly, different examples of cognitive profiles are given below: ‘Explosion’, ‘Star’ and three ‘Ovals’. Explosion represents one extreme, where there is little overlap in both base knowledge and domain expertise, while Star represents another extreme, where there is a lot of similarity in base knowledge but little overlap in domain expertise (close to the situation of CanSoft/GiantSoft’s acquisition case). The Star in the diagram below would be in the best position for a knowledge transfer to result in innovation. Ovals 1, 2 and 3 represent respectively CanSoft/GiantSoft, FutureTech/BrightTech and MajCom/NextCom.

Figure 5.1.2: Cognitive Proximity Diagram



5.1.3 Organizational proximity

Individual aspects of organizational proximity i.e. national and corporate culture, and structure all have a different impact on knowledge transfer, but in general it appears that the larger the proximity (similarity in each of the aspects), the more likely that the transfer would be smooth and effective. It requires less adjustment from either side to collaborate and there would also be fewer conflicting practices that could hinder knowledge transfer. For example, if two organizations have the same structure, it would be easier for employees to recognize how the new company is managed. This finding is in agreement with the findings of Rallet and Torre (1999), which suggested that if there were common procedures or ways of doing things, employees from two organizations could interact without deliberately learning about how things are done. Boschma (2005) asserted that organizational proximity provides stable conditions and a consistent environment, which minimizes uncertainty and increases the effectiveness of coordination, and consequently facilitates knowledge transfer. On the contrary, if companies were very different in terms of structure, employees might need to be acquainted with the new organizational structures and systems in order to be productive in their work. It would also be

more difficult for employees to identify potentially promising opportunities by combining and leveraging knowledge-based resources that are available in the new company.

Within organizational proximity, cultural clashes due to differences both at the national and corporate level have often been named in the literature as a major organizational cause for M&A failure (Stahl and Voigt, 2008). At the national level, if the cultures differ too much, e.g. differences in spoken languages, and difference in cultural values and customs, there could be a lot of cultural barriers and clashes that need to be overcome. In all three cases of the present study, however, there was large national culture proximity, as companies were based in English speaking, Western countries, where many cultural values are shared (see Table 5.1.3: Organizational Proximity and Its Impact).

Table 5.1.3: Organizational Proximity and Its Impact

	Proximity	Impact on knowledge transfer
CanSoft/GiantSoft	National culture: [++] Corporate culture: [+] Structure: [–]	Large cultural proximity eased knowledge transfer but the differences in structure required adjustments to be made from CanSoft's employees. At the same time, the structural differences helped CanSoft to better structure its new product development processes.
FutureTech/BrightTech	National culture: [++] Corporate culture: [±] Structure: [±]	Relatively large organizational proximity eased knowledge transfer. There was not a significant negative impact experienced except some ambiguity and confusion in communication and the decision making process while transferring knowledge.
MajCom/NextCom	National culture: [++] Corporate culture: [–] Structure: [±]	There were both positive and negative impacts mainly due to the relatively large cultural differences at the corporate level. The difference in corporate culture caused the perception of exclusion of NextCom from technical participations. Positive impact was that NextCom adopted a more flexible approach to developing new product and technology.

At the corporate level, cultural proximity in the cases showed more complexity. While some differences showed a positive impact on knowledge transfer, others appeared to impact the knowledge transfer negatively. For example, NextCom's conversion to MajCom's more lenient culture to meet development commitments was generally viewed as positive to the productivity in developing new product and technology. But the same company suffered from a difference in another cultural aspect that is related to how certain technical teams work at MajCom. NextCom interviewees indicated that MajCom teams tended to unilaterally make technical decisions that would cause difficulties for other teams. The consequences of excluding other teams, especially

those from NextCom are twofold. First, not involving NextCom technical people meant that its technical constraints were not considered, and that caused difficulties, which otherwise could have been avoided. Second, the exclusion conjured up the perception that NextCom was deliberately kept out from participating in technical meetings and decisions. It reinforced the feeling that they were outsiders and hurt some NextCom employees' feelings toward their coworkers at MajCom. Thus it impacted their willingness to work with them, which would have impeded knowledge transfer.

The complexity of cultural proximity found in the present study reflects findings in prior research. In a meta-analysis on cultural impact on M&A, Stahl and Voigt (2008) found that post-M&A integration and performance is subject to cultural distance. Ahuja and Katila (2001) found that cultural proximity had no impact on innovation, while a replicate study by Cloudt et al. (2006) concluded interestingly that cultural proximity did have an impact on innovation.

On the structural aspect, differences require initial adjustments on the part of employees. For example, CanSoft employees needed to get used to GiantSoft's more complex organizational structure, as it is a very large company with several divisions. It was difficult for some CanSoft employees to find their counterparts. The more established structure at GiantSoft also slowed down the decision making process. In addition, due to the difference in size, (GiantSoft is at least ten times larger than CanSoft), it was hard for CanSoft to get its technological capability known and fully understood by the rest of GiantSoft. It required CanSoft's pro-active engagement to get itself "promoted" and accepted within the new organization. In the other cases, structural differences were much smaller and, in general, did not seem to significantly impact knowledge transfer.

Based on the discussion above, it is reasonable to conclude that a close organizational proximity is desirable for knowledge transfer. This is because this closeness minimizes the uncertainty and confusion, when employees from both firms interact. On the other hand, a lack of organizational proximity would require time and effort for employees to get used to the new organizational settings and to adjust to the difference. In some cases if the differences are considerably large, the process of transferring knowledge could be very challenging. This is in agreement with the literature. Scholars like Lubatkin, (1983) Marks, (1982) Datta (1991), have long suggested that organizational incompatibilities, such as differences in management style, organizational structure, and culture, affect post-M&A integration and cause problems for M&A benefits to realize.

However, there are situations when different organizational environments could provide opportunities for learning, as discussed in the case of MajCom/NextCom, where NextCom adopted a more flexible approach in product development process from MajCom. A similar situation was seen in the case of CanSoft/GiantSoft, where there were large differences in the firms' structures. However, the structural issues were pro-actively dealt with. As a result, the negative impact of structural differences on knowledge transfer was minimized; at the same time,

the differences contributed to a quicker adoption of a more structured product development process by CanSoft, which eventually helped CanSoft to improve its innovative productivity within the combined firm.

Therefore, it can be argued that when a shift toward a better process or cultural aspect is well managed, it can also affect the new firm's innovative productivity favourably. This argument is in line with Calderini and Garrone's (2003) research evidence, which suggests that organizational differences may foster the learning process, especially in R&D functions. Similarly, Stahl and Voigt (2008) cite studies by Barkema and Vermeulen (1998) and Vermeulen and Barkema (2001) which indicate that organizational diversity (i.e. differences in cultures and systems) can help companies to become less rigid and to develop knowledge structures that will enhance innovation and learning.

However, Bjorkman et al. (2007) suggest that M&A firms can only realize these benefits if the differences are moderate. They further argue that when the differences are too great, it is difficult for M&A partners to evaluate the potential of M&A to adopt each other's organizational practices. In that case they would also be less likely to be engaged in knowledge transfer. In addition, if firms are too different in terms of organizational settings, the integration and post-M&A performance would suffer (Hagedoorn and Duysters, 2002). This is because the integration of specialized functions - e.g. R&D - that improve levels of innovation is more complex than other routinized functions, such as manufacturing and sales (Hagedoorn and Duysters, 2002; Nelson and Winter, 1982).

Thus, if organizational distance is moderate and is well managed, adjustments can be made gradually, while the combined firm enjoys opportunities to enhance organizational learning and innovative performance that originate from firms' organizational differences. Based on the case evidence and relevant literature, the following proposition is developed:

Proposition 4. Organizational distance that is moderate and is well managed has a positive impact on post-M&A innovative performance.

5.2 Retention strategy

Across the cases, management committed a lot of resources to ensure the integration is smooth and objectives are attained. There were a range of measures that were implemented post-M&A to address integration issues and specific proximity factors, as discussed above in the proximity section. Measures to retain key employees are a major management intervention that is commonly observed across the cases. The interviews indicated that the retention issues might influence the knowledge transfer and the acquisition outcome. The importance of the retention of key employees is confirmed in the literature. For example, Ranft and Lord (2000) found that the retention of key employees - top managers and senior technical employees - is positively associated with the transfer of knowledge-based resources. They suggested that in technology-

based industries, technological knowledge resides mainly in human employees in two ways: in individual employees and in the firm's collective human capital. Socially complex relationships among technical employees contain knowledge that is needed for the new firm to create new knowledge (Kogut and Zander 1992, 1996; Puranam and Srikanth, 2007). It is furthermore argued that the departure of key people would cause adverse change and loss to the firm's knowledge-based capabilities (Puranam et al. 2003; Ranft and Lord, 2000, 2002) and reluctance of employees to share knowledge transferred (Greenberg and Guian, 2003).

The interviewees from both new BrightTech and new GiantSoft clearly indicated that there was the intention to retain the acquired firm's key employees, who were seen as the 'agents of transfer. For example, the CEO of CanSoft stated that key employees are important to the success of the business and the acquisition. The new company would take whatever action to make sure that they do not walk out the door and the knowledge is preserved. To the contrary, MajCom did not intend to retain as many technical employees, which was reflected in the subsequent termination of a key project and most of the technical employees associated with it.

The extent to which the retention issues truly impact the integration depends on how effectively they are addressed by the integration team and management during the integration. A common measure addressing retention issues is the financial incentive for key people to stay with the new company. There were two sorts of financial incentives: a "stay bonus" for key people and a "transition bonus" (plus severance package) for people who had lost or were going to lose their jobs.

CanSoft/GiantSoft and FutureTech/BrightTech both had a retention plan and were successful in retaining people, but MajCom/NextCom did not have such a plan. It only had a small 'welcoming stock grant' available to all employees. As a result of the merger, MajCom lost many senior technical employees. In addition, most of the senior managers at NextCom left either voluntarily or involuntarily. Although it is very likely that a lack of a comprehensive retention plan played a key role in the departure of many senior employees at NextCom, there are other factors (e.g. termination of a key project and the economic situation) that caused the problems at NextCom.

The benefits of having a transition bonus is that, although the impact of losing jobs on an individual's productivity cannot be eliminated, giving people some monetary compensation reduces its impact. In some cases, companies rely heavily on the "to-be-terminated" employees and their know-how to transfer knowledge. For instance, BrightTech needed to retain most of FutureTech's experienced technical operators to do the knowledge transfer. The transfer would not have been possible and as effective as it was, if these employees were not motivated or incentivised.

Case evidence suggests that retention plans are helpful in retaining employees. The new GiantSoft successfully retained most of CanSoft's key employees. Similarly the new BrightTech

was able to retain technical employees it wanted to retain (see Table 5.2: Retention Outcome). It should be noted, however, that relationships between monetary incentives and retention are not straightforward. Retention can be affected by whether employees might be attracted to work for the company for other reasons (Puranam et al., 2009). Further, they might leave the company because they are not satisfied with the fact that their company was merged with or acquired by another (Graebner, 2009; Ranft and Lord, 2000).

Table 5.2: Retention Outcome

	CanSoft/GiantSoft	FutureTech/BrightTech	MajCom/NextCom
Retention Measures	Dealt with by a retention plan; stay bonus and transition bonus	Dealt with by a retention plan; stay bonus and transition bonus	Not dealt with effectively; there was no retention plan other than a general welcome stock grant and transition bonus.
Outcome	No significant turnover	No significant turnover	Significant turnover at NextCom: senior managers and technical people associated with two key developing areas left

5.3 Knowledge transfer and innovation

Based on the previous discussions, the success of the knowledge transfer is dependent on at least two categories of influences, those related to proximity dimensions and those related to retention issues. In general, for an effective knowledge transfer, the larger the geographical and organizational proximity, the better, and a relatively large cognitive proximity in terms of base knowledge with a significant difference in domain expertise is also favourable (see Table 5.3: Knowledge Transfer Outcome). As for retention issues, if the new company could effectively retain key employees, such as senior managers and senior technical employees, the knowledge-based technological resources could be preserved and more easily and effectively transferred. In CanSoft/GiantSoft and FutureTech/BrightTech cases, interviewees viewed the knowledge transfer as effective and successful. In the MajCom case, knowledge transfer was moderately successful. It lost a significant number of technical employees associated with the continued project that the new management wanted to retain. In addition, most of the NextCom's senior managers left the company, who, according to Ranft and Lord (2000), would provide stability and continuity after the acquisition or merger. In addition, they would also play a role in realizing post-M&A values, both expected and serendipitous (Graebner, 2004).

Table 5.3: Knowledge Transfer Outcome

	CanSoft/GiantSoft	FutureTech/BrightTech	MajCom/NextCom
Knowledge transfer	Successful	Successful	More or less successful
Possible reasons	• Large geographical proximity with a small distance that was addressed	• Small geographical proximity with a distance that was addressed	• Small geographical proximity with a distance that is not effectively addressed

	• Similarity in base knowledge allowed for communication, while dissimilarity in domain expertise allowed for radical innovation • Large organizational proximity that eased knowledge transfer but required some adjustments • Successful resolutions of retention issues eliminate their negative impact on knowledge transfer	• Similarity in base knowledge allowed for communication, there is little dissimilarity in domain expertise • Relatively large organizational proximity eased the knowledge transfer • Successful resolutions of retention issues	• Similarity in base knowledge allowed for communication, but a lack of dissimilarity in domain expertise led to termination of some projects and people, which caused retention issues • Differences in organizational proximity were both positively and negatively associated with knowledge transfer • Retention issues were not effectively addressed
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5.4 Innovative performance

Thus far, the relationships between proximity and retention factors on one hand and knowledge transfer on the other are established, but the impact of knowledge transfer on innovation is yet to be discussed. Successful transfer of technological knowledge and capabilities would enable the new company to leverage them to enhance its innovative performance. Previous research found a positive relationship between knowledge transfer and innovation (Capron, 1999; Yang, 2005; Zander and Kogut 1995, Zollo and Singh, 2004). The success of knowledge transfer would become more evident when the newly acquired knowledge-based resources are redeployed by the new company to create innovation (Capron, Dussauge and Mitchell, 1998).

The present study looks at innovative performance on the basis of the change in incremental and radical innovation. According to Leifer et al. (2000, p.5), incremental innovation occurs when a firm exploits existing knowledge to improve products, technologies or processes, and radical innovation involves development of new products, technologies or processes that can transform the market place by exploring new technologies. Across the cases, there is evidence that post-M&A, the combined companies have enhanced their innovative performance. This evidence lends support to Ahuja and Katila's (2001) theory that in technology M&A, regardless of the underlying motivation, innovative performance could improve, due to the involvement of a substantial technological component.

In the current literature, there are a number of explanations of how M&A lead to more innovation. According to Man and Duysters (2005), first, M&A results in a large combined R&D budget. This allows the new company to gain economies of scale and scope in research, i.e. taking on more and larger R&D projects that could lead to more advanced technology being developed. Second, it would allow the new company to leverage the two firms' complementary

knowledge base by combining the individual strengths to create product and technology that each of them cannot develop on its own or cannot develop so fast (Gerpott, 1995). Thus M&A could result in faster introduction of new products and enhanced variants of existing products to the market (Puranam et al. 2003). Third, the new company could take best practices for product development/innovation management to increase R&D productivity.

Interviewees provided their views on the change in innovative performance (see Table:5.4: Post-M&A Innovation). For incremental innovations, there are four different categories of change identified that are similar to those suggested by Man and Duysters, although more detailed. These categories are: 1. Product optimization, that is using the combined technological knowledge and capabilities to enhance product capability and features; 2. Product recombination, that is using combined knowledge and capabilities to create new types of products; 3. Acceleration of product development (due to access to research facilities and a large technical employee base); and 4. Enhancement in firm's R&D practices that improve productivity (such as, the adaptation of more structured R&D processes by CanSoft and more lenient product development processes by NextCom).

Although in all the cases there have been incremental innovations that are associated to the transfer of knowledge, CanSoft/GiantSoft has been by far the most successful. CanSoft not only had various types of incremental innovation, it also had the opportunity to create new products by tapping into GiantSoft's large knowledge base, where there were research findings that were not used. On the other hand, BrightTech and MajCom have mostly created incremental innovation on the basis of optimization of existing products. The firms have mainly leveraged each other's technical strengths to increase the performance of their products and technology. For example, BrightTech was able to leverage some of FutureTech's proven technology to accelerate its development process around various laser products.

Table 5.4: Post-M&A Innovation

	CanSoft/GiantSoft	FutureTech/BrightTech	MajCom/NextCom
Incremental innovation	• Product optimization (improved products) • Product recombination (new products) • Acceleration of product development (access to research capabilities and unused research findings) • Enhanced R&D practice	• Product optimization • Product recombination • Acceleration of product development (access to proven technology)	• Product optimization • Acceleration of product development (larger pool of knowledge and technology) • Enhanced R&D practice
Enabling factors	• Prior partnership and similar base knowledge • Untapped research knowledge of the acquirer, large knowledge base of the acquirer	• Active in the same industrial domain/technological area, the acquired company's proven technology	• Active in the same industrial domain/technological area,

Radical innovation	Exploring new or next generation technology, adding completely new capability (acquisition of a third high-tech company), leveraging the acquirer's reputation to initiate projects that could transform the market place	N/A	N/A:
Enabling factors	Large difference in domain expertise, availability of acquirer's resources and reputation		
Prohibiting factors		Too much overlap in two companies knowledge and capabilities; too little difference in domain expertise	Too much overlap in two companies knowledge and capabilities; too little difference in domain expertise; lack of strategic intent/focus

The new GiantSoft was the only company that experienced radical innovation. It has explored next generation technology and launched products in new fields. CanSoft, as a new unit within GiantSoft, was also able to take on projects that could change the market place by leveraging GiantSoft's credibility and capabilities. Finally GiantSoft has added fundamentally different set of knowledge and capabilities to CanSoft by acquiring a third company. The newly gained knowledge and capabilities could allow it to develop substantially different products and technology in the future.

The absence of radical innovation from the new MajCom and BrightTech might be explained by the large cognitive proximity that they share. Unlike GiantSoft, MajCom and BrightTech had little difference in domain expertise and a very large overlap in their products and technology. The lack of different domain expertise limited the sources of innovation resulting from a collaborative effort to capitalize on complementary skills and expertise. For MajCom, the overlap in product and technology forced the new company to consolidate or to terminate product lines and existing projects, which caused losses in human capital that could have further reduced the company's capability to deliver innovation. It should be noted however that the strategic intent of the new company might also have played a role in the post-M&A innovation. For example, interviewees believed that the new MajCom would have the capability to explore a significantly different set of products and technology by leveraging the combined technical strength of the new company, but it did not, because it was more focused on penetrating the American market.

These outcomes lend support to the conclusion drawn by Makri et al. (2009) that knowledge transfer in M&A between firms with similar knowledge base is positively related to incremental innovation, while knowledge transfer between firms with complementary technology and capabilities is positively related to radical innovation. Similarly, studies on R&D alliance found that on one hand if the knowledge bases between partners are too similar, there would be little benefit to radical innovation, and on the other hand if the technical knowledge were complementary the benefits to radical innovation would be much greater (Danneels, 2002; Quintana and Benavides, 2010).

6. Conclusion and implications

6.1 Conclusions

Building on prior study findings on intra- and inter-organizational knowledge transfer, this study investigated the impact of three proximity dimensions as well as management interventions on M&A knowledge transfer and innovation. Evidence from three M&A, where technology-based companies were involved, supports the links between various dimensions of proximity (i.e. geographical, cognitive and organizational) and knowledge transfer, and subsequently, between knowledge transfer and innovation. All three dimensions of proximity examined in the study had an influence on knowledge transfer between the involved companies.

A close geographical proximity mainly serves as a facilitator to face-to-face contacts, which are of paramount importance while transferring knowledge. When employees from two combining companies come together initially, trust and healthy working relationships need to be built. In doing so, it is important to have face-to-face contacts. In addition, face-to-face contacts enhance the richness in learning and are therefore essential to effective and successful knowledge transfer. In cases where geographical proximity is small, management could intervene by allowing employees to travel to create a situation where face-to-face contacts are available.

In addition, the evidence exhibits two aspects to cognitive proximity: base knowledge and domain expertise. It is suggested that the combining companies should share at least some significant base knowledge in order to communicate effectively on technological issues. If the companies cannot find a substantial common ground in base knowledge, it would be difficult for them to understand and leverage each other's technological knowledge. However if both companies were in the same technological domain, there would be too little distinct domain expertise – specialized knowledge and capabilities – for the new company to pursue significant innovation avenues, except certain product and process related incremental innovations. In addition, issues such as termination of projects, product lines and people, would emerge. These issues might elevate difficulties in knowledge preservation and transfer. Due to the fact that key people hold a vast amount of valuable knowledge in technology-based industries, their departure could cause losses and damage to both the collective knowledge, and individual knowledge and expertise held by them. On the other hand, if firms have a different domain expertise, the need to terminate projects, product lines and people would be minimized. Also the likelihood for a greater degree of complementarity between firms' technological knowledge and capabilities would arise. This enhances the potential for radical innovation, which is important to firms' competitiveness. From an innovative perspective, it is important to have two companies that on the one hand find a common ground in terms of base knowledge, while on the other hand differ sufficiently in their domain expertise.

On organizational proximity, the cases suggest that in general a closer proximity eases knowledge transfer, as it would provide fewer conflicting and ambiguous situations that hinder

knowledge transfer, thus, collaborations would happen more naturally and efficiently. On the other hand, if there is a lack of organizational proximity, it would require considerable commitments and efforts from both firms' employees to adjust themselves and to overcome the differences. In some instances, differences could be so large that they are difficult to cope with, which in turn could seriously affect knowledge transfer. However, when differences are moderately large and manageable, opportunities for learning and chance to adopt best practices could emerge to improve firms' innovative productivity, such as more efficient product development processes.

In addition to the impact of proximity dimensions, the retention of key employees also plays a role in knowledge transfer. The findings support what has been suggested in the literature, that the more successful the retention, the better the knowledge is preserved and transferred (Ranft, 2006). The transfer of knowledge subsequently creates opportunities for the combined companies to innovate.

6.2 Contributions

The study contributes to the literature by illuminating the relationship between various dimensions of proximity and M&A knowledge transfer, which has not attracted significant research attention. In the current literature, the main focus has been on geographical proximity in relation to knowledge transfer between and within organizations, but much less attention has been paid to knowledge transfer in the M&A context. (Intra-organizational knowledge transfer studies include Argote, 1999; Kane et al., 2005; Zander and Kogut 1995, and inter-organizational knowledge transfer studies include Ambos and Ambos, Acs et al., 1992; Jaffe, 1996; 2009; Jasimuddin, 2007). This study has also showed the role that various proximity dimensions (and not only geographical proximity) play in technology-based M&A, and has provided a number of propositions for future research.

The current study also provides a new perspective to view cognitive proximity. Unlike the current literature that measures proximity mainly based on how close firms are technologically, the present study sheds light on the distinction between base knowledge and domain expertise. The findings suggested that similarity in base knowledge enables firms to communicate and absorb each other's knowledge while dissimilarity in domain expertise creates chances to explore technological opportunities. Measuring cognitive proximity at these two distinct levels of knowledge would likely allow for a better assessment for the suitability between M&A partners in terms of cognitive proximity and provide better predictability of post-M&A innovative performance.

In addition, the study reveals the complexity of organizational proximity in technology M&A, where there are both positive and negative impacts of individual organizational factors on knowledge transfer that would affect the innovative outcome.

Furthermore, unlike prior quantitative studies, the present study's qualitative case approach helped to examine and gain detailed insights on how M&A impact innovation. The detailed understanding gained from the study does not only help us better evaluate the importance of proximity factors in M&A knowledge transfer, but it also helps us explain why strong innovative performance occurs and why it does not.

6.3 Implications for practitioners

This study provides directions for managerial practice. The study presents two main implications that are relevant to practitioners, i.e. senior executives considering taking the M&A path. First, the findings on the relationships between proximity and knowledge transfer and innovation could assist practitioners to better select and evaluate potential M&A targets. They would be able to better assess the proximity dimensions between the acquirer and the potential target in finding an optimally suitable target. This would reduce costly strategic errors of merging with or acquiring an 'unfit' partner.

Second, the findings could improve managerial practices for post-M&A integration and knowledge transfer. The study has identified important factors that affect knowledge transfer and innovation, such as a lack of geographical proximity, as well as the role management could play to facilitate knowledge transfer and to diminish the negative impact.

6.4 Limitations and directions for future studies

Despite the effort made to ensure the best possible design for the study, there are limitations that should be acknowledged. First, due to the qualitative nature of the study, generalizability of the findings to other situations is limited; however this limitation does not apply to the generalizability at the analytical level (Yin, 2004). Analytical generalizability is helpful to extend existing theories or build new theories. In other words, this study is not intended to generalize findings to a broader population, but rather to gain insights on the influence of proximity dimensions on knowledge transfer and innovation. The aim was to help extend current theories. Future quantitative research is needed to empirically validate the study's findings.

In addition, the study had to deal with a limited number of companies that were available. The few available cases limited the study's ability to select the best possible sample to include. Moreover, in terms of finding data sources for triangulation, the study was not able to gain a more diversified set of sources such as internal reports as wished. Interviewees were mostly either reluctant or unable to share these report, because M&A information was deemed as highly sensitive.

Furthermore, it was not possible to isolate the effect that specific proximity dimensions have on knowledge transfer and innovation. Prior studies such as Rallet and Torre (1999) and Boschma (1999) have suggested that different proximity dimensions could exert an influence on each other.

Thus it would be worthwhile for future studies to investigate the individual effects of each dimension as well as the interaction effects among various dimensions.

In conclusion, this study can be helpful in setting parameters for more advanced research on knowledge transfer and innovation in the context of M&A. Given the prevalence of M&A activity in the market, and its adoption by firms intent on gaining technological knowledge and capabilities quickly, this will continue to be a promising area of research.

References

- Acs, Z., Audretsch, D. & Feldman, M. (1992). Real effects of academic research: Comment. *American Economic Review*, 82, (1). 363–367.
- Agrawal, A. & Jaffe, J.F. (2000). The Post-Merger Performance Puzzle. *JAI Series: Advances in Mergers and Acquisitions*, Vol. 1, New York, Elsevier Science.
- Ahuja, G. & Katila, R. (2001). Technological acquisitions and the innovation performance of acquiring firms: a longitudinal study. *Strategic Management Journal*, Vol. 22, 197-220.
- Alavi, M. & Leidner, D.E. (2001). Review: Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues. *MIS Quarterly*, Vol. 25, No. 1, pp. 107-136.
- Albino, V., Garavelli, A.C. & Schiuma, G. (2001). A metric for measuring knowledge codification in organisation learning. *Technovation*, Vol. 21, Issue 7, pp. 413-422.
- codification in organisation learning. *Technovation*, Vol. 21, Issue 7, pp. 413-422.
- Ambos, T.C. & Ambos, B. (2009). The impact of distance on knowledge transfer effectiveness in multinational corporations , *International Journal of Information Management*, Vol. 15, 1-14.
- Ambrosini, V. and Bowman, C. (2001). Tacit Knowledge: Some Suggestions for Operationalization. *Journal of Management Studies*, 38, pp. 811- 829.
- Amin, A. & Wilkinson, F. (1999). Learning, proximity and industrial performance: an introduction. *Cambridge Journal of Economics*, Vol. 23, 121-125.
- Anderson, J.R. (1976). *Language, memory, and thought*. Hillsdale, Erlbaum, NJ.
- Argote, L. (1999). *Organizational Learning: Creating, Retaining, and Transferring Knowledge*. Kluwer Academic Publishers.
- Arrow, K.J. (1969). Classificatory notes on the production and transmission of technological knowledge. *American Economic Review*, 59 (2), 29-35.
- Ashkenas, R.N. & Francis, S.C. (2000). Integration Managers: Special Leaders for Special Times. *Harvard Business Review*, 78 (6), 108-116.
- Audretsch, D.B. (1995). Innovation, Growth and Survival. *International Journal of Industrial Organization*, Vol. 13 (4), 441-457.
- Aune, B. (2009). *An Empiricist Theory of Knowledge*. Available on-line at www.hist-analytic.org/ETPreface.pdf.

- Bannert, V. & Tschirky, H. (2004). Integration planning for technology intensive acquisitions. *R&D Management*, 34, 481–494.
- Barkema, H. & Vermeulen, F. (1998). International Expansion through start-up or acquisition: a learning perspective. *Academy Management Journal*, 41, 337-349.
- Barrett, A. (2002). Johnson & Johnson: a shopping spree waiting to happen. *Businessweek*, retrieved in November, 2008 from businessweek.com/magazine/content/02_24/b3787083.htm.
- Bjorkman, I., Stahl, G.K. & Vaara, E. (2007). Cultural differences and capability transfer in cross-border acquisitions: the mediating roles of capability complementarity, absorptive capacity, and social integration. *Journal of International Business Studies*, 38 (4), 658-672.
- Blanc, H. & Sierra, C. (1999). The internationalization of R&D by multinationals: a trade-off between external and internal proximity. *Cambridge Journal of Economics*, 23, 187-206.
- Boschma, R.A. (1999). The rise of clusters of innovative industries in Belgium during the industrial epoch. *Research Policy*, Vol. 28, 853-871.
- Boschma, R.A. (2005). Proximity and Innovation: A critical assessment. *Regional Studies*, Vol. 39, 61-74.
- Brannen, M.Y. & Peterson, M.F. (2009). Merging without alienating: interventions promoting cross-cultural organizational integration and their limitations. *Journal of International Business Studies*, Vol. 40 (3), 468-489.
- Breschi, et al. (2003). Knowledge-relatedness in firm technological diversification. *Research Policy*, Vol. 32, 69-87.
- Bruner, R.F. (2002) Does M&A pay? A survey of evidence for the decision-maker. *Journal of Applied Finance*, Vol. 12, No. 1. pp. 48-69.
- Buono, A. (2003). SEAM-less post-merger integration strategies: a cause for concern. *Journal of Organizational Change Management*, Vol. 16 (1), 90-98.
- Caimcross, F (1997). *The Death of Distance*. Harvard Business School Press, Cambridge.
- Calderini, M. & Garrone, P. (2003). Mergers and Acquisitions and Innovation Strategies. In Calderini, M. & Garrone, P. & Sobrero, M. (ed.) (*Corporate Governance, Market Structure and Innovation*). Edward Edgar, UK.
- Capron, L. (1999). The long-term performance of horizontal acquisitions. *Strategic Management Journal*, Vol. 20, 987-1013.

Capron, L., Dussauge, P. & Mitchell, W. (1998). Resource redeployment following horizontal mergers and acquisitions in Europe and North America 1988-1992. *Strategic Management Journal*, 19, 631-661.

Chaudhuri, S. (2004). *Can Innovation Be Bought? Managing Acquisitions in Dynamic Environments*, Harvard University, (Unpublished Ph.D. Dissertation).

Christensen, C. (1997). *The Innovator's Dilemma*. Harvard Business School Press, Boston.

Cloodt, M., Hagedoorn, J. & Kranenburg, H.V. (2006). Mergers and acquisitions: their effect on the innovative performance of companies in high-tech industries. *Research policy*, 35, 642-654.

Cohen, W.M. & Levinthal, D.A. (1990). Absorptive capacity: a new perspective on learning and innovation. *Administrative Science Quarterly*, 35, 128-152.

Creswell, J.W. (2007). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches*, 2nd Edition. Thousand Oaks, CA: Sage Publications.

Crosbie Financial Post (2008). *Canadian M&A Activity – Fourth Quarter 2007 Report*. Retrieved from <http://www.crosbieco.com>, April 2009.

Crosbie Financial Post (2010). *Canadian M&A Activity – First Quarter 2010 Report*. Retrieved from <http://www.crosbieco.com>, August 2010.

Danneels, E. (2002). The Dynamics of Product Innovation and Firm Competences. *Strategic Management Journal*, 23, 1095-1121.

Datta, D.K. (1991). Organizational fit and acquisition performance: effects of post-acquisition integration. *Strategic Management Journal*, Vol. 12, 281-297.

Davenport, T. & Prusak, L. (1998). *Working knowledge*. Harvard Business Press, Cambridge, MA.

David, K. & Singh, H. (1994). Sources of acquisition cultural risk, in von Krogh, G., Sinatra, A., Singh, H. (Eds). *The Management of Corporate Acquisitions: International Perspectives*, The Macmillan Press, London.

Desrochers, P. (2001). Geographical proximity and the Transmission of Tacit Knowledge. *The Review of Austrian Economics*, 25-46.

Drucker, P. (1969). *The Age of Discontinuity; Guidelines to Our Changing Society*. Harper and Row New York

- Ducker, P. (1989). *The New Realities: In Government and Politics/in Economics and Business/in Society and World View*. Harpercollins.
- Eisenhardt, K.M. (1989). Building theories from case study research. *Academy of Management Review*, 14, 532-550.
- Eisenhardt, K.M. (1991). Better stories and better constructs: the case for rigor and comparative logic. *Academy of Management Review*, Vol. 18, 620-627.
- Eisenhardt, K.M. & Graebner, M.E. (2007). Theory building from cases: opportunities and challenges. *Academy of Management Journal*, 50, 25-32.
- Ensign, P.C. (2009). *Knowledge Sharing among Scientists: Why reputation Matters for R&D in Multinational Firms*. New York, NY: Palgrave Macmillan.
- Ensign, P.C. & Hebert, L. (2009). Competing explanations for knowledge exchange: technology sharing within the globally dispersed R&D of multinational enterprise. *Journal of High Technology Management Research*, 20, 75-85.
- Fagin, R., Halpern, J.Y., Moses, Y. & Vardi, M.Y. (2003). *Reasoning about knowledge*. MIT Press, Cambridge, MA.
- Feldman, M.P. (1999). The new economics of innovation, spillovers and agglomeration: a review of empirical studies. *Econ. Innov. New Techn.*, 1999, Vol. 8, 5-25.
- Fernandes, P. (2007). Biotechnology financing, not acquisitions, for filling the pharma pipeline - A sustaining strategy. *Expert Opinion on Drug Discovery*, Vol. 2, 917-921.
- Fleming, L. (2001). Recombinant Uncertainty in Technological Search. *Management Science*, 47, 117-132.
- Gerpott, T. (1995). Successful integration of R&D functions after acquisitions: an exploratory empirical study. *R&D Management*, 25, 161-178.
- Graebner, M.E. (2004). Momentum and Serendipity: How Acquired Leaders Create Value in the Integration of Technology Firms. *Strategic Management Journal*, 25, 751-777.
- Graebner, M.E. (2009). Caveat venditor: Trust asymmetries in acquisitions of entrepreneurial firms. *Academy of Management Journal*, 52, 435-472.
- Graebner, M.E., Eisenhardt, K.M. & Roundy, P.T. (2010). Success and failure in technology acquisitions: lessons for buyers and sellers. *Academy of Management Perspectives*, Vol. 24, 72-91.

Grant, R.M. (1996). Prospering in Dynamically-Competitive Environments: Organizational Capability as Knowledge Integration. *Organization Science*, Vol. 7, No. 4, pp. 375-387.

Greenberg, D. and Guinan, P.J. (2003). *Mergers and Acquisitions in Knowledge Enterprise*, Retrieved in August 2009 from: babsoninsight.com/contentmgr/showdetails.php/id/631.

Hagedoorn, J. & Duysters, G. (2000). The effect of mergers and acquisitions on the technological performance of companies in a high-tech environment. *ECIS Working Papers 00.04*, Eindhoven Centre for Innovation Studies, Eindhoven University of Technology.

Haspeslagh, P.C. & Jemison, D.B. (1991). *Managing acquisitions: creating value through corporate renewal*. Free Press, New York.

Hitt M.A., Hoskisson, R.E. & Ireland, R.D. (1990). Mergers and Acquisitions and Managerial Commitment to Innovation in M-Form Firms. *Strategic Management Journal*, Vol. 11, Special Issue: Corporate Entrepreneurship. pp. 29-47.

Hitt, M.A., Hoskisson, R.E., Ireland, R.D. & Harrison, J.S. (1991). Effects of acquisitions on R&D inputs and outputs. *Academy of Management Journal*, Vol. 34, 693-706.

Hitt, M.A., Hoskisson, R.E., Johnson, R.A. & Moesel, D.D. (1996). The market for corporate control and firm innovation. *Academy of Management Journal*, Vol. 39, 1084-1119.

Hofstede, G. (1980). *Culture's consequences: International differences in work-related values*. Newbury Park, CA: Sage.

HP News Release (2010). *HP to Acquire 3PAR*. Retrieved in September, from <http://www.hp.com/hpinfo/newsroom/press/2010/100902b.html>.

Jaffe, A. (2006). Regional localization of technological accumulation: application to the tri-state regions. *Annals of New York Academy of Sciences*, Vol. 787, 121-142.

James, A., Georghiou, L. & Metcalfe, J.S. (1998). Integrating technology into merger and acquisition decision making. *Technovation*, Vol. 18 (8-9), 563-573.

Jasimuddin, S.M. (2007). Exploring knowledge transfer mechanisms: The case of a UK-based group within a high-tech global corporation. *International Journal of Information Management*, Vol. 27, 294-3000.

Jemison, D.B. & Sitkin, S.B. (1986). Corporate Acquisitions: A process perspective. *Academy of Management Review*, 11, 145-163.

Jensen, M. (1988). Takeovers: Their Causes and Consequences. *Journal of Economic Perspectives*, Vol. 2, No. 1, pp. 21-48.

- Kane, A. A., Argote, L. & Levine, J. M. (2005). Knowledge transfer between groups via personnel rotation: Effects of social identity and knowledge quality. *Organizational Behavior and Human Decision Processes*, 96, 56-71.
- King, D.R., Dalton, D.R., Daily, C.M. & Covin, J.G. (2003). Meta-analyses of post-acquisition performance: indications of unidentified moderators. *Strategic Management Journal*, 25, 187-200.
- Kogut, B. & Zander, U. (1992). Knowledge of the firm, combinative capabilities, and the replication of technology. *Organization Science*, 3, 383-397.
- Kogut, B. & Zander, U. (1996). What Firms Do? Coordination, Identity, and Learning. *Organization Science*, Vol.7, 502-518.
- Kuznets, S. (1966). *Modern economic growth: rate, structure, and spread*. Yale University Press: New Haven, CT.
- Leifer, R. et al., (2000). *Radical Innovation: How Mature Companies Can Outsmart Upstarts*. Harvard Business School Press.
- Leten, B., Belderbos, R. & Van Looy, B. (2007). Technological Diversification, Coherence, and Performance of Firms. *Journal of Product Innovation Management*, 24: 567–579.
- Liebowtiz, J. & Wright, K. (1999). Does measuring knowledge make “cents”? Expert Systems with Applications, Vol. 17, Issues 2, pp. 99-103.
- Lubatkin, M.H. (1983). Mergers and the performance of the acquiring firm. *Academy of Management Review*, 1983, Vol. 8, 218-225.
- Lundvall, B.A., Johnson, B., Andersen, E.S. & Dalum, B. (2002). National systems of production, innovation and competence building. *Research Policy*, Vol. 31, 213-231.
- Machlup, F. (1980). *Knowledge and Knowledge Production*. Princeton University Press, Princeton.
- Makri, M., Hitt, M.A. & Lane, P.J. (2010). Complementary technologies, knowledge relatedness, and invention outcomes in high technology mergers and acquisitions. *Strategic Management Journal*, Vol. 31, 602–628.
- Man, A.P. & Duysters, G. (2005). Collaboration and innovation: a review of the effects of mergers, acquisitions and alliances on innovation. *Technovation*, Vol. 25, 1377-1387.
- Mandell, M. & Sauter, V.L. (1984). Approaches to the Study of Information Utilization in Public Agencies. *Science Communication*. Vol. 6. 2. pp. 145-164.

- Marks, M. (1982). Merging human resources: a review of current research. *Mergers and Acquisitions*, Vol. 17, 38-44.
- Mehrabian, E.W. (1971). *Silent messages*. Chandler, California, US.
- Mergestat (2000), mergerstat.com, in Rumyantseva, M., Gurgul, G. & Enkel, E. (2002), "Knowledge integration after Mergers & Acquisitions", Discussion paper.
- Miles, M. B. & Huberman, A. M. (1994). *Qualitative data analysis*. Thousand Oaks, 2nd edition, CA: Sage.
- Monge, P.R., Rothman, L.W, Eisenberg, E.M., Miller, K.I. & Kirste, K.K. (1985). Dynamics of organizational proximity. *Management Science*, Vol. 31, 1129-1141.
- Nelson, R. & Winter, S.G. (1982). *An evolutionary theory of economic change*. Harvard University Press, Cambridge, MA.
- Nonaka, I. (1991). The knowledge-creating company. *Harvard Business Review*, Vol. 69, November-December, pp. 96-104.
- Nonaka, I. (1994). A Dynamic Theory of Organizational Knowledge Creation. *Organization Science*, Vol. 5, No. 1, pp. 14-37.
- Nonaka, I. & Takeuchi, H. (2005). *The Knowledge-Creating Company*. Oxford University Press, New York.
- Nooteboom, B. (2000). Learning by interaction: absorptive capacity, cognitive distance and governance. *Journal of Management and Governance*, 4, 69-92.
- OECD (2000). *Science, Technology and Industry Outlook 2000: innovation Network*. Paris.
- Osterloh, M. & Frey, B.S. (2000). Motivation, Knowledge Transfer, and Organizational Forms. *Organization Science*, Vol. 11, No. 5, pp. 538-550.
- Patel, P. & Pavitt, K. (1997). The technological competencies of the world's largest firms: Complex and path-dependent, but not much variety. *Research Policy*, Vol. 26, pp. 141 – 156.
- Patton, M.Q. (2002). *Qualitative research and evaluation methods*, 3ed edition. Thousand Oaks, CA: Sage.
- Perez, C. & Soete, L. (1988). Catching up in technology: entry barriers and windows of opportunity. *Technical Change and Economic Theory*, Retrieved in September 2009 from <http://arno.unimaas.nl/show.cgi?uid=5550>.
- Polanyi, M. (1966). *Tacit dimension*. Doubleday & Co, New York.

- Porter, M. (1986). *Competitive Advantage: Creating and Sustaining Superior Performance*. Free Press, New York.
- Powell, W.W. & Koput, K.W. (1996). Interorganizational Collaboration and the Locus of Innovation: Networks of Learning in Biotechnology. *Administrative Science Quarterly*, 41, 116-145.
- Prabhu, J.C., Chandy, R.K. & Ellis, M.E. (2005). The Impact of Acquisitions on Innovation: Poison Pill, Placebo, or Tonic? *Journal of Marketing*, 114-130.
- Prahalad, C. & Hamel, G. (1990). The core competences of the corporation. *Havard Business Review*, May-June.
- Puranam, P., Singh, H. & Chaudhuri S. 2009). Integrating Acquired Capabilities: when structural Integration is (Un)necessary. *Organization Science*, Vol. 20, 313-328.
- Puranam, P., Singh, H. & Zollo, M. (2003). A bird in the hand or two in the bush? Integration trade-offs in technology-grafting acquisitions. *European Management Journal*, 21, 179-184.
- Puranam, P. & Srikanth, K. (2007). What they know vs. what they do: How acquirers leverage technology acquisitions. *Strategic Management Journal*, Vol. 28, 805-825.
- Quintana, C. & Benavides, C.A. (2010). *Accessing technological knowledge through R&D alliances: Consequences for radical and incremental innovation*. DRUID - Danish Research Unit for Industrial Dynamics, conference paper, retrieved on August, 2010 from <http://www2.druid.dk/conferences/viewpaper.php?id=501207&cf=43>.
- Quintas, P., Lefere, P. & Jones, G. (1997). Knowledge management: a strategic agenda. *Long Range Planning*, 30, 385-391.
- Rallet, A. & Torre, A. (1999). Is geographical proximity necessary in the innovation networks in the era of global economy? *GeoJournal*, Vol. 49, 373-380.
- Ranft, A. (2006). Knowledge preservation and transfer during post-acquisition integration, in Sydney Finkelstein and Cary Cooper (ed.) (*Advances in Mergers & Acquisitions, Volume 5*). Emerald Group Publishing Limited, 51-67.
- Ranft, A. & Lord, M.D. (2000). Acquiring new knowledge: the role of retaining human capital in acquisitions of high-tech firms. *Journal of High Technology Management Research*. Vol. 11: 295-319.
- Ranft, A. & Lord, M.D. (2002). Acquiring new technologies and capabilities: a grounded model for acquisition implementation. *Organization Science*, Vol. 13 (4), 420-441.

- Rich, R. (1997). Measuring Knowledge Utilization: Processes and Outcomes. *Knowledge and Policy: The International Journal of Knowledge Transfer and Utilization*, Vol. 10, 3, pp. 11-24.
- Schuler, R. & Jackons, S. (2001). HR issues and activities in Mergers and Acquisitions. *European Management Journal*, Vol. 19, 239-253.
- Schumpeter, J.R. (1942). *Capitalism, socialism, and democracy*. Harper & Brothers, New York, NY.
- Schweizer, L. (2005). Organizational integration of acquired biotechnology companies in pharmaceutical companies: The need for a hybrid approach. *Academy of Management Journal*, 48, 1051-1074.
- Scocco, D. (2006). Incremental vs. Radical Innovation. Innovationzen.com, available on www.innovationzen.com
- Shrivastava, P. (1986). Post-merger integration. *Journal of Business Strategy*, 7, 65-76.
- Singh, H. & Zollo, M. (1998). *The impact of knowledge codification, experience trajectories and integration strategies on the performance of corporate acquisitions*. Wharton Institutions Centre, The Wharton School.
- Spender, J.C. (1996). Making knowledge the basis of dynamic theory of the firm. *Strategic Management Journal*, 17, pp. 45-62.
- Stahl, G.K. & Voigt, A. (2008). Do Cultural Differences Matter in Mergers and Acquisitions? A Tentative Model and Examination. *Organization Science*, Vol. 19, 160-176.
- Stake, R. (1995). *The art of case study research*, Thousand Oaks, CA: Sage Publications.
- Tellis, W. (1997). Application of a Case Study Methodology. *The Qualitative Report*, Vol. 3 (2), 1-19.
- Tetenbaum, T.J. (1999). Beating the odds of Merger and Acquisition failure: seven key practices that improve the chance for expected integration and synergies. *Organizational Dynamics*, autumn.
- Torre, A. & Gilly, J.P. (2000). On the analytical dimension of proximity dynamics. *Regional Studies*, Vol. 34, 169-180.
- Tsai, W. (2001). Knowledge Transfer in Intraorganizational Networks: Effects of Network Position and Absorptive Capacity on Business Unit Innovation and Performance. *Academy of Management Journal*, Vol. 44, 5, pp. 996-1004.

- Tsai, Y.T. & Hsieh, L.F. (2006). An innovation knowledge game piloted by merger and acquisition of technological assets: a case study. *Journal of Engineering and Technology Management*, Vol. 23, (3) 248-261.
- Tushman, M.L. & Anderson, P. (1986). Technological Discontinuities and Organizational Environments. *Administrative Science Quarterly*, Vol. 31, No. 3, pp. 439-465.
- Varga, A. (2000). Local academic knowledge spillovers and the concentration of economic activity. *Journal of Regional Science*, (40) 345-367.
- Vermeulen, F. & Barkema, H. (2001). Learning through acquisitions. *Academy management Journal*, 44, 457-476.
- Winter, S.G. (1984). Schumpeterian competition in alternative technological regimes. *Journal of Economic Behavior & Organization*, Vol. 5, pp. 287-320.
- Winter, S.G. (1987). *Knowledge and competence as strategic assets: The Competitive Challenge*. Ballinger, Cambridge, MA.
- Yang, J. (2005). Knowledge integration and innovation: Securing new product advantage in high technology industry. *Journal of High Technology Management Research*, 16, 121-135.
- Yin, R. (1984). *Case study research: Design and methods*, 1st Edition. Beverly Hills, CA: Sage Publishing.
- Yin, R. (1994). *Case study research: Design and methods*, 2nd Edition. Beverly Hills, CA: Sage Publishing.
- Zander, U. & Kogut, B. (1995). Knowledge and the speed of the transfer and imitation of organizational capabilities. *Organization Science*, 6, (1) 76-92.
- Zollo, M. & Singh, H. (2004). Deliberate Learning in Corporate Acquisitions: Post-Acquisition Strategies and Integration Capability in U.S. Bank Mergers. *Strategic Management Journal*, Vol. 25, 1233-1256.

Appendix

Appendix 1: Definitions of knowledge

Author	Definition
Plato	Justified true belief.
Drucker, (1989, p. 242)	"Information that changes something or somebody — either by becoming grounds for actions, or by making an individual (or an institution) capable of different or more effective action."
Davenport and Prusak, (1998, p. 5)	"A fluid mix of framed experience, contextual information, values and expert insight that provides a framework for evaluating and incorporating new experiences and information."
Liebowitz and Wright, (1999, p. 99)	"Information with a process applied to it to give 'value-added.'"
Albino et al., (2001, p. 414)	"An abstract entity consciously or unconsciously created by an individual through an interpretation of information sets that have been acquired through experience and the consideration of that experience, thus providing its owner with a mental and/or physical skill within a given "art""
Nonaka and Takeuchi, (1995, p. 58)	"A dynamic human process of justifying personal belief towards the truth"

Appendix 2: Different approaches to knowledge dimensions

Author	Dimensions of knowledge
Unknown author, stems from the classical periods	A priori and a posteriori
Unknown author, stems from the classical periods	Analytic and synthetic
Polanyi (1966)	Tacit and explicit
Machlup (1980)	Practical, intellectual, small talk/pastime, spiritual and unwanted
Winter (1984)	Articulable and unarticulated
Winter (1987)	Tacit/articulable; observable/not observable in use; complex/simple, and dependent/independent of a system
Anderson (1989); Kogut and Zander (1992)	Procedural and declarative
Nonaka (1991, 1994); Spender (1996)	Tacit/explicit and individual/collective
Albino et al., (2001)	Intuitive, tacit, qualitative, quantitative and scientific