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Towards an Integrated Framework for the Knowledge Transfer Process

by

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ABSTRACT

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In the contemporary knowledge-based society, knowledge has become the most important strategic resource for an organisation's sustainable competitive advantage. Recent evidence suggests that knowledge management is an emerging discourse in which knowledge transfer has become a key concern in organisations, and thereby knowledge transfer is in the forefront of knowledge management research areas.

With this in mind, the research uses the case study style of qualitative research to investigate the current understanding of the theory and practice of knowledge transfer through assessing empirically the transmission mechanisms by which people transfer their knowledge at IBM Laboratory, identifying the factors that influence the choice of knowledge transfer mechanism, discovering the perceived role of knowledge storage and the knowledge administration within the knowledge transfer process, and exploring an integrated and comprehensive framework that might be implemented to promote successful knowledge transfer. The Lab has been chosen purposively to learn more about the issues central to knowledge transfer and to allow themes associated with the research questions to emerge, which are then interpreted to give a greater understanding of the issues, employing Miles and Huberman procedure of data analysis and presentation.

The outcomes of the study provide insights into the phenomena surrounding knowledge transfer, which based on case evidence leads to an interesting *decision tree* of media user for different transfer situations. The empirical evidence also suggests a *hybrid* approach in a sense that one approach, be it personalisation or codification, alone can not meet all the situations. Furthermore, an attempt is also made to develop a sound and robust *knowledge transfer framework*, integrating knowledge storage and the knowledge administration within the knowledge transfer process. The framework encompasses five components: the actors engaged in the process; the typology of the knowledge that is transferred; the mechanisms used; the repositories where knowledge is stored; and the knowledge administrator to manage and maintain knowledge. The model explains a systematic and holistic perspective on knowledge transfer implementation, viewing knowledge transfer as an interactive and dynamic process.

Use of the case study is reasonable and appropriate for this kind of exploratory research, and it is likely that given the topic and the research study this thesis yields some very interesting findings concerning knowledge transfer in a real-world setting.

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Abbreviations and Acronyms

ACL	Access Control List
BPR	Business Process Reengineering
CKO	Chief Knowledge Officer
CICS	Customer Information Control System
DfEE	Department of Education for Employment
DTI	Department of Trade and Industry
E-mail	Electronic Mail
F-2-F	Face-to-Face
IBM	International Business Machines
ICT	Information and Communication Technology
IM	Instant Messaging
IT	Information Technology
KIF	Knowledge Intensive Firm
KM	Knowledge Management
OM	Organisational Memory
TQM	Total Quality Management
UDDI	Universal Description Discovery & Integration

DEDICATION

I dedicate this work to the memory of my late mother (Amma), Kohinoor Dilara Aftab, who, from early childhood, taught me the importance of knowledge and education. All credit goes to her as she provided me with the foundations for all of my achievements.

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Chapter 1

Introduction to the Research

1.1 Setting the scene

Knowledge management is an emerging discourse with many issues yet to be discovered and resolved. Over recent years, management and information systems journals have been dedicated to the issues surrounding knowledge management. Although the terms data, information and knowledge can be used with a similar meaning, knowledge also differs from information and data. A fuller description of these definitions can be found in Section 2.3.2. In summary, the definition of organisational knowledge that is used throughout the thesis is of interpreted organisational information which is processed data (i.e., facts and events) that helps organisational members to take purposeful actions and make decisions so as to accomplish their assigned tasks, what Machlup (1980) calls practical knowledge.

Knowledge has become one of the most important strategic resources for an organisation's sustainable competitive advantage (Prahalad & Hamel, 1990; Starbuck, 1992; Kogut & Zander, 1992; Jasimuddin et al., 2005a). Knowledge management is thus termed because it deals with the management, including the transfer and storage, of organisational knowledge. The majority of the existing knowledge management literature tends to focus on issues such as knowledge typology (Polanyi, 1962; Nonaka, 1994; Spender, 1996; Blackler, 1995; Jasimuddin, 2005a), knowledge transfer (Albino et al., 1999; Argote & Ingram, 2000; Smith & McKeen, 2003a; Connell et al., 2003; Pan & Scarbrough, 1999; Huber, 2001), knowledge creation (Nonaka, 1994; Nonaka & Takeuchi, 1995; Nonaka & Kanno, 1998; Jenkins & Balogun, 2003), and knowledge storage and retrieval (Walsh & Ungson, 1991; Olivera, 2000; Stein & Zwass, 1995; Sherif, 2002; Jasimuddin et al, 2005b; Anand et al., 1998).

To support knowledge management initiatives, organisations need to acknowledge the role of knowledge transfer. As a result, the topic of knowledge transfer is becoming increasingly significant as a knowledge management research area. Numerous practical questions and challenges concerning knowledge transfer that still remain unanswered demand further research. The present study addresses some of the unresolved operational issues relating to knowledge transfer. The focus of the work is on the operational application of knowledge management, particularly management of the knowledge transfer process, in large organisations. In addition, it makes theoretical contributions in the sense that it extends the existing theory of the knowledge transfer by adding additional components to the knowledge transfer process model (see section 6.5.1).

1.2 Significance of the research

Before moving on to the operational issues of knowledge transfer, an essential starting point is to mention the motivation behind the research. Knowledge transfer is widely regarded as a strategic issue of knowledge management research (McAdam & McCreedy, 1999; Hendriks, 1999; Cohen & Levinthal, 1990; Albino et al., 1999; Argote & Ingram 2000). Hendriks (1999, p. 91), for instance, contends that knowledge transfer is identified as a major focus area for knowledge management. In a survey result, McAdam and McCreedy (1999) show that knowledge transfer is a key element of knowledge management. This is because, as several researchers, most notably Argote et al. (2000) and Argote et al. (1990), argue, an organisation that carries out the transfer of knowledge among its members is more productive and more likely to survive than an organisation that does not. Similarly, the value of knowledge increases when it is preserved and reused within the organisation (Douglas, 2002).

Realising the significance of knowledge transfer as an important research topic, Holtshouse (1998a, p. 277) suggests that research on how knowledge can be transferred between knowledge contributors and users is one of the three priority areas for further research while the two other research areas are how tacit knowledge is utilised and how knowledge assets can be made visible.

Although increases in performance are evident through the transfer of knowledge within an organisation, several studies (e.g., Argote, 1999; Argote et al., 2000; Szulanski, 2000) acknowledge that knowledge transfer is still a major challenge. Szulanski (2000, p. 23), for example, points out that "intra-firm transfer of knowledge is often laborious, time-consuming, and difficult". In parallel with this, Smith and McKeen (2003b, p. 5) note that "knowledge transfer theory is still in its most rudimentary stages". Against this backdrop, the researcher has been prompted to focus on issues surrounding knowledge transfer.

Researchers within the knowledge management field have already shown considerable interest in various issues with regard to knowledge transfer, including factors that facilitate and inhibit knowledge transfer (Szulanski, 1996; McDermott & O'Dell, 2001; Smith & McKeen, 2003a; Argote & Ingram, 2000; Hendriks, 1999; Kalling, 2003; van den Hoff & van Weenen, 2004), knowledge transfer for innovation (Hogberj & Edvinsson, 1998; Gilbert & Cordey-Hayes, 1996; Hall, 2001), and the knowledge transfer process (Szulanski, 1996; Huber, 1991; Pan & Scarbrough, 1999).

However, the majority of the literature on knowledge transfer has ignored the factors that impact on the selection for knowledge transfer mechanism along with the integration of two other constructs of knowledge management, namely knowledge storage and the knowledge administration, which have profound influence on the effectiveness of knowledge transfer. Several researchers (e.g., Gray & Chan, 2000; Argote & Ingram, 2000; Douglas, 2002; Connelly & Kelloway, 2001; Kalling, 2003), have provided some isolated descriptions of the significance of having an interaction between knowledge transfer and knowledge storage and also the presence of the functional role of knowledge administrator to carry out knowledge transfer initiatives.

The two issues have been addressed independently of one another in the knowledge management literature. However, the knowledge transfer literature has largely ignored the importance of knowledge storage and the knowledge administration within an integrated framework of knowledge transfer. There is a need for further empirical work that highlights the linkage of knowledge storage and the knowledge administration together within an integrated framework for effective knowledge transfer.

The present research intends to address that gap and thereby draws on and contributes to a growing body of knowledge management by examining knowledge transfer mechanisms, and by describing the knowledge transfer framework that exists in International Business Machines (IBM), the world's largest computer company and prescribing a knowledge transfer framework that integrates knowledge storage and knowledge administration, using data from IBM.

1.3 Aim and objectives of the research

The aim of the present study is to investigate and advance current understanding of the theory and practice of knowledge transfer within knowledge management. To achieve the aim of the research, the following objectives have been defined:

- to review knowledge transfer and other related constructs within the knowledge management literature;
- to empirically assess the transmission mechanisms by which organisational members carry out the transfer of their knowledge and to explore factors that influence the choice of knowledge transfer mechanism;
- to discover the role of knowledge storage and knowledge administration within knowledge transfer processes as perceived by organisation members;
- to develop an integrated and holistic framework of knowledge transfer processes that might promote successful knowledge transfer in an organisation; and
- to identify issues and areas for further research.

1.4 Navigation of the research topic to formulate research questions

Before setting out the research questions, it is pertinent to describe how the researcher navigates and subsequently narrows down the research topic. Especially for a research student, it is more difficult to pursue because he or she is not always aware of what the

essential issues and the research question(s) are without having navigated and reviewed the relevant literature. A useful discussion of key issues concerning literature review is provided by Weber (2003, p. iii), who says:

> "like many graduate students, I had great difficulty finding a topic for my thesis. Unfortunately, I did not attend to the lesson I should have been learning via this experience about the importance of and difficulties associated with choosing a "good" research problem....Today I believe that the choice of research problem – choosing the phenomena we wish to explain or predict – is the most important decision we make as a researcher."

This section demonstrates how a research topic is narrowed down to a workable size. By drawing a navigation map, the researcher is pointed towards research questions (Jasimuddin et al., 2005c). Figure 1.1 illustrates the navigation map of the present research, revealing the core themes and issues in knowledge management, and helping to set out the research questions. The map demonstrates that the majority of the relevant literature tends to focus on four key issues that appear to be involved in knowledge management: knowledge typology, knowledge transfer, knowledge creation, and knowledge storage. The narrowing down process with regard to knowledge transfer is elaborated below.

The extant literature reveals that the knowledge transfer process can be explained in terms of an operational level of analysis ((Albino et al., 1999; Bender & Fish, 2000; Kalling, 2003), a conceptual level of analysis (Albino et al., 1999; Gilbert & Cordey-Hayes, 1996; Huber, 1991; Steensma 1996), or a combination of the two (Albino et al., 1999). Based on an operational perspective, "knowledge transfer is a communication process with information processing activities, where the actors involved can carry out the transfer of knowledge using an appropriate mechanism" (Albino et al., 1999). On the other hand, the conceptual viewpoint focuses on knowledge transfer that is closely related to the notion of the learning organisation (Gilbert & Cordey-Hayes, 1996; Huber, 1991; Steensma, 1996). In this regard, Albino et al. (1999, p. 54) put it as follows:

> "The knowledge transfer process encompasses two dimensions... the knowledge transfer process can be conceptualised as the combination of two components: the "information system" and the "interpretative system", related to an operational level and a conceptual level of analysis, respectively."

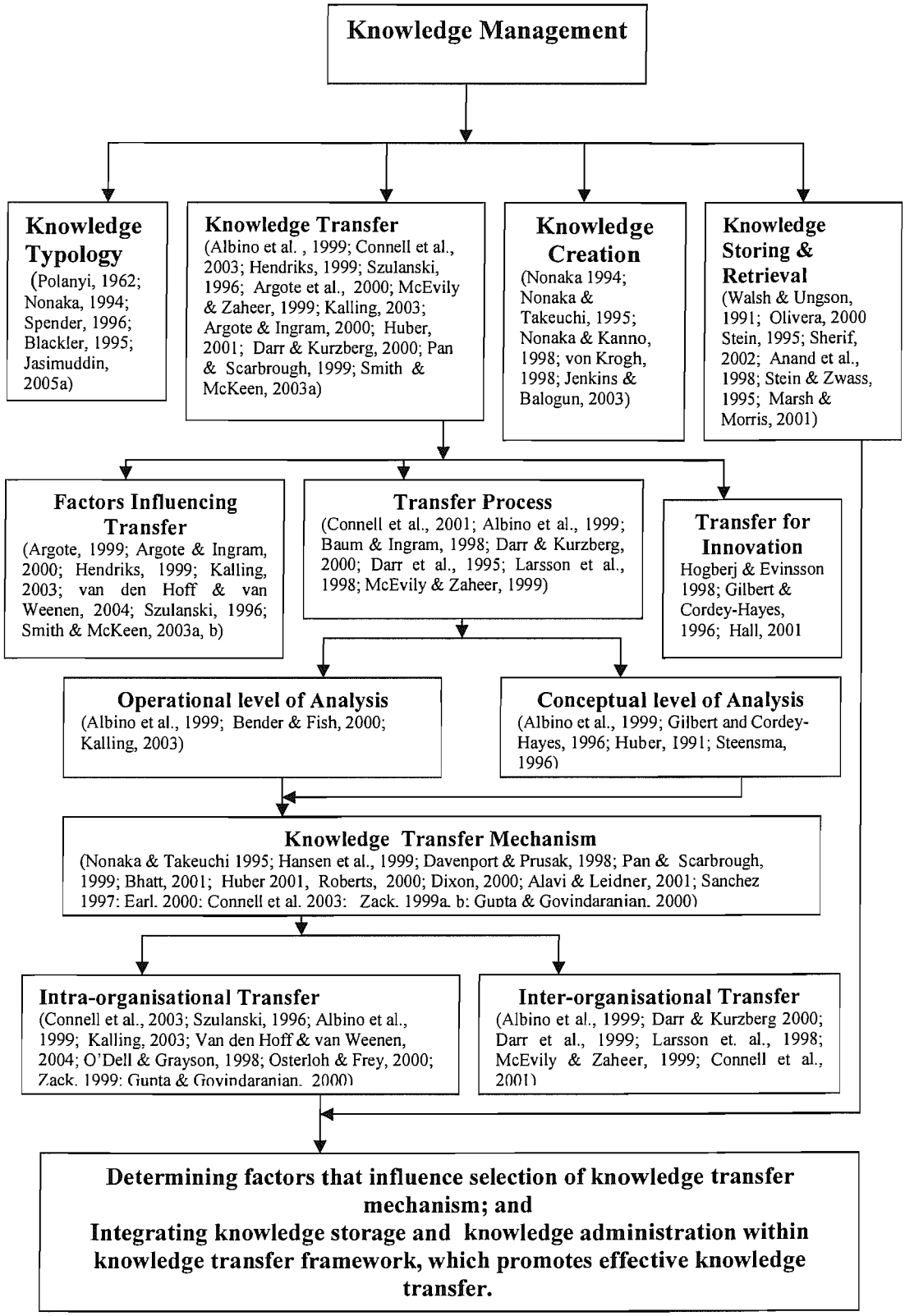


Figure 1.1 Navigation map of knowledge management research

The research topic can be narrowed down by looking at only one of the perspectives. The scope of the present study is limited to the operational level of analysis. Focusing on knowledge transfer at the operational level, knowledge transfer can be accomplished within an organisation, i.e. intra-organisational (Szulanski, 1996; Kalling, 2003; van den Hoff & van Weenen, 2004; O'Dell & Grayson, 1998; Osterloh & Frey, 2000), or between different organisations, i.e. inter-organisational (Albino et al., 1999; Darr & Kurzberg, 2000; Larsson et al., 1998; McEvily & Zaheer, 1999; Connell et al., 2001). Possible research may concentrate on intra-organisational knowledge, inter-organisational knowledge, or a combination of both. The researcher has confined the researchable topic to knowledge transfer within an organisation.

The selection of a convenient mechanism for effective knowledge transfer constitutes an important area of research. Buchel and Raub (2001, p. 518) identify two reasons for the increased attention to knowledge transfer mechanisms within organisations: "(i) managers spend more than 70 per cent of their time managing information by using a wide variety of mechanisms and (ii) with the introduction of computer-assisted tools, the effective and efficient use of an appropriate mechanism has become an ever more difficult task". When it comes to mechanisms for knowledge transfer, "appropriateness" refers to the extent to which a mechanism is useful and convenient to carry out the transfer of knowledge. For example, technology-focused mechanism is not appropriate to transfer tacit knowledge whereas people-focused mechanism is likely to be suitable when the actors of the transfer process are not geographically dispersed (see Chapter 4).

In spite of knowledge transfer being in the forefront of knowledge management research areas (Hendriks, 1999) and significant research into knowledge transfer (Albino et al., 1999; Hansen et al., 1999; Kalling, 2003), the existing research has the limited exploration of the issues relating to selection of knowledge transfer mechanisms which encourages the present study. There have been a few studies where researchers have stressed the importance of knowledge transfer mechanisms (Nonaka & Takeuchi, 1995; Davenport & Prusak, 1998; Argote, 1999; Roberts, 2000; Dixon 2000). Some scholars, most notably Hansen et al. (1999), Scarbrough et al. (1999), Bhatt (2001), Huber (2001), Alavi and Leidner (2001), Sanchez (1997), Earl (2000), Connell et al. (2003), Zack (1999a, b), and Gupta and Govindaranjan (2000), have addressed the approaches to

knowledge transfer and the mechanisms used to carry out the transfer of organisational knowledge.

To date it seems that the mechanisms that are used for knowledge transfer can be classified into two dominant groups: people-focused mechanisms and technology-mediated mechanisms – what Hansen et al. (1999) call the personalisation approach and the codification approach respectively. For example, Gupta and Govindaranjan (2000, p. 79) argue that "the transfer of knowledge occurs through transmission mechanisms such as the exchange of documents, conversations between the parties concerned, and the movement of experts". It is argued that the knowledge transfer seems to be accomplished well when an appropriate mechanism of knowledge transfer is selected.

Using the navigation map, it is found that the given literature fails to address the rationale underlying the selection of a particular mechanism, and there is a research gap in understanding the factors that influence the determination of an appropriate transmission mechanism of knowledge. Against this backdrop, the identification of factors that influence the choice of an appropriate mechanism for successful knowledge transfer warrants further research. Accordingly, the present study addresses the factors that help in deciding the selection of a suitable mechanism for knowledge transfer by looking at the perception of organisation members. Reflecting this view, the *first research question* is set out:

> ***What are the perceived determinants of selection for knowledge transfer mechanism within an organisation?***

Again, organisational knowledge that is transferred within an organisation using an appropriate medium without storing it properly has limited value. The value of knowledge increases when it is preserved and reused within the organisation. Douglas (2002, p. 74) comments "knowledge that is in the head of a person has limited value, while the value of knowledge can increase exponentially when it is networked, stored, and reused, and quickly integrated into business practices and processes". The web-based technology allows for easy storage of transferred knowledge. It is argued that knowledge transfer processes seem to be efficient when knowledge is transferred and again stored to be easily retrieved for future re-use in complementary ways (Gray & Chan, 2000).

Despite the fact that there are literatures relating to both knowledge transfer and knowledge storage in an organisation, it is noticed that the interplay between knowledge transfer and knowledge storage has been ignored in the existing literature. However, a few researchers (e.g., Gray & Chan, 2000; Argote & Ingram, 2000; Douglas, 2002; Connelly & Kelloway, 2001; Kalling, 2003) have touched on the issue merely noting the significance of the integration of knowledge transfer and knowledge storage.

Similarly, although most of the literature seems consciously or unconsciously to have failed to link the knowledge administration role to the knowledge transfer process, few scholars (e.g., Raub & von Wittich, 2004; Awazu & Desouza, 2004; Davenport & Prusak, 1998; Abell & Oxbrow, 1999; Bontis, 2002; Szulanski & Cappetta, 2003; Mckeen et al., 2002) have slightly touched on the issue noting the role of the knowledge administration. Using insights from the existing literature, an individual who is supposed to administer organisational knowledge is an important component for successful knowledge transfer. The knowledge administrator or equivalent seems to ensure the availability of timely, accurate and relevant knowledge to users (see Chapter 4). von Krogh et al. (1997) introduce the knowledge enabler, whom they call a knowledge activist, who acts in three roles: "as a catalyst of knowledge creation, as a connector of knowledge creation initiatives and as a merchant of foresight".

Having discussed the significance of the interplay of knowledge storage and knowledge administration to carry out the transfer of knowledge, the importance of integrating these components within a comprehensive knowledge transfer framework is understandable which indicates a need for further exploration of the integration of knowledge storage and knowledge administration within knowledge transfer processes. The absence of such a framework for understanding the effective transfer of knowledge on a broad basis has become an increasingly key problem for academics and practitioners. When it comes to knowledge transfer, "effectiveness" refers to whether the intended user of the knowledge receives what the contributor of knowledge has sent. Since the integrated framework for knowledge transfer incorporating knowledge storage and knowledge administration is largely unexplored, the present study also addresses the role of knowledge storage and the knowledge administration within knowledge transfer processes by looking at the perception of the organisation members. Reflecting this view, the *second research question* is formulated:

How can existing knowledge transfer frameworks be extended to incorporate the knowledge repository and knowledge administration functions, that may help carry out the effective transfer of knowledge?

By addressing the two research questions, this study intends to facilitate a better understanding of the operational issues involved in knowledge transfer.

1.5 Thesis layout

This doctoral thesis consists of six chapters including this introductory chapter. They are organised as follows.

This introductory chapter has set the scene for the thesis by acknowledging that knowledge management has been classified into four broad areas, of which knowledge transfer as a topic of research has received considerable attention. The importance of knowledge transfer as a topic of the present research has been elaborated in order to explain the motivation behind the selection of the research topic, along with defining the aim and objectives of the study. The chapter includes a navigation map, which helps to appreciate the vast literature on knowledge management and to subsequently narrow down the knowledge transfer literature so as to define the research objectives and eventually set the scope of the research questions.

Chapter 2 provides a thorough review of the extant literature on knowledge management to establish a theoretical basis for this research. The broader categories of the topics that are covered in this chapter include: an overview of knowledge management, organisational knowledge, knowledge transfer, knowledge storage and the knowledge administration. However, it is to be noted that knowledge transfer itself is the centre of all the themes and issues of knowledge management reviewed, and it will be found throughout subsequent chapters.

Chapter 3 outlines the research methodology adopted in this research. The present research has been an exploratory study focusing on several facets of knowledge transfer in an organisational setting. This chapter introduces the research paradigm, the motive

behind the choice of the case study approach of qualitative research, the methods of data collection, and the rationale underlying the employment of the data analysis procedures described by Miles and Huberman (1984). The chapter also explains the rationale behind the selection of the research site, i.e. IBM UK, from which empirical data are drawn.

The empirical findings of the study are the focus of Chapter 4. The chapter starts with an overview of the organisation under study and its knowledge transfer activities. The knowledge transfer mechanisms used at IBM are addressed, before giving an account of the determinants of the choice of knowledge transfer media. The subsequent section outlines the importance of knowledge storage for effective knowledge transfer along with the problems associated with the knowledge repository. The chapter ends by highlighting the role of the knowledge administrator or equivalent in carrying out knowledge transfer and maintaining a knowledge repository.

Chapter 5 discusses the results of the empirical findings. The chapter focuses on the appropriate approach to knowledge transfer and the determinants that guide the selection of knowledge transfer mechanism. A decision tree is drawn to help identify the most convenient mechanism that may promise successful transfer of knowledge. The rationale underlying the integration of knowledge storage within the knowledge transfer process and the existence of the knowledge administrator equivalent receive special attention. An integrated framework of knowledge transfer is proposed incorporating additional components, such as knowledge storage and knowledge administration, through a rigorous analysis of field data collected from the organisational setting. Finally, the chapter reflects upon a number of principles prescribed by Klein and Myers (1999) which shed some light on the validation, generalisation and evaluation of the research findings.

Chapter 6 presents a summary of the research activities and findings. It also draws conclusions and outlines the theoretical, methodological and practical contributions of the research. The chapter ends with an account of the potential limitations of the study and provides insights for further research.

Chapter 2

Literature Review

2.1 Introduction

This chapter surveys the existing literature in management and information systems studies and presents an overview of knowledge management, particularly organisational knowledge, knowledge transfer, knowledge storage, and knowledge administration. This review aims to identify and analyse the core themes and issues surrounding knowledge management in general and more specifically knowledge transfer. The chapter is more focused on the selection of knowledge transfer mechanism along with the role of knowledge storage and knowledge administration for successful knowledge transfer. These issues will also be pulled together at the end so as to identify research gaps that still exist, and help shape the research questions.

In the emerging knowledge-based society, knowledge management has become a key concern in organisations. Section 2.2 starts with a discussion about what constitutes knowledge management. The view is adopted that organisational knowledge is regarded as the critical source of sustainable competitive advantage. The subsequent section (2.3) discusses theories and typologies of knowledge and provides an alternative typology. Knowledge transfer is a strategic topic of knowledge management research because it seems to enhance the transmission of knowledge among organisation members for present and future use. With this in mind, section 2.4 reviews the literature relating to knowledge transfer, which defines the research gaps that guide the present study. The notion of knowledge storage (also termed organisational memory) is outlined in section 2.5. The knowledge administrator or equivalent is becoming an important component of knowledge management to help find the source of knowledge, maintain knowledge repositories, and encourage others to engage in knowledge transfer activities. In line with this, section 2.6 reviews the literature regarding the knowledge administration.

Having reviewed the extant literature, the ways in which the research gaps identified and the research questions formulated have been highlighted in section 2.7.

2.2 Knowledge management

It was Karl Wiig who coined the 'Knowledge Management' concept in 1986 at a conference for the International Labour Organization held in Switzerland (cited in Beckman 1999, p. 2). In the newly emerging knowledge society, organisational knowledge is being increasingly recognised as a critical strategic resource. As a result, knowledge management is becoming a fully fledged field. This section presents an overview of the recent and rapidly growing literature on knowledge management (herein KM).

KM has received increased attention over the last decade or so among academics and practitioners from across a broad range of subjects. Raub and Ruling (2001) observe that KM discourse draws on multiple disciplines, most specifically information systems, organisation theory, human resources management, and strategic management. Table 2.1 illustrates evidence that the KM field stems from more than one discipline.

Table 2.1 Origin of Knowledge Management field

Discipline	Focuses on	Sources
Information systems	KM systems that support the identification and distribution of knowledge in organisations.	Alavi & Leidner, 1999; Blumentritt & Johnston, 1999; Swan et al., 2000; Hendriks, 2001; Hislop, 2002; Boland & Tenkasi, 1995
Organisation theory	KM for the creation, transfer and use of knowledge in organisations.	Nonaka & Takeuchi, 1995; Davenport & Prusak, 1998; Probst et al., 2000; Swan & Scarbrough, 2001
Strategic management	Knowledge as an organisational resource of strategic significance.	Barney, 1991; Prahalad & Hamel, 1990; Spender, 1996; Grant, 1996
Human resources management	Knowledge workers for organisational value creation.	Drucker, 1988; Soliman & Spooner, 2000; Scarbrough, 1999

Like many other management techniques (viz., Total Quality Management, Quality Circles, Business Process Re-engineering), KM is sometimes discussed as a fashionable concept or fad. Several researchers, most notably Swan et al. (1999), Raub and Ruling (2001), and Scarbrough and Swan (2001), address this debate by referring to a number of insights derived from the management fashion literature (e.g., Abrahamson, 1996). Five indicators that support the notion of KM as a fashion are identified: (i) since the 1990s there has been a growing popularity in terms of number of articles and books regarding KM; (ii) conferences and workshops focusing on KM have been organised very frequently; (iii) the growing number of KM gurus and consultants has become apparent; (iv) phenomenally widespread usage of KM as a task of major consulting firms is apparent; and (v) the increasing importance of the label 'KM' for the sales promotion purpose is found.

However, just because such an area seems to have the features of fashion does not mean that it is nothing more than a fad. There are researchers (e.g., Wiig, 1997; Ruggles, 1998; Buckley & Carter, 2000; Davenport & Grover, 2001) who have argued that KM is more than just a new fad. Wiig (1997), for example, notes that KM is far from being a narrow management initiative, or 'fad', such as TQM, BPR, etc. This corresponds well with Hull's (2000) comments who put it:

> "The phenomenon is 'not merely some passing fad, but is in the process of establishing itself as a new aspect of management and organisation and as a new form of expertise." (p. 49)

It is evident that a lot of scholars are working on the KM topic because it is important. Although formal research in this area has been seen in mainstream Information Systems journals, over the past two decades 17 peer-reviewed research journals have surfaced to address major aspects of KM as a primary focus. Burden's (2000) KM bibliography, which encompasses both research and industry publications, reports that over 900 books and 8000 articles are devoted to the KM field (as cited in Schwartz, 2005). In the emerging knowledge based society, every organisation starts viewing itself as knowledge-intensive and adopts knowledge management approaches in every business unit and action. Hence it is to be argued that KM is not just a fad. Davenport and Grover

(2001) argue that while KM is developed first in industries that are basically selling knowledge-professional services, and research and development functions- it is quickly moving into other industries, including manufacturing, financial services, even government and military organisations. That's why Davenport and Grover (2001) claim "it is becoming increasingly clear that Knowledge Management is here to stay" (p. 3).

2.2.1 Definitions and importance of knowledge management

Several researchers, most notably Wiig (1997), Snowden (1998), Hibbard (1997), DeJarnett (1996), and Newman and Conrad (2000), have produced definitions of KM. Wiig (1997), for example, views KM as the systematic creation and use of knowledge to maximise knowledge-related effectiveness of an organisation.

Although various definitions of KM have been mentioned by researchers, there is no consensus. According to DeJarnett (1996), KM is the process of creating, interpreting, transmitting, using, preserving and refining knowledge. In parallel with this, Hibbard (1997) defines KM as the capture of an organisation's collective expertise wherever it resides – in people's heads, or in databases, on paper– and distribution of the expertise wherever it can produce the biggest returns. However, Snowden (1998, p. 63) gives a broader definition of KM, saying:

> "knowledge management can be defined as the identification, optimisation, and active management of intellectual assets, either in the form of explicit knowledge held in artefacts or as tacit knowledge possessed by individuals or communities."

In similar lines, Newman and Conrad (2000, p. 11) say:

> "knowledge management is a discipline that seeks to improve the performance of individuals and organisations by maintaining and leveraging the present and future value of knowledge assets. Knowledge management systems encompass both human and automated activities and their associated artefacts."

Others see KM as critical to organisational survival (Despres & Hiltrop, 1995; Neef, 1999; Beckman, 1999). The benefits as derived from KM initiatives are many. In this

connection, Petrash (1996) maintains that KM ensures the availability of *"right knowledge to the right people at the right time"* so that the best decisions and right actions can be taken at the right time. Sutton (2001, p. 80) also contends that management of knowledge seems to have two core objectives:

(i) To improve the exploitation of the knowledge resources of an enterprise;

(ii) To protect the knowledge resources of an enterprise.

Quintas et al. (1997) argue along similar lines, stating that KM is the continuous process of managing knowledge to meet existing and emerging needs, and to identify and exploit existing and acquired knowledge assets. Furthermore, KPMG (1999) describes KM goals and provides a list of benefits derived from applying KM, including the generation of new ideas and the exploitation of the organisation's thinking power, supporting innovation, capturing insight and experience to make them available when, where and by whom required, and fostering collaboration and knowledge sharing. Reflecting this view, the term "Knowledge Management" is used to refer to the effective and efficient exploration and utilisation of organisational knowledge so as to enhance an organisation's sustainable competitive advantage.

2.2.2 Approaches to knowledge management

To date it seems that two major perspectives on KM have emerged: the technical view of KM and the social view of KM. The technical view of KM has been labelled variously as the cognitive perspective (Swan et al., 1999), the engineering perspective (Markus, 2000), or the KM as technology camp (Alvesson & Kurreman, 2001). Similarly, the alternative perspective, that is, the social view of KM, is also labelled differently as the community perspective (Swan et al., 1999), the cultivation perspective (Markus, 2000), or the KM as people camp (Alvesson & Kurreman, 2001). The basic assumptions of these perspectives are shown in Table 2.2.

Table 2.2 Alternative approaches to Knowledge Management

	Approaches	
	Technical	**Social**
Paradigm	Knowledge is objectifiable - abstracted from context.	Knowledge is socially constructed-situated in the societies.
Function	The main function of KM is to make tacit knowledge explicit, and transfer and reuse it across different locations.	The primary function of KM is to transfer and apply tacit knowledge through social networking and create new knowledge
Social Ties	The development of social ties is less important to transfer explicit knowledge.	The development of strong social ties is crucial to transfer tacit knowledge.
Technology	Technology is crucial to capture and transfer knowledge.	Technology is not crucial to transfer knowledge between individuals.
Strategy	The codification strategy is important for the transfer of knowledge.	The personalisation strategy is important for transfer of knowledge.

(Compiled from several sources: Swan et al., 1999; Alvesson & Kurreman, 2001; Markus, 2000; Swan & Scarbrough, 2001; Sorensen & Snis, 2001)

2.3 Organisational knowledge

As mentioned in section 2.2.1, there is a growing awareness of the way organisations manage knowledge. Organisational knowledge is at the centre of KM discourse. Although the study of the notion of knowledge itself is not new, in recent times knowledge has been considered the most critical resource of an organisation in the emerging knowledge-based society (Drucker, 1993; Bell, 1973; Toffler, 1990; Grant, 1996). This section addresses debates and perspectives on organisational knowledge and its related activities, including its importance, and its typologies within the existing theories of knowledge postulated by organisational theorists, along with an attempt to provide an alternative typology of knowledge.

2.3.1 The role of knowledge in the organisational context

The role played by knowledge in an organisation has been receiving a growing recognition in the management literature (e.g., Toffler, 1990; Drucker, 1992; Brown &

Duguid, 1998; Nonaka & Takeuchi, 1995; Choo, 1996; Binney, 2001; Jasimuddin et al., 2005a). Many scholars, most notably Kogut and Zander (1992), Prahalad and Hamel (1990), Starbuck (1992), and Drucker (1993), argue that in "post-industrial" society, the knowledge within an organisation is the main source of its competitive advantage. Drucker (1992, p. 95), for example, asserts that:

> "In this society, knowledge is the primary resource for individuals and for the economy overall. Land, labour, and capital – the economist's traditional factors of production – do not disappear, but they become secondary."

In parallel with this, Nonaka (1994), for example, suggests that knowledge is the single most important production factor in terms of an organisation's capacity to survive and subsequently the means of gaining and sustaining its competitive advantage. This has also been underscored by Quinn (1992, p. 241) who puts it:

> "with rare exceptions, the economic and producing power of the firm lies more in its intellectual and service capabilities than its hard assets – land, plant and equipment....virtually all public and private enterprises – including most successful corporations – are becoming dominantly repositories and coordinators of intellect."

This view is an extension of that of Toffler (1990), who recognises the fact that in knowledge-based society, knowledge is the source of the highest quality power. Likewise, Hamel and Prahalad (1991) maintain that an organisation's value stems from knowledge and competencies which are embedded in people. This has coincided with the development of the 'knowledge-based theory of the firm' as postulated by Grant (1997), who argues that the transition from an industrial society to a knowledge-based society has led to an increasing focus on knowledge as the most important resource for organisations. Reflecting this view, DfEE (2000, p. 4) assert:

> "Knowledge is crucial because at the cutting edge of innovation in the new economy are knowledge producers: universities and businesses whose fundamental products are the ideas and research which provide the engine for change in goods and services."

In this connection, Choo (1996) identifies three reasons underlying the utilisation of an organisation's knowledge: (i) to make strategic decisions; (ii) to make sense of changes in its external environment; and (iii) to create new knowledge. However, while there is much more attention among academics and practitioners to comprehending the role of knowledge in organisations, there are still many unresolved issues regarding our understanding of data, information and knowledge. The following part of the section sets out to explain the issue.

2.3.2 The meanings of data, information, and knowledge

A number of researchers (e.g., Frappallo, 1997; Perlby, 1998) argue that the terms data, information and knowledge have a very similar meaning. Others (e.g., Wiig, 1993; Nonaka, 1994; Court, 1997; Davenport & Prusak, 1998; Blumentritt & Johnston, 1999; Buckley & Cater, 2000) contend that knowledge differs from information and data. Buckley and Cater (2000, pp. 57-58), for instance, put it:

> "Information is 'interpreted data', with meaning not possessed by simple data, and knowledge is 'structured information'....which does not characterise the simpler 'information'."

In their classic book *Working Knowledge*, Davenport and Prusak (1998) provide a comprehensive discussion of the distinctions between data, information and knowledge, suggesting that data are simply facts, which then become information by the addition of meaning, while knowledge originates in peoples' heads, drawing on information which is transformed and enriched by personal experience. It is helpful to view data, information, and knowledge as separate constructs. Although the terms data, information and knowledge can be used with a similar meaning, knowledge also differs from information and data. But they are also linked sequentially. For example, the list of stock prices is data; information is the meaningful data that is extracted for the prices of various stocks; and finally knowledge is the processed information that helps one to make decisions regarding stock investments, considering stock price, company profile, industry information, portfolio risk, availability of funds, etc. These three constructs can

be viewed as a hierarchy of increasing meanings, depth and relevance to action as depicted in Figure 2.1.

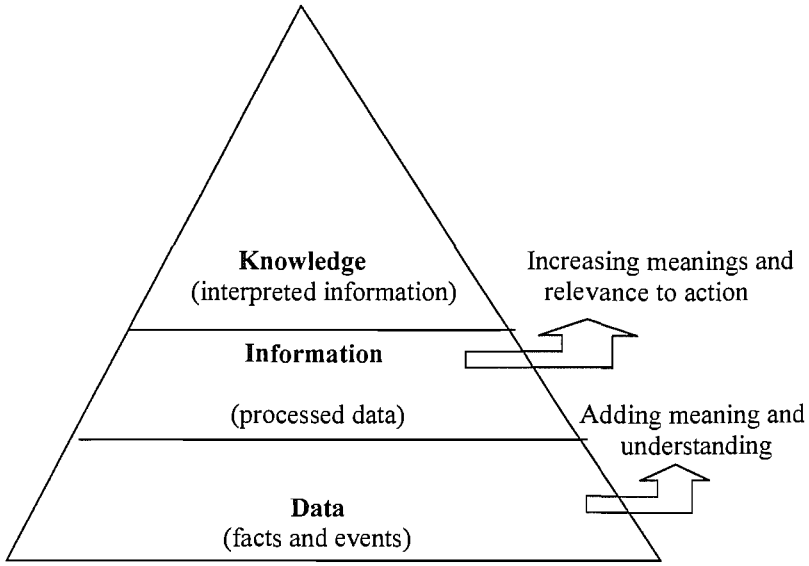


Figure 2.1 Data – Information – Knowledge Hierarchy

Nonaka (1994) points out that the history of philosophy can be regarded as a never-ending search for the meaning of knowledge. Although philosophers like Plato defined knowledge as "justified true belief", Blackler (1995, p. 1032) argues that knowledge is multi-faceted and complex and therefore is very difficult to define. Empson (2001a) provides several dimensions for two broad alternative perspectives on knowledge in organisations as shown in Table 2.3.

Several researchers (e.g., Machlup, 1980; Alavi & Leidner, 1999; Blackler, 1995; Spender, 1996; Connell et al., 2003) acknowledge knowledge as a catalyst for purposeful action and decisions. Machlup (1980), for instance, argues that the kind of knowledge that is important for business is practical knowledge. Parallel to this, Alavi and Leidner (1999, p. 5) state that "knowledge is a justified personal belief that increases an individual's capacity to take effective action". For the purpose of this thesis, practical or actionable knowledge has been focused upon.

Table 2.3 Alternative perspectives on knowledge in organisations

	Knowledge as an asset	Knowing as a process
Purpose of research	Normative To identify valuable knowledge and to develop effective mechanisms for managing that knowledge within organisations	Descriptive To understand how knowledge is created, articulated, disseminated, and legitimated within organisations
Disciplinary foundations	Economics	Sociology
Underlying Paradigm	Functionalist	Interpretive
Epistemological assumption	Knowledge as an objectively definable commodity	Knowledge as a social construct
Models of knowledge	Exchanges of knowledge among individuals are governed by an implicit market within organisations	Knowledge is disseminated and legitimated within organisations through an ongoing process of interaction among individuals
Main levels of analysis	Organisation and its knowledge base	Individual in social context

Source: Empson (2001a, p. 813)

2.3.3 An overview of the theories of organisational knowledge

It is easier to conceptualise and utilise knowledge if different types of knowledge and how they relate to one another can be recognised and understood. The literature includes a number of distinctions between different forms of knowledge. For example, Polanyi (1962), Nonaka and Takeuchi (1995), Spender (1996), and Blackler (1996) have proposed theories of knowledge that have been widely cited in other relevant literature on organisation and knowledge management. Their theories are based on various dimensions, notably tacitness, organisational levels, and location, and are detailed in the following section.

2.3.3.1 Polanyi's theory of knowledge

Polanyi (1962; 1966) defines knowledge as an activity which is better described as a process of knowing, arguing that all knowledge is either tacit or rooted in tacit knowledge. Polanyi suggests that the knowledge that can be expressed is only a small part of the whole body of knowledge. Tacit knowledge, as first described by him, is constructed from people's experience in the world and forms the basis for explicit knowledge. Viewing tacit knowledge as 'in-dwelling', Polanyi (1966, p. 4) states, "We know more than we can tell". According to him, tacit knowledge is embedded in the human brain and is not easy to articulate and transfer. In this context, he cites the example of the skater who can skate beautifully but cannot explain how he manages to skate the way he does. On the other hand, explicit knowledge can be easily codified and thereby is easier to understand, store and transfer.

Much of the recent literature about knowledge is built on the classical work of Polanyi (1962), which also draws on Plato's original definition of knowledge as 'justified true belief'. Emphasising knowledge as an activity, Polanyi describes it as both static 'knowledge' and dynamic 'knowing'. Polanyi's distinction between explicit and tacit knowledge has become extremely influential on the work of Nonaka (1994) and Spender (1996).

2.3.3.2 Nonaka and Takeuchi's theory of knowledge

Acknowledging Polanyi (1966) as his source for making a difference between explicit and tacit knowledge, Nonaka (1994) points out that knowledge creation embraces a continual dialogue between explicit and tacit knowledge, which boosts the creation of new ideas. In their seminal book *The Knowledge Creating Company*, Nonaka and Takeuchi (1995) establish a dynamic model of knowledge creation, hypothesising four different modes of knowledge conversion: socialisation, externalisation, internalisation and combination, as shown in Figure 2.2.

Socialisation. Socialisation is the process of sharing experiences and is often

done through observation, imitation, and practice in order to create tacit knowledge.

Externalisation. Externalisation is the process of articulating tacit knowledge and turning it into an explicit form. Such a process occurs when an employee writes a report after attending a meeting with other organisation members.

Internalisation. Internalisation is a process of converting explicit knowledge into tacit knowledge. Such a process occurs after a member of a firm reads a report about an event in the firm, thereby mentally combining it with previous experience.

Combination. Combination is a process of assembling existing explicit knowledge to create new explicit knowledge. Such a process occurs while an organisation member writes a report based on several written documents of the organisation.

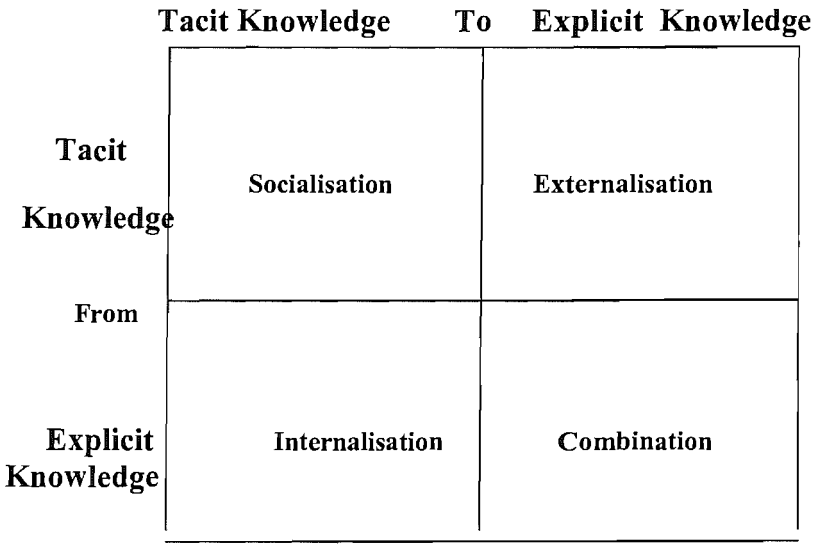


Figure 2.2 Knowledge Creation Model (Nonaka, 1994)

According to Nonaka and Takeuchi (1995), knowledge creation is defined as a spiralling process of interactions between tacit knowledge and explicit knowledge. They contend that the interactions between these two types of knowledge lead to the creation of new ideas and knowledge through four different modes of knowledge conversion. Nonaka and Takeuchi's (1995) descriptions of the "knowledge-creating" organisation provide a useful starting point for theorising about how an individual's personal knowledge can be transformed into organisational knowledge that has value to the firm.

Furthermore, Nonaka (1991) contends that tacit and explicit knowledge are mutually complementary entities that interact with one another and may be transformed from one type to another through individual or collective creative activities.

2.3.3.3 Spender's theory of knowledge

Another theory of organisational knowledge that appears to be similar, in some respects, to Nonaka's has been suggested by Spender (1994, 1996), who proposes a 'pluralistic epistemology' seeking to capture the different types of knowledge that organisations make use of. Spender's (1996) typology of knowledge has studied the interplay between tacit and explicit knowledge at the individual and social levels. Such knowledge appears to be an expansion of Nonaka's theory of knowledge.

Viewing an organisation as a dynamic, knowledge-based activity system, Spender argues that knowledge can be held either by an individual or collectively, and can also be manifested tacitly or codified explicitly, suggesting the creation of four types of organisational knowledge, which he illustrates as a two-by-two matrix in Figure 2.3.

Automatic knowledge – tacit knowledge held by the individual (personal knowledge);

Collective knowledge – tacit knowledge held by the organisation (communities of practice);

Conscious knowledge – explicit knowledge held by the individual; and

Objectified knowledge – explicit knowledge held by the organisation.

	Individual	**Social**
Explicit	Conscious	Objectified
Tacit	Automatic	Collective

Figure 2.3 Different types of organisational knowledge (Spender, 1996)

2.3.3.4 Blackler's theory of knowledge

Synthesising Nonaka and Spender's views on knowledge in an organisation, Blackler (1995) maintains that knowledge can be analysed as an active process which is mediated, situated, provisional, pragmatic and contested. He acknowledges that the concept of knowledge is complex and its relevance to organisation theory has been insufficiently developed, arguing that knowledge resides in bodies, routines, dialogues, brains or symbols.

Blackler sets out a framework that includes five types of knowledge used within an organisation: Embodied, Embedded, Encultured, Embrained, and Encoded. Blackler's framework suggests that these different types of knowledge dominate in different types of organisations: Expert-dependent organisations (professional bureaucracy such as a hospital), Knowledge-routinised organisations (machine bureaucracy such as a traditional factory), Communication-intensive organisations (Adhocracy innovation mediated production), Symbolic-analyst dependent organisations (knowledge intensive firms such as a software consultancy). Blackler (1995) explains the five types of knowledge in following ways.

Embodied knowledge – knowledge residing in the hands of individuals of an organisation. Such knowledge is the expertise of a craftsperson rooted in action.

Embedded knowledge – knowledge residing in systematic routines of a firm. Typically this kind of knowledge is the systematic relationship between technology, roles, formal procedures and emergent routines.

Encultured knowledge – knowledge that is something collective, performing every day, embedded in the form of communities of practice. Such knowledge is closely linked to the process of achieving shared meanings resulting from interaction and is shaped collectively.

Embrained knowledge – knowledge that resides in the brains of organisation members. Such knowledge is linked to the conceptual skills and cognitive abilities of people.

Encoded knowledge – knowledge that can easily be communicated by signs and symbols among the employees of a firm. Such knowledge takes the form of books, manuals and codes of practice.

2.3.4 Alternative view of knowledge typologies

Having reviewed various typologies of knowledge from existing organisational knowledge theories, one dimension, i.e., exogenous sources' knowledge, has been relatively neglected in these theories. The existing theories address organisational knowledge, referred to as the knowledge that is created and available inside the organisation, overlooking the role of knowledge from external sources. Exogenous knowledge is the knowledge of customers, suppliers, and competitors other than the organisation's own knowledge.

Knowledge source is an important dimension of organisational knowledge typology, because knowledge of an organisation is the outcome not only of the interaction among its own members but also of the interactions between forces that can be referred to as endogenous (e.g., organisational employees) and exogenous forces (e.g., customers, suppliers, competitors). In this regard, McAdam and McCreedy (2000) question how knowledge can be restricted to within the factory while it is socially constructed.

Most theorists of organisational knowledge, particularly Nonaka, Spender and Blackler, have failed to take into account the role of external forces, which are supposed to play a significant role in knowledge creation, at least in shaping the existing knowledge (Jasimuddin, 2004). So it is pragmatic to accommodate and thereby adjust them with the organisation's own knowledge. Given the potential importance of exogenous knowledge, it is remarkable that the existing literature has only attracted little and rather fragmented research interest (e.g., Hoerem et al., 1996; Tsoukas, 1996; Pentrash, 1996; Baily & Clarke, 2001; Empson, 2001b). Empson (2001b), for example, contends that professional service firms rely upon two main forms of knowledge: technical knowledge and the knowledge of their clients.

Drawing on insights from the extant literature, an attempt is made to provide an alternative classification of knowledge, based on the interactions between the roles of internal forces and external forces in organisational knowledge, which can be called "knowledge by sources." This perspective has been approached by observing several researchers' work (e.g., McAdam & McCreedy, 2000; Hoerem et al., 1996; Tsoukas, 1996; Baily & Clarke, 2001) who have not explicitly taken into account the importance

of knowledge from other sources. Given the pivotal importance of exogenous knowledge, four categorisations of organisational knowledge based on two dimensions – tacitness of and sources of knowledge – as a two-by-two matrix is depicted in Figure 2.4. Each of the quadrants implies a different type of knowledge in either personalised or codified form.

Endogenous–tacit knowledge. Such knowledge remains in the hands and brains of organisation members and is hard to articulate and codify. Such knowledge is the skills, expertise, and experiences of the employees of an organisation.

Endogenous–explicit knowledge. Such knowledge is codifiable and available in an organisation. Organisation members write down something after attending a meeting with other members of the organisation. This knowledge includes the manuals and codes of practice of the firm.

Exogenous–tacit knowledge. Knowledge that is neither codified nor available within an organisation falls under this category. It resides in the brains of people who are located outside the organisation. Such knowledge includes suppliers' experience, customers' ideas and competitors' next possible useful move.

Exogenous–explicit knowledge. Such knowledge is something that takes articulated form but is not available within the firm's own boundary. This knowledge is closely linked to suppliers' manuals, customers' requirements, and competitors' patents.

	Tacit knowledge	**Explicit Knowledge**
Endogenous Source	Organisational members' skills Crafts persons' expertise Employees' experiences	Manuals Codes of practices Formal routines and procedures
Exogenous Source	Suppliers' experiences Customers' ideas Competitors' next useful move Researchers' experiences	Suppliers' design manuals Customers' regulatory guidelines Competitors' products and patents Researchers' articles

Figure 2.4 Sources-Based Knowledge Model

The important point is that the knowledge is possessed by people both inside and outside the organisation. As a result, 'source-based knowledge' is incorporated as an alternative dimension. Source-based knowledge can take various forms, namely, employees' knowledge, customers' knowledge, suppliers' knowledge and competitors' knowledge. It is important to note that the ability to acquire and manage knowledge depends on the type of knowledge source. Endogenous–explicit knowledge would seem to be the easiest type of knowledge in a sense that it could be easily acquired and managed because it is not only articulated but also resides within an organisation. On the other hand, exogenous–tacit knowledge would seem to be the most difficult to acquire and manage because such knowledge is neither easily codified nor resides within the organisation's boundary. As we move bottom left to top right, knowledge acquisition is eased.

This typology of organisational knowledge makes a distinction between endogenous knowledge and exogenous knowledge. The empirical part of this thesis is about endogenous knowledge. This distinction between endogenous knowledge and exogenous knowledge specifically directs the researcher's attention at endogenous knowledge (i.e., knowledge within the organisation) rather than exogenous knowledge. One implication is that, for example, dealing with endogenous knowledge, it is expected to be based within the same culture, while if knowledge is received from the exogenous sources then that may not be the case. This distinction is helpful to make and in fact when the empirical work is conducted at the organisational setting, the researcher actually talks about endogenous knowledge quite explicitly. This revised typology of knowledge will be returned to on p. 77 while discussing the case organisation.

Figure 2.5 provides an overall picture of knowledge typologies covering a wide variety of dimensions postulated by various commentators, along with an alternative view of organisational knowledge, emphasising "exogenous knowledge" in addition to the knowledge of organisation members (endogenous knowledge).

Following the understanding that the sustainability and competitiveness of an organisation very much depends upon the availability of the knowledge to the right person at the right time in the right location, the following sections look at how organisational knowledge can be made available for further use, explaining the importance of knowledge transfer, knowledge storage and knowledge administration.

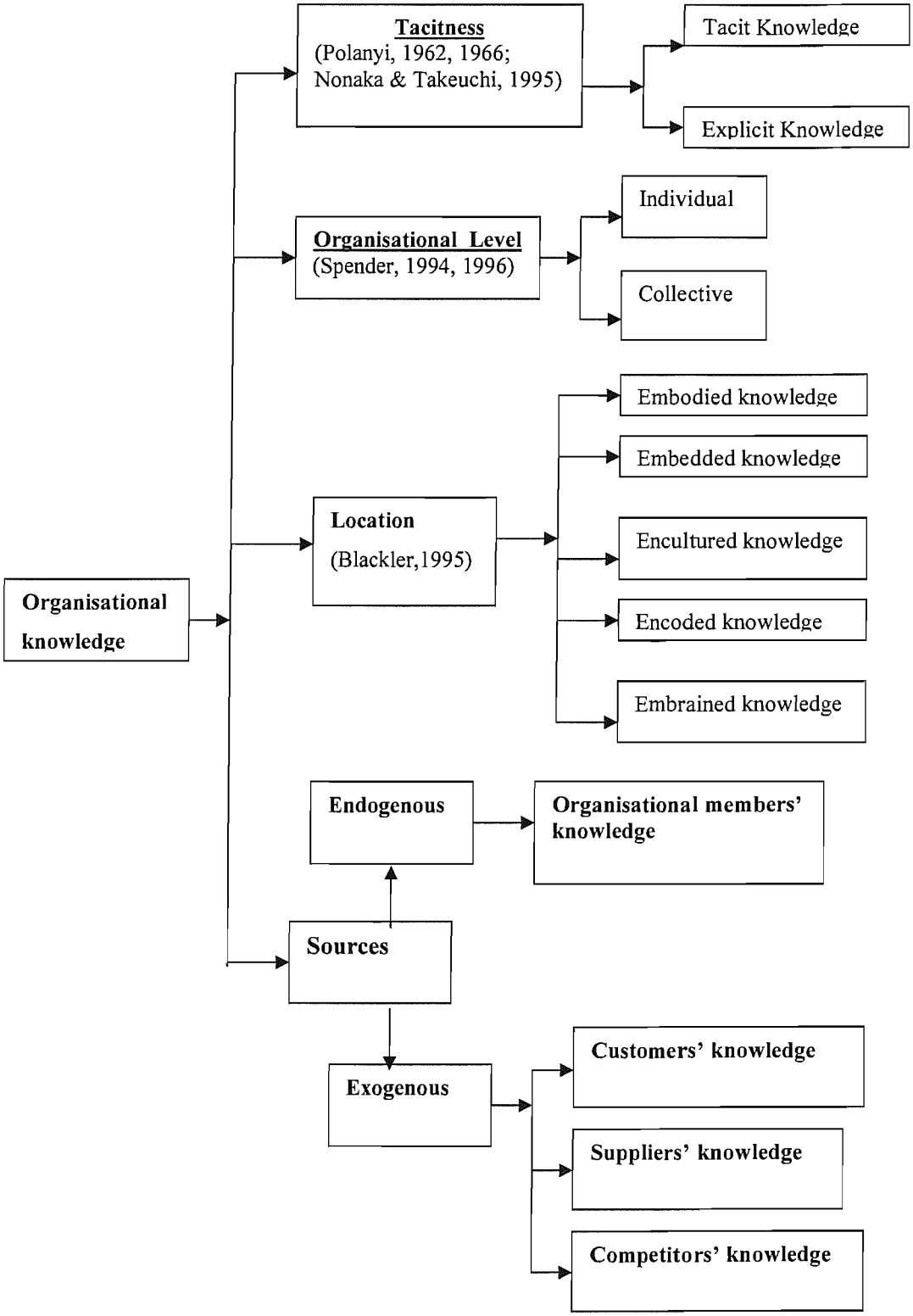


Figure 2.5 Typologies of organisational knowledge

2.4 Knowledge transfer

Knowledge that resides in a human brain has value to an organisation as long as the person possessing the knowledge, as a part of the organisation, uses it effectively for the organisation even if s(he) has chosen not to share it with any one. But if such knowledge is transferred to others it may become more useful in a sense that other individuals may use it. If s(he) leaves the organisation without passing the knowledge on to other colleagues, then the organisation may be vulnerable. These are the reasons why knowledge transfer is widely emphasised as a strategic issue for the competitive advantage of an organisation (Cohen & Levinthal, 1990; Albino et al., 1999; Argote & Ingram, 2000). This section begins by providing descriptions of the fundamental concepts of knowledge transfer.

Knowledge transfer is important both within an organisation, i.e., intra-organisational (Szulanski, 1996; Kalling, 2003; van den Hoff & van Weenen, 2004; O'Dell & Grayson, 1998; Osterloh & Frey, 2000) and between different organisations, i.e., inter-organisational (Albino et al., 1999; Powell et al., 1996; McEvily & Zaheer, 1999). Knowledge transfer between individuals and departments within an organisation is considered to be a crucial task in modern business (van den Hoff & van Weenen, 2004; O'Dell & Grayson, 1998). As has been noted previously, the present study is concerned with knowledge transfer within an organisation. The terms 'knowledge transfer', 'knowledge share', and 'knowledge exchange' are inter-changeably used throughout the research.

2.4.1 Knowledge transfer defined

Searching for an answer to the question "what is knowledge transfer?" seems to be crucial for the research purpose. The term "knowledge transfer" is used to refer to the process of exchanging knowledge among members of the organisation so as to gain and sustain its competitive advantage. Despite the fact that knowledge transfer is a relatively recent topic within knowledge management discourse, several researchers, most notably Hendricks (1999), Argote et al. (2000), Szulanski (2000), Hogberj and Evinsson (1998),

Ipe (2003), and Kalling (2003), have produced a variety of definitions. Hogberj and Evinsson (1998), for instance, argue that the transfer of knowledge occurs when it is communicated from one carrier (e.g., individual, group, or organisation) to another, or within a carrier. In parallel with this, Argote et al. (2000, p. 3) define knowledge transfer in organisations as "the process through which one unit (e.g., group, department, or division) is affected by the experience of another". This corresponds well with Connelly and Kelloway (2001), who state that knowledge transfer is "a set of behaviours that involves the exchange of knowledge with others".

However, focusing on intra-organisational knowledge transfer that is relevant to the present research, Ford and Chan (2002), for example, define knowledge transfer as "the process of the dissemination of knowledge from one individual (or group) to another within the organisation". According to Ipe (2003, p. 341), "knowledge sharing is basically the act of making knowledge available to others within the organisation". Resonating with this, Kalling (2003, p. 115) puts it thus: "knowledge transfer within an organisation is seen as the process by which an organisation makes available knowledge about routines to its members". Based on the above definitions, an attempt can be made to provide a working definition of knowledge transfer for the purpose of the present research as:

> *Knowledge transfer within an organisation is an act of transmission of organisational knowledge between knowledge contributors and knowledge users using certain communication channels so that they can take purposeful actions and make decisions that seems to help accomplish their assigned tasks.*

2.4.2 Significance of knowledge transfer within an organisation

Several researchers (e.g., Szulanski, 1996; Kalling 2003; van den Hoff & van Weenen, 2004; O'Dell & Grayson, 1998; Osterloh & Frey, 2000) argue that the organisation's success can be based on its ability to transfer the knowledge from one organisation unit to another. In line with this view, Argote et al. (2000) note that knowledge transfer is becoming increasingly important in organisations. Hendricks (1999) also contends that knowledge transfer provides the opportunity to enhance the organisation's competitive advantage. Reflecting this view, Argote and Ingram (2000) suggest that "knowledge transfer is a basis for competitive advantage in organisations".

In the emerging knowledge-based society, the ability to transfer knowledge within an organisation has been found to contribute to the performance of the organisation in both manufacturing sector (Galbraith, 1990) and service sector (Baum & Ingram, 1998; Darr et al., 1995). Gibert and Cordey-Hayes (1996), for instance, maintain that knowledge transfer helps improve organisational capabilities by assimilating new technology. The argument of Gibert and Cordey-Hayes (1996) is developed by Cohen and Levinthal (1990), who suggest that the transfer of knowledge is a critical factor in an organisation's ability to innovate. The significance of knowledge transfer is also viewed by the Department of Trade and Industry's (DTI) 1998 Competitiveness White Paper as:

> "Our [Britain's] success depends on how well we exploit our most valuable assets: our knowledge, skills, and creativity. These are the key to designing high-value goods and services and advanced business practices. They are the heart of a modern, knowledge-driven economy."

A growing body of empirical evidence indicates that an organisation that is engaged in transferring knowledge effectively among its members is more productive than an organisation that is not (e.g., Argote et al., 2000; Argote et al. 1990; Baum & Ingram, 1998). Argote et al. (2000, p. 1), for example, point out that "organisations that are able to transfer knowledge effectively from one employee to another are more productive and more likely to survive than organisations that are less adept at knowledge transfer". The question that may become relevant is not whether but how quickly an organisation can engage in carrying out knowledge transfer among its members.

2.4.3 Knowledge transfer topics

As noted earlier, researchers within the KM field have shown interest in various issues surrounding knowledge transfer, including factors influencing knowledge transfer, knowledge transfer for innovation, and the knowledge transfer process. The issues relating to the notion of knowledge transfer are discussed in turn.

2.4.3.1 Motivators of and barriers to knowledge transfer

van den Hoff and van Weenen (2004) argue that determining the factors that influence knowledge transfer *per se* constitutes an important area of KM research. The majority of the existing literature tends to focus on the factors influencing knowledge transfer. It is found that a growing body of empirical studies (e.g., O'Dell & Grayson, 1998; Szulanski, 1996; Connelly & Kelloway, 2001; Hendricks, 1999; Pan & Scarbrough, 1999; Davenport & Prusak, 1998; Huemer et al., 1998; Kelloway & Barling, 1999; Cross et al., 2001; Rush, 2001; McDermott & O'Dell, 2001; Argote & Ingram, 2000; Kalling, 2003; Smith & McKeen, 2003a) provides some light on the factors that stimulate or inhibit knowledge transfer. In reviewing the relevant literature, one encounters a very broad range of forces that promote or impede knowledge transfer in organisations. Szulanski (1996), for example, identifies the three biggest barriers to knowledge transfer: (i) negligence on both ends of the transfer, (ii) the absorptive capacity of the user and (iii) the lack of social ties between the actors.

2.4.3.2 Knowledge transfer for innovation

Viewing knowledge transfer as a major focus area for KM, a limited but growing literature on various aspects concerning knowledge transfer for innovation can be found. Several researchers (e.g., Nonaka & Takeuchi, 1995; Hogberj & Evinsson 1998; Gilbert & Cordey-Hayes, 1996; Hall, 2001) recognise the importance of knowledge transfer so as to make that knowledge available for innovation. The literature reveals that existing knowledge in an organisation may be utilised for the further development of knowledge, which is popularly referred to as knowledge creation (Nonaka & Takeuchi, 1995; Hall, 2001; Gilbert & Cordey-Hayes, 1996) or for decision making and other business purposes (Walsh & Ungson, 1991; Connell et al., 2003; Choo, 1996).

2.4.3.3 Knowledge transfer process

Barrett et al. (2004, p. 1) contend that the major emphasis of organisations is placed on the process of knowledge transfer, which is increasingly seen as crucial to organisational success. To date, two important perspectives on knowledge transfer have been revealed. Most researchers in the KM discourse tend to view knowledge transfer

either as 'an act of transmission and reception' or to think in terms of 'a process of reconstruction.' Davenport and Prusak (1998) argue that knowledge transfer involves both the transmission of information to a recipient and absorption from one person (or group) to another person (or group). This coincides with Hendricks (1999, p. 92), who gives a broader theory of knowledge transfer, saying:

> "Knowledge sharing is something else than but related to communication....To learn something from someone else, i.e., to share his or her knowledge, an act of reconstruction is needed. It takes knowledge to acquire knowledge and, therefore, to share knowledge. Knowledge sharing presumes a relation between at least two parties, one that possesses knowledge and the other that acquires knowledge. The first party should communicate its knowledge, consciously and willingly or not, in some form or other (either by acts, by speech, or in writing, etc.). The other party should be able to perceive these expressions of knowledge, and make sense of them (by imitating the acts, by listening, by reading the book, etc.). Two sub-processes make up the process of knowledge sharing."

In line with this, several other researchers, most notably Bender and Fish (2000), Albino et al. (1999), and Kalling (2003), theorise the knowledge transfer process in terms of an operational level of analysis (the information system), a conceptual level of analysis (the interpretative system), or a combination of both. From an operational point of view, knowledge transfer is a communication process with information-processing activities in which a contributor can transfer knowledge to a prospective user by information flows conveyed by an appropriate medium (Bender & Fish, 2000; Albino et al., 1999; Kalling, 2003), whereas from the conceptual viewpoint, knowledge transfer is strictly connected to the concept of the learning organisation (Gilbert & Cordey-Hayes, 1996; Huber, 1991; Steensma, 1996; Albino et al., 1999). For the purpose of this research, knowledge transfer is regarded as an act of transmission and reception of knowledge within an organisation, which is very much an operational level of analysis (i.e. the information system) taking the process of reconstruction for granted.

2.4.3.4 Knowledge transfer mechanisms

There have been a few studies where researchers have addressed knowledge transfer mechanisms and recognised their importance for effective knowledge transfer (Nonaka & Takeuchi, 1995; Hansen et al., 1999; Davenport & Prusak, 1998; Argote, 1999; Roberts, 2000; Dixon, 2000; Scarbrough et al., 1999; Bhatt, 2001; Huber, 2001; Alavi & Leidner, 2001; Zack, 1999a, b; Sanchez, 1997; Earl, 2000; Connell et al., 2003). It is an essential starting point to define mechanisms in relation to knowledge transfer. The mechanism can be defined as the transmission means that is used for transferring ideas and knowledge among individuals. For the purpose of the present study, the terms mechanism, medium and means are used interchangeably.

Broadly speaking, knowledge transfer in organisations can take place in different ways. These mechanisms include interaction of personnel (Albino et al., 1999; Argote et al., 2000), social interactions (Takeishi, 2001; Yli-Renko et al., 2001; Kelloway & Barling, 1999), conversations and meetings (Smith & McKeen, 2003a, b), stories (Connell et al., 2004), personnel movement (Almeida & Kogut, 1999; Gruenfeld et al., 2000), training (Moreland & Myaskovsky, 2000; Thompson et al., 2000), communities of practice (Bhatt, 2001), observation (Nonaka, 1991), and patents and scientific publications (Albino et al., 1999; Argote et al., 2000).

To date, the mechanisms of knowledge transfer that are mentioned in the relevant literature can be classified into two dominant approaches, which Hansen et al. (1999) call the *personalisation* strategy and the *codification* strategy. Hansen et al. (1999) argue that the *personalisation* strategy is an approach where knowledge is closely tied to the individual who develops it and is shared mainly through face-to-face interaction, while in the *codification* strategy knowledge is codified and stored in databases, where it can be accessed and used easily by anyone in the organisation.

The *personalisation* strategy tends to focus on tacit knowledge and addresses the transferring of knowledge through the face-to-face interface. Various methods are recommended as suitable for facilitating the transfer of tacit knowledge. Davenport and Prusak (1998) suggest that "organisations can hire people and let them talk to one

another, and use water coolers, talk rooms, and picnics as examples of places where the transfer of tacit knowledge can take place". Nonaka and Takeuchi (1995) use "the examples of apprenticeships, the use of metaphors and analogies, networking, and learning by doing as viable ways of transferring tacit knowledge". Several other scholars (Lam, 1997; Storey & Bamett, 2001; Brown & Duguid, 1998) suggest direct communication between individuals as a means of tacit knowledge transfer. Brown and Duguid (1998), for example, argue that such knowledge is shared socially through language and stories. Reflecting this view, Argote (1999) identifies several mechanisms for transferring knowledge, including "training members, allowing them to observe the performance of experts, and providing opportunities for communication between members".

On the other hand, the *codification* strategy emphasises the making explicit of tacit knowledge, in order to transfer the knowledge quickly and to allow it to be carefully stored in databases through the use of Information and Communication Technology (ICT), where it can be made easily available for use. A significant proportion of the contemporary literature (e.g., Scarbrough et al., 1999; Storey & Barnett, 2001, Alavi & Leidner, 2001; Bhatt, 2001; Hendriks, 1999; Hlupic et al., 2002; van den Hoff & van Weenen, 2004; Huber, 2001) suggests that ICT could play a central role in the transfer of an organisation's knowledge. Huber (2001), for example, mentions that sophisticated ICT tools, such as group support systems, computer-assisted tools including intranets, email, and electronic bulletin boards, can be employed to carry out the transfer of explicit knowledge. During the past decade, many organisations invested heavily in ICT tools hoping to increase their ability to manage the vast array of knowledge (Eginton, 1998).

2.5 Knowledge Storage

This section gives an overview of the key concepts of knowledge storage. Viewing knowledge as a crucial resource, organisations recognise the value of knowledge storage for present and future use. The preservation of knowledge (which is popularly referred to as "organisational memory") seems to be a major building block in implementing

KM so as to re-use and create knowledge. Douglas (2002, p. 74) comments along similar lines, noting that:

> "knowledge that is in the head of a person has limited value, while the value of knowledge can increase exponentially when it is networked, stored, and reused, and quickly integrated into business practices and processes."

This view is an extension to that of Gray and Chan (2000, p. 13) who put it thus:

> "knowledge that is created but not stored in a repository, that is either simply forgotten or passed on to a user directly without being recorded, represents a waste of resources, because a prospective user will have to solve old problems again."

As mentioned earlier (see section 2.4), knowledge that is transferred among the organisational members is likely to be more useful than that retained by the individual. Moreover, if such transferred knowledge is stored and retained in a repository so that other members of the organisation could get access to retrieve it for future use, it is more useful. But all knowledge of the organisation should not be preserved and retained in a knowledge repository. If irrelevant knowledge is stored then knowledge storage will be filled with garbage. So knowledge, which is perceived as current, relevant and correct, should be stored into and should also be retrievable from knowledge repositories.

Many organisations have recognised the need for and advantages of knowledge storage. Stein (1995) suggests that a better understanding of organisational memory can assist in solving problems through the utilisation of stored knowledge. Organisational memory is an important strategic element of KM, by which organisational knowledge is stored and retrieved for present and future (re)use in problem-solving or decision-making, thereby resulting in the enhancement of the firm's competitive advantage.

The terms 'organisational memory' and 'knowledge storage' will be used synonymously throughout the thesis. Before discussing the role of knowledge storage in an organisation, it is a useful starting point to define what organisational memory is. Organisational memory is thought to be the sum of the memories of organisation members. El Sawy et al. (1986, p. 12) define memory as:

> "a hidden repository of details of past decisions and their perceived results, past surprises and the organisation's responses, rules of thumb and other unwritten decisions that regulate current decisions and actions."

Walsh and Ungson (1991, p. 61) provide a holistic definition of organisational memory: "stored information from an organisation's history that can be brought to bear on present decisions". This corresponds with definitions given by several other academics, notably Stein (1995) and Probst et al., (2000). Stein (1995, p. 22), for example, states, "organisational memory is the means by which knowledge from the past is brought to bear on present activities, thus resulting in higher or lower levels of organisational effectiveness". Reflecting this view, Probst et al. (2000, p. 218) describe memory as:

> "a system of knowledge and skills that preserves and stores perceptions and experiences beyond the moment when they occur, so that they can be retrieved at a later time."

2.5.1 Contradictions regarding the notion of organisational memory

While reviewing the relevant literature, several disagreements among academics regarding organisational memory have been identified, most notably (i) whether or not organisations have memories; (ii) whether organisational memory and KM are different fields or overlap; (iii) whether organisational memory resides in human brains or in other places; (iv) whether such memory should be viewed as a static storage bin or be treated as a dynamic socially constructed process; (v) whether approaches to knowledge storage can be described in the context of being either technically based or people focused; and (vi) whether such storage is functional or dysfunctional in terms of organisational performance and effectiveness. Although numerous contradictions in organisational memory are apparent in the literature, drawing on the insights of the extant literature, it can be argued that each perspective seems to highlight a different aspect of the same reality. Viewpoints sometimes focus on one aspect and ignore others.

For instance, an organisation can learn and memorise knowledge of its past through its members via mental and structural artefacts. With regard to the contentious issue of whether organisational memory and KM overlap, researchers view organisational memory as a significant element of KM (Schwartz et al., 2000). While KM deals with organisational knowledge holistically, organisational memory focuses on the storage of knowledge. With respect to the location of organisational memory, the inclination is to the view that an organisation's knowledge resides both in people's heads and in artefacts. The central tenet of much research in the area is the assertion that organisational memory is a static storage bin. However, there is a trend to suggest that organisational memory is a storage bin but is dynamic in nature, where knowledge is preserved and updated regularly so that full use of it may be made.

Despite the growing tendency to emphasise the role of technology in organisational memory, there is a tendency to pay equal importance to human and technical elements in handling organisational memory. Anand et al. (1998) point out that it is difficult to implement KM initiatives and particularly to manage organisational memory without understanding the nature of the relationships that might exist between the technology and the organisational elements, including individuals. Along similar lines, it is argued that knowledge storage is a social-technical approach that links both people and technology. Although there are various arguments against making use of knowledge from past experience, there is a tendency in the literature to view knowledge repository as functional particularly because it contributes to effective decision making.

Reviewing the extant literature, a pluralistic stance is taken, which falls somewhere between the rather divergent perspectives while recognising the contradictions. However, there is an agreement about the importance of making efforts to ensure that the knowledge available in repositories remains relevant and current.

2.5.2 The role of knowledge storage in organisations

Olivera (2000, p. 811) contends that an organisation's ability to preserve knowledge can have a positive impact on its performance. Several researchers have argued that there are many benefits from the storage of knowledge in an organisation, namely, increased

organisational learning (Huber, 1991; Stein, 1995; Casey, 1997), rapid product development (Hargadon & Sutton, 1997; Moorman & Miner, 1997), and sharpening core competence (Stein, 1995). Walsh & Ungson (1991, pp. 73-74) point out that the storage of knowledge has three critical roles to play within an organisation: (i) an informational role, i.e., contributing to decision making; (ii) a controlling role, i.e., monitoring present activities to ensure that previous mistakes are not being repeated thus minimising transaction costs; and (iii) a political role, i.e., influencing the actions of others resulting from the control of knowledge.

There is no doubt that employee turnover leads to the loss of knowledge if it is not stored which can weaken the competitiveness of the organisation (Prahalad & Hamel, 1990). In this regard, Argote et al. (1990) state that knowledge storage can effectively safeguard the organisation from the negative impact of employee turnover. Stein (1995, pp. 31-32) lists the benefits that an organisation can derive from knowledge storage:

- *It can help managers maintain strategic direction over time.*
- *It can help the organisation avoid the nightmare of cycling through old solutions to new problems because no one can remember what was done before.*
- *It can give new meaning to the work of individuals if such efforts are retained.*
- *It can facilitate organisational learning.*
- *It can strengthen the identity of the organisation.*
- *It can provide newcomers with access to the expertise of those who preceded them.*

2.5.3 The interplay between knowledge transfer and knowledge storage

While there is much more attention among researchers to comprehending knowledge transfer and knowledge storage, there are still many gaps in the clear-cut understanding of their integration. The following part of the section sets out to explain the issue. Despite the fact that there is a vast literature relating to knowledge transfer and knowledge storage in an organisation, the two literatures have largely developed independently of each other. The majority of the relevant literature seems to have consciously or unconsciously failed to link knowledge storage with knowledge transfer as such. But a few academics (e.g., Gray & Chan, 2000; Argote & Ingram, 2000;

Douglas, 2002; Connelly & Kelloway, 2001; Kalling, 2003) provide isolated descriptions of the significance of the integration of knowledge transfer and knowledge storage.

It is arguable that organisations should recognise the advantages of such integration in order to re-use knowledge for present and future business needs. Reflecting this view, Connelly and Kelloway (2001) observe that many organisations attempt to improve knowledge transfer among their employees through the creation of a 'knowledge repository'. Ruggles (1998) points out that "an organisational member can contribute his (her) expertise electronically to the organisation in a way that can be accessed by other employees". Since knowledge is dispersed asymmetrically, web-based technology allows the storage of transferred knowledge. Gray and Chan (2000, p. 13) also suggest "the storage of knowledge in a repository so as to allow its re-use for solving future problems". Resonating with this, Argote and Ingram (2000, p. 152) maintain that knowledge repositories play a dual role in knowledge transfer in organisations, arguing that:

> "on the one hand, the knowledge repositories are changed when knowledge transfer occurs. Thus, changes in the knowledge repositories reflect the outcomes of knowledge transfer. On the other hand, the state of the knowledge repositories affects the processes and outcomes of knowledge transfer."

In line with Connelly and Kelloway (2001) and Argote and Ingram (2000), it can be postulated that 'knowledge storage' needs to be incorporated within the knowledge transfer process so as to ensure successful KM implementation. Whilst there is a clear indication of the importance of integrating the storage of knowledge within knowledge transfer processes, the interplay between knowledge transfer and knowledge storage has been relatively ignored in the knowledge management literature. Hence, there remains a research gap in empirically understanding this interaction which the present study addresses.

2.6 Knowledge administration

While reviewing the relevant literature, several academics suggest the employment of someone in the role of administrating organisational knowledge. Davenport (1997, p. 188) argues that "knowledge will not be well managed until certain people within an organisation have clear responsibility for the job, suggesting that for the successful implementation of KM, organisations require knowledge managers". In this connection, Gopal and Gagnon (1995, p. 7) contend "organisations with successful KM functions are those with appointed senior-level executives to carry out the role of full-time chief knowledge officer (CKO)".

There are several terms used by researchers to address such person in KM initiatives. Davenport and Prusak (1998) make a long list of job titles in relation to knowledge administration, such as knowledge manager, knowledge coordinator, and knowledge network facilitator, that link with the tasks to be performed to implement KM. Some scholars label them in various different terms: chief knowledge officer (Raub & von Wittich, 2004; Abell & Oxbrow, 1999; Loeb et al., 1998; KPMG, 1998; Davenport, 1996; Bontis, 2002; Awazu & Desouza, 2004; Roberts, 1996), a source's agent (Szulanski & Cappetta, 2003), knowledge activist (von Krogh et al., 1997; von Krogh et al., 2000), knowledge manager (Mckeen et al., 2002; Davenport, 1997) and network coordinator (Schonstrom, 2005). However, such a person will be referred to as knowledge administrator throughout the research.

2.6.1 The role of knowledge administrator

To date, the literature surrounding the role of the knowledge administrator is inadequate (Bontis, 2002; Awazu & Desouza 2004). Nevertheless, Davenport (1996) argues that such an individual, whom he calls the chief knowledge officer, has two critical responsibilities: creating a KM infrastructure and building a knowledge culture. Parallel to this, von Krogh et al. (1997, p. 475) introduce the knowledge activist "as a knowledge enabler who acts in three roles: as a catalyst of knowledge creation, as a connector of knowledge creation initiatives and as a merchant of foresight". Reflecting this view, Mckeen et al. (2002, p. 9) set out the knowledge administrator's aim:

> "the explicit aims of their work are broad and ambitious; 'developing a knowledge management strategy' and 'managing and leveraging knowledge content' for the firm rank highest on the list of goals."

Davenport (1997, p. 188) also highlights the tasks that a knowledge administrator may perform: (i) the collection and categorisation of knowledge, (ii) establishment of a knowledge-oriented technology infrastructure, and (iii) monitoring the use of knowledge. Loeb et al. (1998) liken the role to a librarian who not only organises books in a library but also helps users to find the right books. Such a person seems to ensure the availability of timely, accurate and relevant knowledge to prospective users. Parallel to this, Davenport and Volpel (2001, p. 215) put it:

> "Operationally, CKOs perform a variety of key roles, including serving as the chief designer of the knowledge architecture, the top of the reporting relationship for knowledge professionals, the head technologies, and the primary procurement officer for external knowledge content. Symbolically, the presence of a CKO serves as an important indicator that a firm views knowledge and its management as critical to its success. If the CKO is a member of the senior executive team, it becomes obvious to employees that knowledge is a critical business resource on the level of labour and capital. But a CKO alone can do little. He can get people to create, share, and use knowledge effectively, and the ways to use technology to enhance knowledge activities."

A few researchers (e.g., Davenport & Volpel, 2001; Liebowitz, 1999; Reynolds, 1998; Earl & Scott, 1999; Stewart, 1998) observe that a CKO or equivalent role is appearing in many companies, including big consulting firms such as Anderson Consulting, Boston Consulting Group, Ernst & Young, PriceWaterhouseCoopers, EDS, and KPMG. Liebowitz (1999, p. 38) also explains how Buckman Labs established a Knowledge Transfer Department in 1992 headed by their Chief Executive Officer (CEO) and a newly appointed chief knowledge officer (CKO) -equivalent. In this context, Holsapple and Joshi (2000) cite that more than 40% of Fortune 500 companies have chief knowledge officers. On the other hand, KPMG (1998) research shows that in the U.K. only 5% of organisations with KM have knowledge administrators. Against this backdrop, it appears that, as von Krogh (2003) suggests, organisations need to create a unit (headed by an individual) in order to direct and oversee knowledge transfer.

2.7 The research gaps to formulate the research questions

The extant literature in KM has been surveyed and reviewed thoroughly to obtain insights so as to identify gaps and consequently to formulate the research questions. At the end of Chapter 2, the key themes emerging from the literature have been used to help shape two research questions. These, in turn, help generate a conceptual framework which explains graphically the main areas of study – the key factors or constructs and the presumed relationships among them (see Appendix A and Figure 4.11) as Miles and Huberman (1994, p. 25) note "It is sometimes easier to generate a conceptual framework after you've made a list of research questions".

The given literature on knowledge transfer within knowledge management discourse has discussed the mechanisms used to carry out the transfer of knowledge, but has failed to address the rationale underlying the selection of a particular mechanism to transfer knowledge. While discussing mechanisms of knowledge transfer, several researchers, most notably Kalling (2003), Day (1994), Albino et al. (1999) Connelly & Kelloway (2001), Hansen et al. (1999), and Zack (1999a), argue that the selection of knowledge transfer mechanism goes with the tacitness of knowledge. While considering the transfer of tacit knowledge between individuals in a synchronised way, personalisation approach is prescribed (Hansen et al., 1999; Connell et al., 2003; Lam, 1997; Davenport & Prusak, 1998; Huysman & De Wit, 2004; Brown & Duguid, 1998). On the other hand, the transfer of explicit knowledge can be facilitated through the adoption of technology-based codification approaches (Scarbrough et al., 1999; Storey & Barnett, 2000; Alavi & Leidner, 2001; Bhatt, 2001; Huber, 2001).

The tacitness of knowledge is not the only factor that influences the choice of knowledge transfer media. Since there is a research gap in understanding why people select one mechanism for knowledge transfer, the first *research question* (p. 8) of the present study is formulated to address the determinants of selection of an appropriate mechanism for knowledge transfer.

Similarly, using insights from the existing literature of knowledge management, it can be argued that the knowledge administration and knowledge storage can be regarded as important elements for successful knowledge transfer. However, the existing theory of knowledge transfer (e.g., Kalling, 2003; Albino et al., 1999; Hansen et al., 1999; Zack, 1999a, b; Davenport & Prusak, 1998; Connelly & Kelloway, 2001) emphasises the nature of knowledge, the actors involved in the knowledge transfer, and the mechanisms used to transfer knowledge, when discussing a knowledge transfer framework. Since a framework for the knowledge transfer process integrating the knowledge storage and a knowledge administration is largely unexplored, the present study also explores the importance of having an integrated framework that incorporates knowledge storage and the knowledge administration. Accordingly, the second *research question* (p. 10) of the present study is set out to address the integration of these additional components within the knowledge transfer framework which eventually extends the existing theory of knowledge transfer.

By addressing the two research questions, this study investigates some of the operational issues surrounding knowledge transfer through identifying the determinants of the choice for knowledge transfer mechanism along with prescribing an integrated and holistic knowledge transfer framework, contributing to the growing body of knowledge about knowledge transfer processes in practical terms.

2.8 Concluding summary

The literature review helps to acquaint a prospective researcher with the previous work on KM which, in turn, leads to the identification of research gaps and formulation of the research questions. This chapter reviews various issues within KM literature, which surrounds organisational knowledge, knowledge transfer, knowledge storage and knowledge administration. The chapter starts with basic issues relating to KM itself, followed by a review of the organisational knowledge literature.

It is argued that the kind of knowledge with which the present research is concerned can be referred to as 'action-oriented' knowledge. While reviewing the existing theories of knowledge, one important dimension is found neglected. Another typology based on

sources of knowledge, i.e., organisational knowledge in terms of the exogenous and endogenous sources, has been discussed.

The remainder of the chapter provides a step-by-step review of the key themes and issues of knowledge transfer, which helps to set out the research questions. Knowledge transfer, which is central to the study, is widely recognised as a strategic issue for the competitive advantage of an organisation.

Throughout the study, knowledge transfer is defined as an act of transmission of knowledge from one party to another, using a communication channel as the way in which the contributor sends knowledge and the user appears to make sense of the knowledge and thereby use it. The various issues, such as the factors influencing knowledge transfer, knowledge transfer for innovation, and knowledge transfer process, that are covered within the knowledge transfer literature, are reviewed in order to argue that knowledge transfer mechanism constitutes an important area of research.

The chapter concludes by reviewing the literature relating to knowledge storage and the knowledge administration to acquire insights so as to highlight their interplay within a holistic framework of knowledge transfer. Organisations recognise the value of knowledge storage as a major building block in accomplishing knowledge transfer. Similarly, someone such as a knowledge administrator may perform a variety of key roles, including facilitating knowledge transfer, maintaining a knowledge repository, and ensuring the availability of timely, accurate and relevant knowledge. There is a clear indication of the importance of integrating the knowledge storage and the knowledge administration as potential components within knowledge transfer framework, which may help accomplish effective knowledge transfer.

Chapter 3

Research Methodology

3.1 Introduction

Research methodology is the way social reality is looked at and studied, which eventually guides a doctoral researcher to select and design a particular research method. The research method is the means for collecting and analysing data. The importance of a robust research method is that it provides a set of verifiable procedures and techniques for the collection and analysis of data. This chapter consists of five sections. It begins with a brief overview of the research paradigm. The subsequent section addresses the rationale underlying the choice of a specific methodology, particularly qualitative research. The reasons behind employing the case study approach within the qualitative research are discussed in the following section. This is followed by a description of the research design, which covers the selection of the research site and the methods of data collection from the case organisation. The chapter ends up with a discussion of data analysis procedures which is based on an approach guided by Miles and Huberman's (1984) work.

3.2 Research paradigm

A research paradigm may be conceptualised as a set of beliefs about social reality. In order to categorise social theories, Burrell and Morgan (1979) develop a framework of research paradigms in which they classify social reality into subjective and objective paradigms. The two research paradigms comprise four sets of assumptions: ontology (i.e., the reality that a researcher investigates), epistemology (i.e., the relationship between that reality and the researcher), human nature (i.e., the relationship between human beings and their environment) and methodology (i.e., the techniques used by the researcher to investigate that reality). Within this framework, the objectivist perspective

tends to view the social world as being as concrete as the natural world, while the subjectivist viewpoint stresses the analysis of subjective accounts by getting inside situations. Table 3.1 depicts a set of assumptions about the two research paradigms as proposed by Burrell and Morgan (1979).

Table 3.1 Assumptions of subjective and objective paradigms

	Research Paradigms	
	A subjective approach	**An objective approach**
Ontology	**a nominalist ontology** Reality is socially constructed as a result of human interactions with it.	**a realist ontology** Reality is independent of human perception.
Epistemology	**an antipositivist epistemology** Reality is based on actors' direct experiences with the world.	**a positivist epistemology** Reality is structured as fixed a priori concepts.
Human nature	**voluntaristic view of human nature** Human beings might be seen as having a more creative role in the situations encountered in their external world.	**deterministic view of human nature** Human beings might be seen as responding in a mechanistic way to the situations encountered in their external world.
Methodology	**ideographic methodology** One can only understand the social world by obtaining first-hand knowledge.	**nomothetic methodology** One can only understand the social world by a search for universal laws.

Based on the above discussion, research methodologies can broadly be classified as either qualitative or quantitative in nature. Ragin (1987) characterises a basic difference between the two approaches by arguing that quantitative researchers work with a few variables and many cases, whereas qualitative researchers rely on a few cases with many variables. Resonating with this, Denzin and Lincoln (1994, p. 4) put it as follows:

> "Qualitative researchers stress the socially constructed nature of reality....Such researchers emphasise the value-laden nature of inquiry....In contrast, quantitative studies emphasise the measurement and analysis of causal relationships between variables, not processes. Inquiry is purposed to be within a value-free framework."

Along the same lines, Silverman (1998), for instance, argues that quantitative studies deal with objective variables while qualitative studies with subjective meanings. King (1996) points out that positivism seeks to test correlations between variables and interpretivism is more concerned with observation and description. In the social science literature, several authors have labelled the two approaches in various ways: quantitative vs. qualitative (van Maanen, 1979), objective vs. subjective (Burrell & Morgan, 1979), outsider vs. insider (Evered & Louis, 1981), nomothetic vs. idiographic (Luthans & Davis, 1982), etic vs. emic (Morey & Luthans, 1984), positivistic vs. phenomenological (Hussey & Hussey, 1997), and positivism vs. interpretive (Silverman, 1993; King, 1996). It is to be noted that the qualitative and quantitative approaches do not map exactly on to the subjective and objective or interpretive and positivism. The key distinction between the two approaches are set out in Table 3.2.

Table 3.2 Approaches to social research

	Social research	
	Quantitative	**Qualitative**
Concepts	Social facts	Social meaning
Methods	Positivism	Interpretivism
Major aim	Hypothesis testing	Hypothesis generation
Scope	Context-free	Context-bound
Role of researcher	Passively involved	Actively involved

(Compiled from King, 1996; Silverman, 1998; Miles & Huberman, 1994)

3.3 Choice of research methodology

This section elaborates the rationale underlying the choice of qualitative research. As noted earlier, the philosophical position of qualitative (interpretive) research is different from that of quantitative (positivist) research. Denzin and Lincoln (1994, p. 2) provide a holistic definition of qualitative research:

> "Qualitative research is multimethod in focus, involving an interpretive, naturalistic approach to its subject matter. This means that qualitative researchers study things in their natural settings, attempting to make sense of or interpret phenomena in terms of the meanings people bring to them."

Reflecting this view, Creswell (1998, p. 15) defines it:

> "as an inquiry process of understanding based on distinct methodological traditions of inquiry that explore a social or human problem. The researcher builds a complex, holistic picture, analyses words, reports detailed views of informants, and conducts the study in a natural setting."

The question is whether to employ qualitative research, quantitative research, or a combination of the two in the present study. In this connection, Strauss and Corbin (1998) argue that the decision to select a research paradigm, be it qualitative or quantitative, depends upon (i) the nature of the research question(s), (ii) the purpose(s) of the investigation, (iii) the researcher's preferences, (iv) the underlying assumptions about study, and (v) the discipline (or discourse) within which the research is located. Lee (1991) argues that the interpretive (qualitative) approach to organisational research has been gaining increasing attention as an alternative to the positivist approach. Similarly, knowledge management topics, including knowledge transfer, in relevant literature are found investigated within its social and organisational context using qualitative research method (e.g., Gilbert & Cordey-Hayes, 1996; Pan & Scarbrough, 1999; Ardichvili et al., 2003; Molina & Yoong, 2003). The rationale for the choice of qualitative research is outlined in turn.

Several authors (e.g., Marshall & Rossman, 1995; Miles & Huberman, 1994) point out that qualitative research investigates social phenomena by exploring and exploiting the experiences of the actors involved in the social situation. Miles and Huberman (1994), for example, contend that qualitative research focuses on naturally occurring ordinary events in natural organisational settings to display what real life is all about. A qualitative research approach has been chosen because the present research attempts to explore how individuals perceive things happening within an organisational context. Based on the philosophical debates raised in section 3.2, qualitative research methodology can be justified as a suitable paradigm for the present research, because:

(i) reality addressed in the study is socially constructed as a result of human interactions with it (*ontology*) which

(ii) is based on their direct experiences with the organisational setting (*epistemology*) where

(iii) they are seen as having a more creative role in the situations rather than as responding in a mechanistic way to the situations encountered in their external world (*human nature*) in which

(iv) social world is understood by obtaining first-hand knowledge (*methodology*).

Again, Creswell (1998) proposes four criteria for determining whether a strong rationale exists for choosing qualitative research. Based on Creswell's (1998) criteria, the present study warrants a qualitative approach for the following reasons:

- **The nature of research question.** The research question in a qualitative study often starts with a 'what' or a 'how' in order to describe what is going on. Parallel to this, the nature of the research questions which the present study addresses also starts with a 'what' and a 'how', creating a demand for a qualitative study.
- **The research topic which needs to be explored.** The research topic explores the factors influencing the selection of knowledge transfer mechanism along with the role of knowledge storage and the knowledge administration for effective knowledge transfer. As the variables cannot be easily identified, and existing theories do not explain such issues, the best choice appears to be a qualitative study.
- **The data collection in natural setting.** The research intends to present a detailed view of the topic and thereby requires the researcher to go to the natural setting in order to collect data. Since a significant amount of time is required to be spent on data collection in the field (i.e., case organisation), a qualitative approach is most appropriate.
- **The nature of data.** The research focuses on naturally occurring events in an organisational setting to demonstrate real life which deals with subjective meanings. Accordingly, the nature of data that needs to be collected for the study is in the form of qualitative rather than quantitative data which depends on the respondents' perception. The choice of a qualitative approach can ensure this.

3.3.1 Approaches to qualitative research

There are various qualitative research methods. Creswell (1998) argues that there are five types of qualitative study approaches, namely biography, phenomenology, grounded theory, ethnography, and the case study. Table 3.3 illustrates dimensions for comparing the five research traditions in qualitative research. The case study approach to qualitative research has always predominated as an alternative to the other traditional qualitative research methods. Corresponding well with this, Denzin (1994, p. 508), for example, contends that "the case study perspective is commonly thought of as a qualitative interpretive framework in the social sciences today". Other methods within the qualitative research are less appropriate for the present study.

For example, biography focuses on the exploration of the life of an individual which is not the case for the present research. Grounded theory involves in developing a theory grounded in data from the field. Whereas the present research addresses some of the unresolved operational issues relating to knowledge transfer which actually supports, articulates and extends the existing theory by means of a piece of empirical work. Furthermore, since the researcher is not able to participate in the organisation under study, ethnography is not suitable. As Cresswell (1998) argues that ethnography needs active participant observations and interviews in the field (e.g. 6 months to a year). The case study approach is deemed to be the most appropriate to address the research questions. The rationale for employing the case study approach for the present research is discussed next.

3.3.2 The rationale behind employing the case study style of qualitative research

The case study is considered a useful approach within the interpretive paradigm. It is widely used for qualitative data collection and analysis to investigate social phenomena by exploring the experiences of the actors involved in the social situation. One of the major proponents of this approach, Yin (1984, p. 23) defines a case study as an empirical inquiry which:

Table – 3.3 Dimensions for comparing five research traditions in qualitative research

Dimension	Biography	Phenomenology	Grounded Theory	Ethnography	*Case Study*
Focus	Exploring the life of an individual	Understanding the essence of experience about a phenomenon	Developing a theory grounded in data from the field	Describing and interpreting a cultural and social group	*Developing an in-depth analysis of a singe case or multiple cases*
Discipline origin	Anthropology, Literature, History, Psychology, and Sociology	Philosophy, sociology, and Psychology	Sociology	Cultural anthropology Sociology	*Political science, sociology, evaluation, urban studies, other social sciences.*
Data collection	Primarily interviews and documents	Long interviews with up to 10 people	Interviews with 20-30 individuals to saturate categories and detail a theory	Primarily observations and interviews with additional artefacts during extended time in the field (e.g. 6 months to a year)	*Multiple sources-documents, archival records, interviews, observations, physical artefacts*
Data analysis	Stories, epiphanies, and historical content	Statements, meanings, meaning themes, general description of the experience	Open coding, axial coding, selective coding and conditional matrix	Description, analysis, and implementation	*Description, themes, and assertions*
Normative form	Detailed picture of an individual's life	Description of the essence of the experience	Theory or theoretical model	Description of the cultural behaviour of a group or an individual	*In-depth study of a "case" or "cases"*

Source: Cresswell (1998, p. 65)

- *investigates a contemporary phenomenon within its real-life context; when*
- *the boundaries between the phenomenon and context are not clearly evident; and in which*
- *multiple sources of evidence are used.*

Eisenhardt (1989, p. 534) argues that "the case study is a research strategy that focuses on understanding the dynamics present within single settings". Resonating with this, Cavaye (1996, p. 229) maintains that such an approach has two necessary elements: (i) it does not explicitly look for controlling or manipulating variables; (ii) it studies a phenomenon in its natural setting. Several scholars, most notably Eisenhardt (1989), Bell (1993), and Yin (1984), identify the benefits of employing the case study method. As Bell (1993, pp. 10-11) puts:

> "The great strength of the case study method is that it allows the researcher to concentrate on a specific instance or situation and to identify, or attempt to identify, the various interactive processes at work. These processes may remain hidden in a large-scale survey."

Yin (1984), for example, points out that the case study approach can be used for all three purposes: exploratory (i.e., exploration of several key issues of the social phenomena), explanatory (i.e., explaining why the things happening in the natural setting), or descriptive (describing the experiences of the actors involved in the social situation). Resonating with this, Eisenhardt (1989, p. 535) suggests that such a research approach is useful to accomplish several aims including (i) providing description, (ii) generating theory, and (iii) testing theory. The present study starts with providing descriptions of the actors' experiences regarding knowledge transfer activities involved at the case organisation, and ends with generating developments of theory through supporting, articulating and extending the existing theories of knowledge transfer. According to Strauss and Corbin (1998, p. 15), 'theory' is "a set of well-developed concepts related through statements of relationship, which together constitute an integrated framework that can be used to explain or predict phenomena". The present research addresses some of the unresolved operational issues relating to knowledge transfer and attempts to account for observed phenomena. However, the study will not

generate a new theory. Rather it will, in the words of Whetter (1989), "improve what already exists". The anticipated result of the process of data collection and analysis is development of a substantive theory (see 6.5.1).

Yin (1984) also suggests that the case study research is suitable to address research questions that focus mainly on the "what", "how", and "why" of a phenomenon. Another point that several researchers (e.g., Yin, 1984; Benbasat et al., 1987; Eisenhardt, 1989) mention is the fact that such research method is useful when the study is exploring a contemporary event or phenomenon within its real-life context, where there is not already an established base. Eisenhardt (1989), for example, asserts that this research approach is especially appropriate in new topic areas.

Yin (1994, pp. 147-152) suggests five characteristics that exemplify case study research: (i) the case study must be significant; (ii) the case study must be "complete"; (iii) the case study must consider alternative perspectives; (iv) the case study must display sufficient evidence; and (v) the case study must be composed in an engaged manner. Yin (2003) also proposes two conditions in choosing the case study approach. Drawing on Yin's (2003) conditions, the present research fulfils them, providing a strong rationale for choosing the case study approach.

- **The exploration of key variables relating to social phenomena.** The nature of the present study is to explore what the variables are that affect the choice of knowledge transfer mechanism, and also how the significant relationship of knowledge storage and the knowledge administration can be incorporated into an integrated framework of knowledge transfer process. As mentioned earlier, Yin (2003) argues that the case study approach is useful when the research explores several key issues of the social phenomena. Parallel to this, the nature of the research questions which the present study addresses also is to explore the key variables relating to knowledge transfer, the best choice appears to be a case study approach.
- **The focus of the research is on contemporary phenomenon.** Knowledge transfer is a recent phenomenon in an organisational context as a topic of knowledge management research, which itself is a

> contemporary discourse and still lacks a coherent theoretical foundation (e.g., Ipe, 2003; Holtshouse, 1999). Yin (2003) also contends that case study is appropriate when the focus of the research is on contemporary events or phenomena within its real-life context. The present research fulfils the condition, providing a strong rationale for choosing the case study approach.

Therefore, the case study methodology of qualitative research is chosen to guide the collection of data from the organisation being studied, and analysis of data in order to support the investigation and to address the two research questions (see pp. 8-10). Most specifically, Yin's (2003) approach of case study is drawn upon as the 'central' research method, with certain tools and techniques for data analysis drawn from Miles and Huberman (1994). These are discussed in the subsequent sections.

3.4 The rationale underlying the selection of the research site and respondents

One of the important issues in any qualitative research including the case study is the selection of a research site. The way in which the research site and the respondents of the case organisation are selected will be discussed in this section. Yin (1984) argues that case studies can involve either single or multiple cases, and numerous levels of analysis. Miles and Huberman (1994, p. 27) suggest "much qualitative research examines a single "case," some phenomenon embedded in a single social setting". In the present study, a single site is chosen. There are a number of reasons for this decision. Denscombe (2004) makes a strong argument in favour of a single research site in order *to gain insights* from looking at the individual case. As Denscombe (2004, p. 30) put it:

> "the logic behind concentrating efforts on one case rather than the many is that there may be insights to be gained from looking at the individual case that can have wider implications and, more importantly, that would not have come to light through the use of a research strategy that tried to cover a large number of instances- a survey approach".

Patton (1990) suggests selecting an organisation which appears to provide the opportunity *to learn a great deal about the issues* central to the research. One other

reason for selecting one research site is because it is *accessible*. In addition, a single case organisation is also considered *manageable*.

For the present study, one large multinational corporation drawn from the high tech computer-related field is chosen purposefully. The case organisation is a division of IBM. The IBM's software development laboratory is based at Hursley near Winchester in the south of the United Kingdom (see details about the case organisation in sections 4.2 and 4.3). Henceforth the acronym IBM will be used in the thesis to refer to this IBM Hursley Lab. The case organisation under study allows its identity to be revealed. The IBM Lab fulfils the four ideal conditions for research site selection as prescribed by Marshall and Rossman (1995, p. 51):

(i) **Easy access to the research site.** The researcher is not restricted in access to the IBM Hursley site and could visit any department of the organisation;

(ii) **A rich mix of processes, people, programs, and interactions is prevalent.** The IBM Lab itself appears to be the mixture of people, technology, process and project in a sense they are closely interrelated and interdependent;

(iii) **The ability to build trusting relations with the respondents in the study.** The respondents are found very cooperative and helpful in providing data in terms of describing their experiences and perceptions about what is happening in the organisation setting, although precise measurement of, for example, trust is beyond the scope of the study; and

(iv) **Data quality and credibility of the study are assured.** Data quality and credibility of the present research are reasonably assured through several visits and cross-checking. No restrictions are placed on the number of visits.

IBM is one of the 20 companies which is most revered for creating, using and sharing knowledge by Fortune 500 executives (Wilson, 2002). Furthermore, the organisation has a stated motive to make effective use and transfer of its knowledge among its members in its mission statements (Scheepers et al., 2004). Like many other Knowledge Intensive Firms (Jasimuddin et al., 2005d), the salient features of IBM include the following: its critical asset is knowledge, its employees maintain face-to-face interaction with clients, and it provides intangible output. Table 3.4 depicts several factors that appear to be crucial in explaining the case organisation.

Table 3.4 The salient features of IBM

Factors	IBM
The contexts in which it operates	High tech
The nature of the services it renders	Software and other high tech solutions
Corporate objective	Profit motive oriented
The nature of ownership	Private enterprise
Major input	Knowledge
Interaction with client	Moderate
Output	Mostly intangible

Additionally, knowledge transfer among organisation members, which constitutes the present research, is perceived to be a strategic issue for its competitive advantage. Knowledge storage is also crucial at IBM. IBM is involved in software development and computer manufacturing. Software development is the outcome of the collective efforts of software developers, testers and others who are expert particularly in computer science. Their main work is accomplished by sitting in front of workstations so their main activity goes along with interacting machines. Despite that, there is a great deal of interaction with people and involvement with non technical activities. As a result, sharing their knowledge is found as a part of their job which involves frequent interaction among them with and without using technology. The following section identifies how respondents are selected.

3.4.1 The respondents at IBM Hursley Laboratory

Miles and Huberman (1994, p. 35) state that "many qualitative studies involve single cases, with few people involved". Sale et al. (2002) argue that in qualitative research samples are not meant to represent large populations. Instead, as Reid (1996) points out, small, purposeful samples of respondents can be used. In line with this, Miles and Huberman (1994, p. 27) also comment that "As much as you might want to, you cannot study everyone everywhere doing everything". So Kuzel (1992) recommends that qualitative samples should be purposive, rather than random. This corresponds well with Patton (1990), who argues that purposeful sampling can be used to select the respondents for qualitative research in order to allow themes or patterns associated with the research questions to emerge and thereby to answer the questions. Therefore, the selection of the respondents for the present study is purposefully driven.

In this study, 41 interviews were taken in IBM's software development laboratory representing both the contributors and users of knowledge. The respondents were selected from various levels of the laboratory, namely software developers, first-line managers and second-line managers working in various departments and projects, so as to provide a broad representation of those involved. The distribution of interviews based on job function is shown in Table 3.5.

Table 3.5 The distribution of interviewees based on job function

The respondents were involved in	**Number of Interviews**
Managing a department/project (including second line managers)	7
Leading a team or a group of developers/testers	13
Developing, designing, coding and testing software	21
	41

Some of the interviewees were contacted and interviewed more than once during the first phase of interviews (see section 3.5.1) in order to get further clarification of their interviews, to cross check the collected data, to identify transcription errors (Neuman, 2000), to verify the transcripts with them, and to explain new issues and themes, such as hoarding of knowledge, knowledge as a political weapon, office plan, ways of inviting others for interaction, management support, publishing paper, hybrid approach to knowledge transfer, etc. Then some of the respondents were again interviewed during a second phase to validate the collected data (Yin, 2003) and to confirm the findings (Miles & Huberman, 1994).

The respondents participated voluntarily. There was no apparent reason why they would have anything to fear from this interview process. The issues relating to the interviews were discussed with each informant in the beginning so as to allow the respondents to express themselves freely, in relation to their personal experiences.

3.5 Data collection methods

Data collection is a series of interrelated activities that a qualitative researcher uses in collecting appropriate data so as to obtain answers to the research questions. Like all other approaches to the qualitative research, a case study approach calls for the collection of data by using interviews, field observations, documents or a combination of these methods. Creswell (1998, p. 123) suggests "a case study involves the widest array of data collection as the researcher attempts to build an in-depth picture of the case". Consistent with this, Eisenhardt (1989, p. 534) asserts that case study approach typically combines data collection methods including interviews, observations, and archives.

Denzin and Lincoln (1994, p. 2) argue that 'triangulation', based on the collection of data from multiple sources, helps secure an in-depth understanding of the phenomena in question. Miles and Huberman (1994, p. 29) quote "We observe, talk to people, and pick up artefacts and documents" during the collection of data. Moreover, the use of multiple data sources also enhances construct validity and reliability. With this in mind, data is collected for this research from multiple sources including interviews, documents, and observations, which are now outlined in turn below.

3.5.1 Interviews

Interviewing has become a widely accepted method of data collection in qualitative research as it provides a situation where the participants' descriptions can be explored. There are three types of interviewing: structured, semi-structured, and unstructured. According to Fontana and Frey (2000, p. 653), "structured interviewing aims at capturing precise data of a codable nature in order to explain behaviour within pre-established categories that may limit the field of inquiry". Miles and Huberman (1994, p. 35) point out that "structured interview schedule may restrict the researcher to the research site whereas if the important phenomena or underlying constructs at work in the field are not in the instrument, they will be overlooked or misrepresented".

On the other hand, unstructured interviewing "attempts to understand complex behaviour without imposing any prior categorisation" (Fontana & Frey, 2000). The

semi-structured (open-ended) interview is in between the two. Yin (2003) emphasises the use of semi-structured interview schedule. Because semi-structured interviews have become the preferred method for qualitative research in a whole range of areas and disciplines (Silverman, 1998). Since the present research is largely exploratory in nature, a semi-structured interview schedule is chosen, and thereby the interviews are the key source of evidence for the research.

A semi-structured interview schedule is developed from issues derived from the knowledge management literature (see the Interview Package Appendix A). After having reviewed relevant literature (reported in Chapter 2), the researcher identifies the research gaps which need to be addressed. The two research questions (pp. 8-10) are formulated which help to generate conceptual frameworks that explains graphically the main things studied – the key factors or constructs and the presumed relationships among them. Miles and Huberman (1994, p. 55) suggest that "the conceptual frameworks and research questions are the best defence against overload".

During the negotiation with the IBM, the tape recording of the interviews was raised. Interviews were tape recorded and interviewees were assured that the contents of the interviews will remain confidential. All of the respondents allowed their interviews to be taped. A total of 41 interviews, including 11 follow-up interviews, were conducted at the IBM Hursley laboratory. The research was carried out in two phases over a six-month period. The first phase of the interview lasted between July and October 2004. During this phase, 30 interviews were carried out.

The interviewees were asked questions like how they perceive the knowledge transfer process at IBM, which mechanisms they believe effective to carry out the transfer of knowledge and why, and their perception regarding the importance of knowledge storage and the knowledge administration within a knowledge transfer framework. The contents of the interview schedule were discussed with each informant at the beginning of the interview and session continues until all the issues surrounding the interview schedule were covered. In most cases, the sequences of questions of the schedule were not maintained. But the respondents were also given flexibility to discuss the issues as they liked to proceed.

The use of open questions allowed the respondents freedom to continue the discussion in their way. The interview protocol was used as an interview guide during the collection of data from the respondents. The nature of semi-structured interview schedule also allowed a number of other issues to emerge (see p. 59). Afterwards, the transcribed data were also verified with some of the interviewees to (i) get further clarification, (ii) cross-check, and (iii) identify transcription errors (Neuman, 2000).

The second phase of the interviews took place from November to December 2004. During this phase 11 interviews were conducted in order to validate the data collected during the first phase (Yin, 2003), ensure reliability (van de Ven & Poole, 1990), and to confirm the findings derived from the first phase interviews (Miles & Huberman, 1994). The second phase of interviews was more focused theory-driven with what Miles and Huberman (1994, p. 35) call "a well-bounded sample of persons".

The selection of the second round interviewees was made in two stages. In the beginning, the researcher listed the names of the interviewees guided by the Contact Summary Sheet, one of the eight analytical methods of Miles and Huberman (1994, p. 51) who define it as "a single sheet with some focusing or summarising questions about a particular field contact". The researcher's perception about the depth of interviewees' knowledge recorded in the summary sheets also helped to select these people. After having forwarded the list of prospective interviewees to the IBM, 11 interviews were arranged following the process. Table 3.6 depicts the phase-wise interviews.

Thus the present research also involves what Miles and Huberman (1994) call a confirmatory study to validate and confirm the findings. Miles and Huberman (1994, p. 35) contend that within a given study, there can be both exploratory and confirmatory aspects in which "exploration often called at the outset and confirmation near the end". Since the study has both exploratory and confirmatory aspects, the research starts with exploration during the first phase of the interviews and ends with confirmation at the second phase of the interviews. The confirmatory study is done with the help of another interview schedule (see Appendix-B).

In both phases, the interviews were tape recorded which lasted from one hour to one and a half hours each, and subsequently transcribed. Most of the interviews were undertaken

in the respondents' office room and a few in formal meeting/discussion rooms. These were supplemented by social interaction in the cafeteria during lunch and sometimes in-between interviews.

Table 3.6 The respondents of the study

The nature of respondents	Interviews		Total Number of Interviews
	Phase I	Phase II	
Managers	4	3	7
Team leaders	9	4	13
Software developer and tester	17	4	21
	30	11	41

3.5.2 Observations

Observational evidence helps supplement interviews in case study research. So observation is also used as another method of data collection in this research. It is to be noted that observational methods can range from complete participation to complete observation. As Wilson (1990, p. 5) puts it:

> "All methods of research are ultimately substitutes for the fundamental method of observation....In social research we either observe people and events directly, or we ask them to inwardly observe their states of mind and memories and to report what they find there."

Observation can be formal, such as the observation of meetings, or less formal, such as any observation made during a field visit (Yin, 1994, p. 87). Complete participation (i.e., participant observation) with the actors in the research site was not allowed by the case organisation during the collection of data. Therefore, a non-participant role was taken for this study. However, respondents were actually observed while they were working and giving interviews. Moreover, in the restaurant inside the IBM Hursley Lab, the people were also observed. The field notes from these observations were subsequently used to verify or elaborate the interview data (Pan & Scarbrough 1999, p. 364).

3.5.3 Documents

Documents can be useful in producing additional information, while complementing interviews and field observations in case study research. Documentation review is useful to substantiate interviews and observations. During the visit to IBM, different types of documents ranging from internal to publicly available documents were collected to view and analyse. Archival data in the forms of articles and promotional materials were also collected from web pages. The contents of these materials were also utilised during data analysis.

3.6 Data analysis methods

The data analysis procedure within the case study employed in this research is based on the approach proposed by Miles and Huberman (1984; 1994). Eisenhardt (1989, p. 532) points out that "Miles and Huberman (1984) codified a series of procedures for analysing qualitative data". Miles and Huberman (1984) define qualitative data analysis as a combination of three concurrent flows of activity: (i) data reduction, (ii) data display, and (iii) conclusion drawing/verification. Eisenhardt (1989, p. 534) notes:

> "Miles and Huberman (1984) have outlined specific techniques for analysing qualitative data. Their ideas include a variety of devices such as tabular displays and graphs to manage and present qualitative data, without destroying the meaning of the data through intensive coding."

Miles and Huberman (1994) provide a comprehensive roadmap to qualitative data analysis using data displays in the form of networks, matrices, charts and graphs. They (p. 59) describe eight main methods that are useful for early data analysis: (i) Contact Summary Sheet, (ii) Codes and Coding, (iii) Pattern Coding, (iv) Memoing, (v) Case Analysis Meeting, (vi) Interim Case Summary, (vii) Vignettes, and (viii) Prestructured Case. They suggest that these techniques help organise data for later, deeper analyses and to use for the displays. It is observed that such an approach to data analysis is becoming popular in management studies, particularly KM research (e.g., Scheepers et al., 2004; Desouza, 2003; Hasan, 1999), as shown in Table 3.7.

Table 3.7 Examples of previous studies that use approaches to data analysis based on Miles and Huberman (1984)

Authors	Title	*Name of Journal/Book*	Vol. (No.), pp.
Scheepers et. al. (2004)	Knowledge strategy in organizations: refining the model of Hansen, Nohria and Tierney	*Journal of Strategic Information Systems*	13, 201-222
Desouza (2003)	Strategic contributions of game rooms to knowledge management: some preliminary insights	*Information & Management*	41(1), 63-74
Hasan (1999)	The Mediating role of a technology in making sense of information in a knowledge-intensive industry	*Knowledge and Process Management*	6 (2), 72-82
Baurmard (1996)	Organizations in the fog: An investigation into the dynamics of knowledge	*Organization Learning and Competitive Advantage*	Chapter 4, 74-91
Ardichvili et. al., 2003	Motivation and barriers to participation in virtual knowledge-sharing communities of practice	*Journal of Knowledge Management*	7(1), 64-77

Eng (2004, p. 91) suggest that the actual process of data analysis of qualitative research begins during the collection of the data in an iterative manner. Miles and Huberman's suggested streams of data analysis are interwoven before, during, and after data collection in parallel form. Miles and Huberman's (1984) three steps of data analysis are discussed below.

3.6.1 Data reduction

Data reduction is the first step suggested by Miles and Huberman, incorporating the process of selecting, focusing, simplifying, and coding of the data that appear in transcriptions of interviews, observations, and written-up field notes. In the words of Miles and Huberman (1994, p. 11), data reduction is "a form of analysis that sharpens, sorts, focuses, discards and reorganises data in such a way that 'final' conclusions can be drawn and verified".

After having transcribed the taped interviews, the transcripts were coded to extract themes from the data, and the themes were then interpreted to give a greater understanding of the issues, which eventually helped address and answer the research questions. The key initial issues were identified and coded after having read the content of the transcripts of all the interviews and observation notes (Desouza, 2003). Transcripts of interviews, observations and field notes were compressed during data reduction using the researcher's interpretation of events, documents and interview material.

Among the analytical tools and methods proposed by Miles and Huberman (1994), Contact Summary Sheet, Codes and Coding, Pattern Coding, and Interim Case Summary were found appropriate and thereby used to organise and reduce the transcripts of the interviews for deeper analyses and to use later in the displays. Other methods, for example, Case Analysis Meeting are less appropriate for the present study. This tool is good for a study which has multiple cases, while it is not the case of the present research which is based on a single case organisation. The following section shows how 'tools' suggested by Miles and Huberman informed the analysis.

3.6.1.1 Codes and Coding

According to Miles and Huberman (1994, p. 56), coding is analysis and codes are tags or labels for assigning units of meaning to the descriptive or inferential information compiled during a study. In this research, codes are attached to "chunks" of varying size – words, phrases, sentences, or whole paragraphs of a transcript of the interviews. These codes describe the phenomena in transcribed interviews. A sample of transcripts of an interview and coding is given in Appendix-C. Miles and Huberman (1994, p. 56) argue that codes "can take the form of a straightforward category label or a more complex one (e.g., a metaphor)." In this research, two phases of coding – initial coding and pattern coding- were used. Initial codes take the form of a straightforward category label "without destroying the meaning of the data through intensive coding" (Eisenhardt, 1989, p. 534). However, in some cases, as shown in Appendix C, meaningful phrases are also assigned as codes as prescribed by Miles and Huberman (1994, p. 58).

In the present study, coding was not put off to the end of data gathering (Miles & Huberman, 1994 p. 66). Rather immediately after an interview was conducted, the researcher transcribed it, followed by writing up the Contact Summary Sheet. Qualitative research depends heavily on ongoing analysis, and coding is a good device for supporting that analysis. The codes were used to retrieve and organise the chunks of sentences.

3.6.1.2 Pattern Coding

Miles and Huberman (1994, p. 57) argue that after having a set of codes that describe the phenomena in transcribed interviews, the second level of analysis, i.e., pattern coding, starts. In the present research, the process of pattern coding was undertaken immediately after all the interview transcripts were coded. Miles and Huberman (1994, p. 69) define pattern coding as "a way of grouping those summaries into a smaller number of sets, themes, or constructs". A sample of pattern coding is given in Appendix-D.

Codes generated during first level of analysis (section 3.6.1.1) were reviewed based on the issues which were found to be frequently mentioned by the respondents, and

grouped together into categories. The issues derived from initial coding (i.e., first level of analysis) were used to deduce key themes that were common or recurring. They included picking up a word or phrase indicating the inferred theme or pattern. Such categorisation helped to identify themes pertaining to each of the two research questions.

Pattern coding helps the researcher to reduce large amounts of data into a smaller number of analytic units, and assists analysis (Miles & Huberman, 1994 p. 69). The pattern codes also help the researcher to analyse data visually, say in a network display, showing how the components interconnect (see Chapter 4).

3.6.1.3 Contact Summary Sheet

The Contact Summary Sheet is another of Miles and Huberman's tool. Miles and Huberman (1994, p. 51) define a Contact Summary Sheet as "a single sheet with some focusing or summarising questions about a particular field contact". It was also used to select the second round interviewees, those whom Marshall and Rossman (1989, p. 94) call elites who are "considered to be the influential, the prominent, and the well-informed people in an organisation". Moreover, follow-up questions were asked to the 'Elites' through sending Emails or arranging a brief meeting when further clarification was necessary. A sample of the Contact Summary Sheet is given in Appendix-E. The process of selecting such respondents for the second round interviewees is discussed in section 3.5.1 (p. 62).

3.6.1.4 Interim Case Summary

An Interim Case Summary is an analytical method described by Miles and Huberman (1994) which was also used in the present research. Miles and Huberman (1994, p. 79) define the Interim Case Summary as "a provisional product of varying length (10-25 pages) that provides a synthesis of what the researcher knows about the case and also indicates what may remain to be found out." The initial draft of Chapter 4 was considered as Interim Case Summary for the present research. It is "the first attempt to derive a coherent, overall account of the case" (Miles & Huberman, 1994 p. 79). In line with Miles and Huberman's prescription, such a summary helped the researcher (i) to

review the preliminary findings, (ii) to have a careful look at the quality of data supporting them, and (iii) to prepare the agenda for the next wave of data collection (the second round of data collection), if a respondent is to be contacted. A sample of the Interim Case Summary is given in Appendix-F.

Although computer assisted qualitative data analysis software (CAQDAS) packages, such as the Ethnograph, ATLAS, and NUDIST are available to help analyse data, the data analysis of the present study was conducted manually. Other researchers attempting to use these software packages have found them difficult to use. For example, Harwood (2001, pp. 80-81) attempted to use such packages in his doctoral research but failed to resolve the problems that he faced in their use. In his words: "due to frustration at the level of inefficiency and lack of progress, the researcher resorted to a manual method of coding" (p. 81). However, in the present study word processing software was used extensively during the transcription of interviews and also for drawing conclusions and verification.

3.6.2 Data display

As mentioned in section 3.6, within procedures prescribed by Miles and Huberman (1994) the second major flow of data analysis activity is data display. Data display refers to "a visual format that presents information systematically so that the user can draw valid conclusions and take needed action" (Miles & Huberman, 1994, p. 91). Collis and Hussey (2003, p. 253) contend that it is more appropriate to convert the text into diagrams and illustrations for analysis and presentation. Displaying data is the process of representing reduced data pictorially that thereby aids the drawing of conclusions and action.

Miles and Huberman (1994, p. 93) argue that the building of formats for displaying qualitative data can be as various as the imagination of the research analyst. However, these formats can fall into two major families: *matrices*, with defined rows and columns, and *networks*, with a series of "nodes" which are linked by arrows. The display format is always driven by the research questions involved and the concepts that emerge in the form of codes. During the analysis in the present study, the data are

displayed using networks. A network is perceived as the most appropriate to display concepts and themes that emerge in the form of codes as it fits the research findings.

3.6.3 Conclusion drawing and verification

The final stage of the data analysis process suggested by Miles and Huberman is concerned with drawing conclusions and verifying them. The present research explores a series of displays for drawing and verifying descriptive conclusions about the phenomena in a bounded context that make up a single case organisation (Chapters 4 and 5). As mentioned earlier, data reduction helps to identify the direction of the emerging themes, which eventually go into a data display using a format (e.g., network).

According to Miles and Huberman (1994, p. 100), conclusions can be drawn through noting patterns (themes) or building a logical chain of evidence. Afterwards, there is the verification issue for the conclusions drawn. As Miles and Huberman (1994, p. 11) put it:

> *Conclusion drawing, in our view, is only half of a Gemini configuration. Conclusions are also verified as the analyst proceeds. Verification may be as brief as a fleeting second thought crossing the analyst's mind during writing, with a short excursion back to the field notes, or it may be thorough and elaborate, with lengthy argumentation and review among colleagues to develop "intersubjective consensus".*

3.6.4 Data analysis tools of Miles and Huberman: a continuous, iterative process

Based on the descriptions of the ways in which the data were analysed using Miles and Huberman's tools, it can be said that Miles and Huberman's tools for data analysis provides a continuous, iterative process in which a researcher has to go back and forth in order to reduce the collected data, display them using a format (e.g., network) and then draw conclusions and verify them. Figure 3.1 demonstrates the three types of data analysis activity along with data collection activity, which form an interactive, cyclical

process. Collis and Hussey (2003, p. 267) argue that "the Miles and Huberman approach spans not only the analysis of qualitative data, but also influences the entire research design from the beginning to the writing of the final report". Galliers (1992) also supports this, arguing that the qualitative analyst who applies an approach based on Miles and Huberman moves around these four "nodes" during the collection and analysis of data. This is the case for the present research.

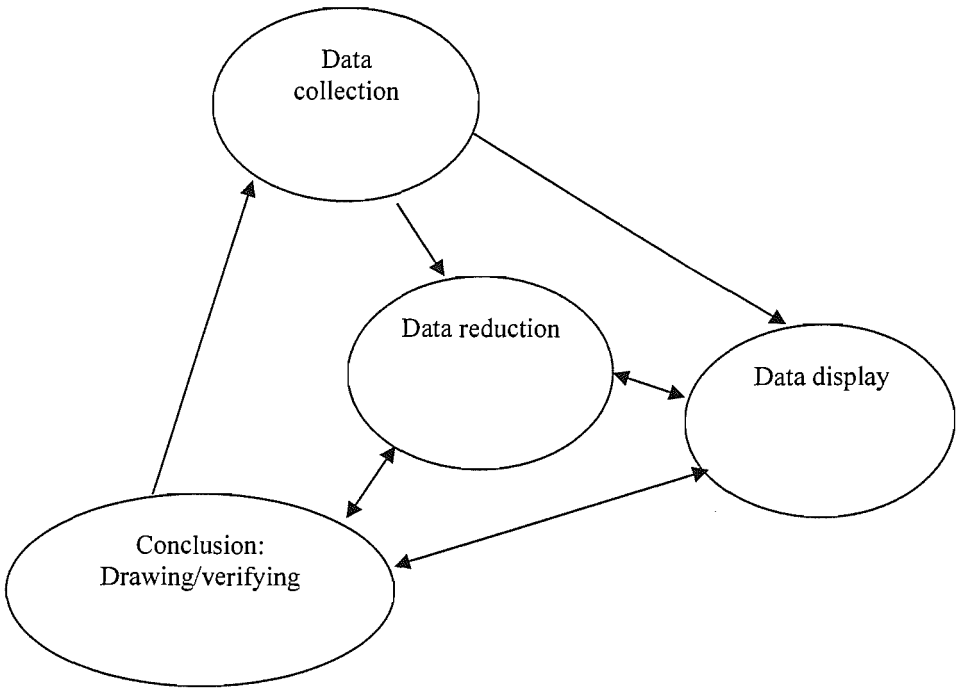


Figure 3.1 Components of data analysis: Interactive model
(source: Miles & Huberman, 1994, p. 12)

In the present study, the data collection and reduction led to new ideas, which went into a network by adding nodes to it and then drew and verified the conclusions (see sections 3.5.1, 3.6.1 and 3.6.2). In short, following the transcription of the first phase interviews, the preliminary analysis was undertaken through the data reduction process. Several network formats were developed in order to display the preliminary findings of the study. Displayed data in the form of networks (see Appendix B) were used during the

second phase of interviews in order to provide deeper analyses and to draw conclusion and verification. The second confirmatory phase of the interviews was conducted with the interviewees from among the previous respondents, which Miles and Huberman call "confirmatory" part of the study. The final stage of data analysis actually involved the refinement of the findings and the frameworks in order to draw and verify conclusions

3.7 Interviewer bias

Miles and Huberman (1994, p. 35) point out that "a biased researcher will ask partial questions, take selective notes, make unreliable observations, and skew information". Keeping this in mind, the researcher was careful in handling bias during data collection and data analysis process. Researcher bias was minimised through (i) asking all the issues surrounding the interview protocol, even if not in sequence, and (ii) the creation of an environment in which the respondents were allowed to express their views and perceptions regarding the issues rather than the researcher restricting their replies to particular issues and themes.

Furthermore, the "interview information pack" is distributed to the prospective respondents in advance via the *IBM contact*. Immediately before the commencement of formal interview session, there are exchanges of information between the researcher and the individual respondent regarding their personal and professional background, the purpose of the research, the methods of data collection, and confidentiality and anonymity. These help the respondents to get a uniform introduction to the research area and process, and minimise aspects as such the Hawthorn effect and other influences of researcher bias.

3.8 Concluding summary

In this chapter, the methodology used in the research has been discussed and also the justification and the rationale underlying its employment was explained. Figure 3.2 provides a pictorial overview of the research methodology of the study. The chapter

commences by describing the research paradigm with the realisation that a choice has to be made regarding how to conduct the study which requires a significant amount of time to be spent on data collection in the natural setting. The rationale behind the use of the case study approach to qualitative research has been explained.

The chapter also provides the justification for the selection of a case organisation. IBM's software development laboratory is chosen as the case organisation because it has a stated motive in its vision to encourage its members to transfer knowledge. Furthermore, the factors that are found in the literature as potential influences on knowledge transfer and knowledge storage have also been reflected at IBM.

The rest of the chapter has described the way in which the data are collected from the IBM lab and subsequently analysed. Data for the study is collected utilising interviews, observations, and documents, which ensure triangulation. However, the main data collection method used is in-depth semi-structured interviewing. Interviews are taped and transcribed. After having transcribed the interviews, the transcripts are coded and analysed to extract themes and patterns to address the research questions. Yin's (2003) approach of case study is drawn upon as the 'central' research method, with certain procedures for data analysis drawn from Miles and Huberman (1994).

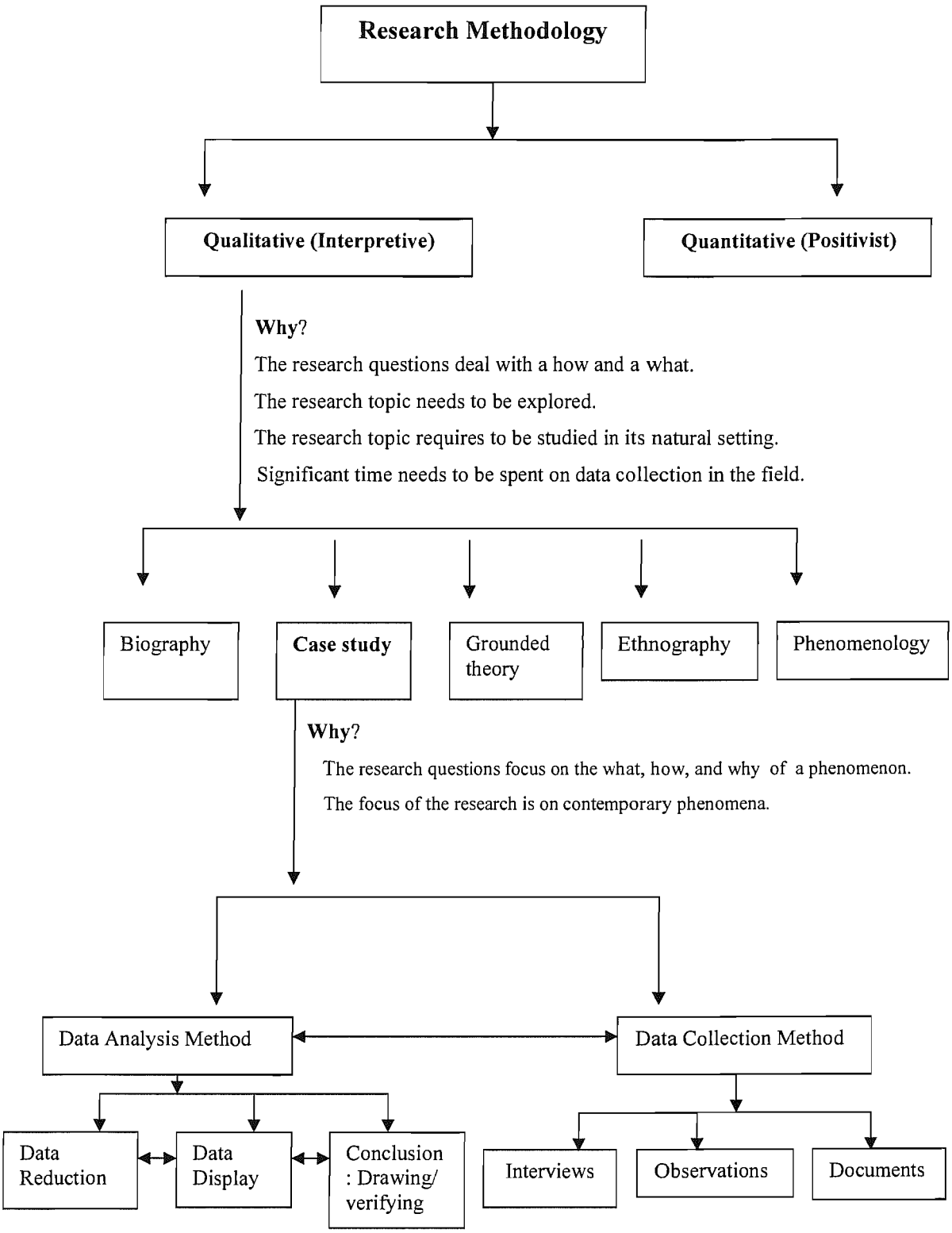


Figure- 3.2 Research methodology for the present research

Chapter 4

An Analysis of Knowledge Transfer at IBM Hursley Laboratory

4.1 Introduction

This chapter describes the research themes and issues that emerged during data collection and analysis. The objective of this chapter is to better understand the variables that help determine the choice of an approach to knowledge transfer, and also to indicate how an integrated framework supporting the connectivity of knowledge storage and knowledge administration within the knowledge transfer process could be implemented to ensure effective knowledge transfer.

Chapter 4 starts with an overview of knowledge transfer activities at IBM, before giving an account of the determinants of choice of media of knowledge transfer. The subsequent section outlines the perceived importance of knowledge storage for effective knowledge transfer along with the problems associated with knowledge repositories. The chapter ends by highlighting the role of knowledge administrator or equivalent in carrying out knowledge transfer and maintaining the knowledge repository.

The empirical findings of the study are the focus of Chapter 4, based on a continuous, iterative process prescribed by Miles and Huberman (1984) that reduces the data collected and displays them using a coherent format (e.g., network). Following the transcription of the first phase interviews, the preliminary analysis is undertaken through the data reduction process (see section 3.6.1), leading to address the research questions. Several network formats are developed in order to display the preliminary findings of the study, which forms a basis for the development of a conceptual framework of knowledge transfer (Chapter 5).

4.2 Overview of IBM

According to Creswell (1998, p. 153), "for a case study approach, data analysis consists of making a detailed description of the case and its setting". In line with this, an overview of the case organisation (IBM) and a sound contextual base for the case study will follow. International Business Machines (IBM) is the world's biggest computer manufacturer. IBM is a Fortune 100 multinational corporation, employing 100,000 staff in Europe, with about 26,000 of those working in the United Kingdom. The company incorporated in 1911, starting as a major producer of punch card tabulating machines. In the 1930s, IBM built a series of calculators based on their card processing equipment. In 1944, the corporation co-sponsored the Mark 1 computer (together with Harvard University), the first machine to compute long calculations automatically. In 1981, IBM created its first personal home-use computer called the IBM PC. IBM is now playing a critical role in the development and application of new devices that are revolutionising information technology (IT).

As the leader in worldwide e-business, IBM regards itself as the largest and most advanced source of IT services anywhere (http://www.pc.ibm.com/). The company is responsible for numerous inventions having to do with computers. IBM regards knowledge management as an important part of its work. Much of its research and development work is carried out in research laboratories through the world.

4.3 Research Site: IBM Hursley Laboratory

The case organisation, IBM's software development laboratory, is based at Hursley near Winchester in the south of the United Kingdom. With a worldwide reputation for innovative products and services, IBM Hursley Lab plays a key role in establishing IBM as the leader in e-business; "pushing the boundaries of e-business is a way of life at IBM Hursley Laboratory" (http://www-5.ibm.com/uk). Its mission statement is "to lead in the creation, development and manufacture of the industry's most advanced ITs including computer systems, software, networking systems, storage devices and microelectronics; and to translate these technologies into value for its customers through its professional solutions businesses worldwide" (http://www-5.ibm.com/uk). It also

perceives the transfer of knowledge as being an important part of its vision. "IBM e-business software developed in Hursley is critical around the world. Promoting IT is a priority for IBM Hursley" (http://www-5.ibm.com/uk). A brief description of IBM was presented in pp. 57-58. In the following sections, this discussion is expanded to develop five important features of IBM and knowledge management in order to provide a contextual base for the case study:

Organisational knowledge at the research site

Overview of job descriptions

IBM and knowledge transfer

Motivations for knowledge transfer at IBM

Management actions that support knowledge transfer

4.3.1 Organisational knowledge at the research site

The view of knowledge typologies developed in Chapter 2 makes a distinction between endogenous knowledge and exogenous knowledge. The ability to acquire and manage knowledge depends on the type of knowledge source. The empirical part of this thesis is about endogenous knowledge at IBM. Endogenous knowledge is expected to be based within single culture (see p. 28). Figure 4.1 depicts internal sources of knowledge at IBM.

	Tacit knowledge	**Explicit Knowledge**
Endogenous Source	The skills, ideas, expertise and experiences of IBM employees'	Design manuals, codes of practices, guidelines, products and patents and other published materials available to the employees and knowledge storage within IBM

Figure 4.1 Internal Sources of Knowledge at IBM

4.3.2 Overview of job descriptions

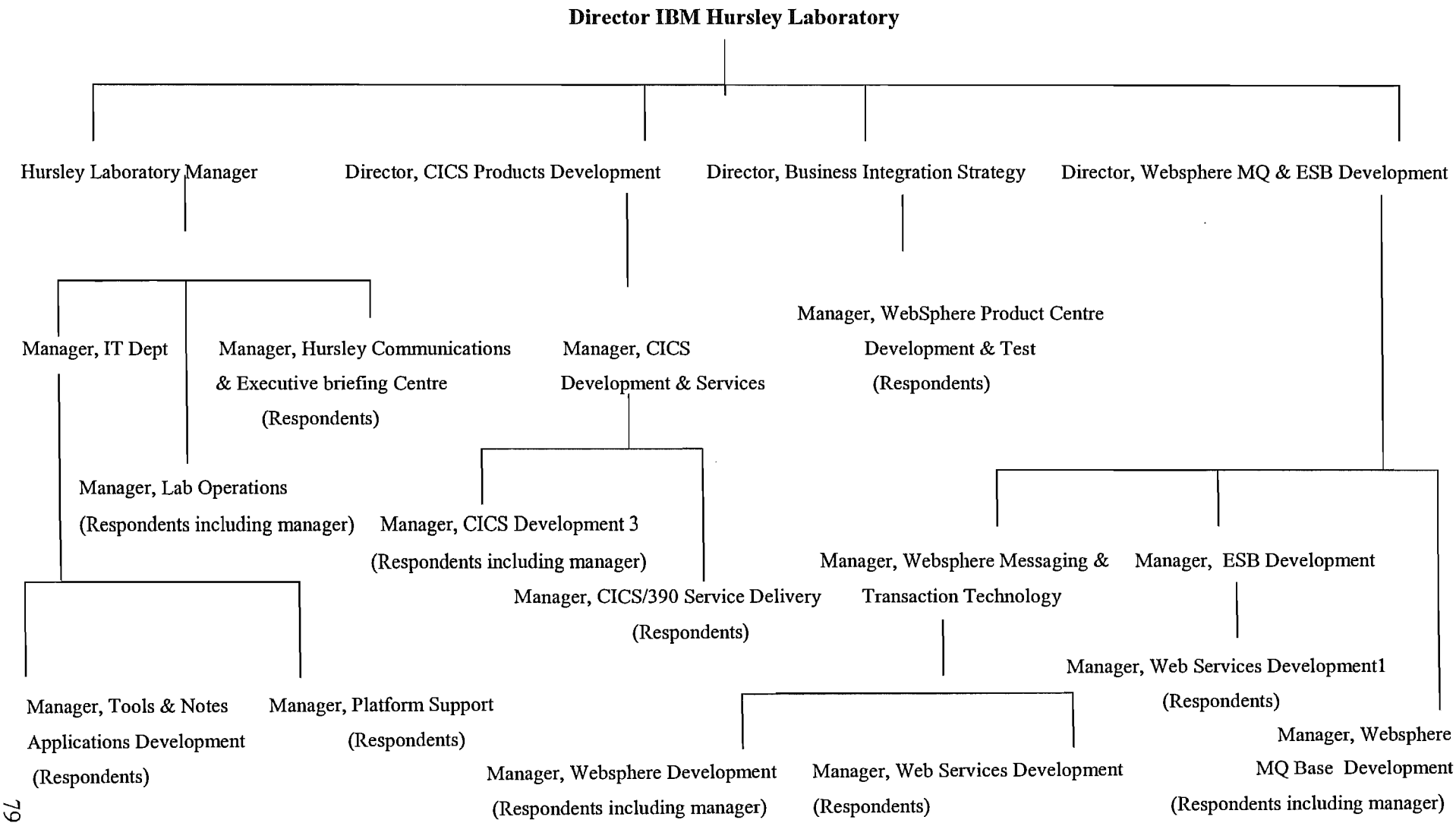
IBM Lab employs around 3000 personnel including 1500 software developers based at Hursley. Software engineers in the UK site regularly collaborate with colleagues based in multiple sites across the US, Canada and the rest of the world. An organisation chart of IBM Hursley Lab is given in Figure 4.2. Broadly speaking, these people are either software developers, computer engineers, or programmers basically involved in a wide range of activities including development and testing of software, and servicing customers' needs. They write instructions and code, and then store them in a database, test the developed software and customise it, and again revise it regularly based on the clients' requirements. Its vision of continuing technological leadership depends on its excellent and highly skilled people who submit scores of patent applications every year (http://www-5.ibm.com/uk). The nature of software development-related job at IBM is interlinked in a sense that it could not ignore the importance of knowledge transfer among its members to accomplish the employees' assigned tasks.

All the people interviewed in the Lab recognise the value of knowledge transfer. The line managers encourage their colleagues to involve themselves in knowledge transfer processes so as to progress and get promotion. Technical mentors spend a lot of time transferring usual business matters to new entrants. Team leaders guide the employees working in their teams. The team leaders or technical mentors provide technical advice to their colleagues, particularly junior members, so that everybody could get up to speed and do their jobs properly. In this regard, a software developer remarks:

> *"I am allowed to ask questions relating to my job. He [a team leader] volunteers to help me. He is one of my colleagues having more experience. We actually have technical mentor, team leader, immediate manager, and manager of managers [second line manager] to help us with technical advice."*

IBM employees irrespective of their status appear to act as knowledge contributors and knowledge users simultaneously. There are various ways in which the employees involve themselves in knowledge transfer processes. IBM employs a variety of computerised systems to support its knowledge transfer activities. One such system is the company's Lotus Notes, a web-based software system, that supports knowledge transfer, links other relevant knowledge resources on its worldwide intranet, and stores

Figure 4.2 Organogram of IBM Hursley



huge amounts of knowledge. The system is used extensively by the organisation members in support of sharing product and service information and is perceived to be highly successful. In addition to Lotus Notes, the Lab also utilises several other software systems, namely Instant Messaging (IM) and Electronic mail (Email), which enable employees throughout the company to share their knowledge and experience associated with various different projects.

4.3.3 IBM and knowledge transfer

Knowledge management, particularly knowledge transfer is crucial for an organisation's survival and strength (Argote et al., 2000; Despres & Hiltrop, 1995; Neef, 1999; Beckman, 1999; Nonaka, 1994; Jasimuddin et al., 2005a). The people interviewed at IBM report that the culture is found to be very much one of knowledge sharing. A second-line manager notes, *"Absolutely. Overall culture is very much knowledge sharing. The company wants them to be more collaborative."* The following discussion helps to indicate the conducive atmosphere of knowledge transfer at IBM.

The nature of the tasks at IBM. Every organisation needs to have an atmosphere in which its members are encouraged to transfer knowledge so as to do their jobs better. Due to the nature of the job, IBM people are more or less dependent on each other to complete the whole task relating to software development. There are several departments, most notably the WebSphere Product Centre Development and Test, the Communications Department, WebSphere MQ, Customer Information Control System (CICS), Universal Description Discovery & Integration (UDDI), Web Services Development, Information Technology (IT) department, and Linux Platform Support etc., which are directly involved in the development of software.

Most specifically, the nature of their tasks is so interrelated that frequent interaction is found to be a part of the job. As a result, knowledge transfer is regarded as a crucial issue in the case organisation because it is the key to accomplishing the tasks. While the developers are engaged in writing software code, the testers are checking whether it is working according to requirements. At the same time, the service people are receiving complaints and requests, if any, from customers and consequently taking necessary

measures to make the products more customised. Each member of a team has to pass on their knowledge to other peers within the functional group and to those who are working in other functional groups. An interviewee says, *"We are involved either in writing codes, testing them or whatever, I don't think any of us can do so without sharing knowledge with others I guess."*

The interviews reveal that there are many knowledge transfer efforts going on inside the Lab. Interestingly, the knowledge transfer process is not seen as a one-time job but rather as a continuous and ongoing process. A manager states, *"Knowledge is constantly changing and it is also going out of date. There are dynamics in it"*. This is reflected by a team leader who says:

> *"If we have a new thought then it is sent to others around us. So we do have a lot of knowledge sharing, particularly in the Lab. It is some kind of family within itself. We have lots of groups like cousins [small teams] over here because we got CICS Division, UDDI Test Department, or whatever. It is like a family. People move from one department to another or one project to another. It is like one big family. We are integrated a lot. We interact with other units as well. And we have regular meetings to transfer knowledge on different issues. We also have status meetings so there is information being shared all the time."*

As mentioned earlier, the people at IBM are involved in various types of activities in which knowledge transfer continuously occurs from design team to code review team to testing team. After successful completion of a release, they have to document it and prepare a hard copy manual for future distribution and use. Such manuals are also available as online manuals in the form of CDs, Web pages, PDF files etc. One member of the organisation calls this d*eferred transfer of knowledge,* since the stored knowledge is supposed to be used in the future.

Knowledge transfer culture at IBM. Knowledge transfer culture is a precondition for successful knowledge management initiatives in organisations (Leidner, 1999). The majority of the interviewees at IBM report that they are engaged in transferring knowledge spontaneously. Almost all respondents mention that the company do have a strong knowledge-sharing culture. A manager interviewed says, *"[IBM], in my opinion,*

is an extreme example of corporate knowledge transfer. We are moving fast with the sharing of knowledge."

The employees interviewed at the research site are found to be quite collaborative and open. A software engineer notes: "*If he doesn't know the answer then he turns around and tells me about others who might know. People are quite open to help each other out."* Ipe (2003) reinforces this point of view by suggesting that "organisational values, such as openness, influence knowledge transfer activities". Several other researchers (e.g., Hislop, 2005; Eisenberg & Riley, 2001; von Krogh, 1998) also support this view by reporting that knowledge related values such as trust and openness have influence on knowledge transfer. The respondents report that they maintain very good relationships with their colleagues. For example, at lunchtime social meetings in the canteen, they discuss their job-related and customer-related issues. While having lunch with interviewees, the researcher notices that the interactions among the people appear cordial and job-focused.

Interviewees also appear cooperative as far as knowledge transfer is concerned. The respondents report that they never think that knowledge transfer would make them vulnerable and eventually translate into, for example, their job loss. A manager remarks:

> *"I don't see anybody hiding back knowledge because we don't think by transferring knowledge we will diminish in some way. I think it is natural thing; people are there just to do that [transfer knowledge]. There is no reason not to [transfer]. It is just part of what we need to do."*

Office layout. After several visits to the research site, the researcher finds a link between the seating arrangement and knowledge-sharing environment. At IBM, two to three employees sit and work together in a single office room. The majority of the people interviewed report that they prefer to work in an open plan environment, and some report that they feel bored working alone in a room. They like to interact during their work with others, particularly the members of their own team. One organisation member states, *"Working in a room with others helps me ask them for help if I really have any query."* Such an open plan is perceived as conducive to carrying out the transfer of knowledge. As a team leader says, *"Three of us working in a room so we can*

see each other and work together, that is our real benefit for the knowledge transfer to take place."

It is observed that most of the employees at the Lab are working in small office rooms, but some are working in real open plan environments. A CICS team leader explains:

> *"Open plan, that is right, I mean I actually prefer to work in open plan office. It is because I want to get all the people around me in a room. If I have a problem then there is always someone to ask and someone else is around for interaction. I think it is very important for knowledge transfer. Sometimes you need to ask someone something. In open plan, there is always someone to discuss."*

One feature observed during the visits is the fact that all the doors are invariably found to be open during office hours. Keeping doors open carries an important message; people actually welcome others to come inside the room to ask something. A team leader states, *"Door open means I like to be interrupted"*. It is noticeable feature of the IBM atmosphere. As a software developer says:

> *"I can just walk down the corridor and see from outside whether the individual [knowledge contributor] I am looking for is available or not. If he is there, I can ask directly whether he can spare time to help me now."*

A software tester also explains the rationale of keeping the office door open:

> *"We have our doors open pretty much all the time. It is guaranteed that the doors are always open. It is like an open plan. And we have an interactive team. My door is open; it does not bother me to think it is too noisy and distractive. I enjoy being open. I do feel connected to everybody else rather than me being cut off from everyone else."*

Having doors opened carries a message that entails the invitation to other colleagues to ask a technical query as well as indicate team spirit and trust amongst themselves. A manager points out that:

> *"Certainly keeping doors open implies 'I am interruptible'. Look now, it is closed [during the interview] I don't expect anybody to come in and ask unless it is real problem and urgent. But generally 'yes' the door is open and I think it is*

the case for everybody else. Being doors open means 'come in and ask me something'. If other's door is closed means 'I don't want to be disturbed'."

4.3.4 Motivations for knowledge transfer at IBM

The majority of the interviewees report that people at IBM are open in their personal motivation to knowledge transfer. They view such openness as a noticeable feature of their organisation, which makes it distinctive. For example, a team leader observes:

"In my previous company, people did not tell everything. They were frightened. There I found people protected their knowledge to protect their job. When I came to [IBM], this is the biggest single difference I found, which is unique: people are very open here. Knowledge is not something that they are worried about sharing. Knowledge transfer helps everybody. Within [IBM] I don't think you ever have to feel alone even if you work something different - it does not matter - people are always there to help."

Another software developer working in UDDI department makes a similar observation:

"Oh yeah. At the technical level people always like to share knowledge. I don't know whether they want to show off or not. You will find that most of the developers will be happy to share their work and experience with others to do a better job."

The question remains why IBM members are enthusiastic about the transfer of knowledge among themselves and what the motivators are that prompt them to transfer knowledge. A software developer points out:

"I have not experienced this [being afraid of transferring knowledge] at all. I find everyone willing to just help anyone who needs to learn. It seems to me that everyone is there to help others..... Well I know that we have to learn things from people and other sources things like manuals, other documents as well. Everyone is so keen to share knowledge with others. Friendly chatting creates a very good environment. It is just good. It is good to come in and see everybody interacting with one another."

This part of the section will outline the motivating factors that emerged to encourage the transfer of knowledge. The study reveals that IBM people transfer knowledge for at least seven reasons.

Jobs are interrelated. The respondents report that they never think to hide knowledge to use it as what an interviewee phrases *"a political weapon to bargain"*. For a company like IBM, it is essential to share knowledge because there is so much going on. It is hard for any one person to know everything that they need to know without talking to somebody else. In fact, they can not do their jobs without exchange of knowledge to each other, because they depend on one another's completed tasks. Furthermore, they intend to finish the job on time. If any of them is found behind schedule, then others' work may then be delayed which encourage them to become collaborative. As a second-line manager says:

> *"I have not noticed any knowledge hoarding sort of thing. I guess wherever you go there might be an element of that [knowledge protection]. Among the developers and testers etc. I don't think so much of that. Where there is test I don't think so much of that. If they do not communicate their knowledge either due to lack of thought or lack of time. Somebody might find it very useful [to share knowledge] rather than 'that is my knowledge I am not going to share with anyone'. I think our process is set up as such that we do share our knowledge."*

Another manager remarks:

> *"I mean most of us around could not do our job without knowledge transfer. Mainly because we are doing things that are so complicated. If one person is working on one section of a product and another person is working on another section of the same product then we cannot have the product without having the both parts together; so we need to interact."*

In a complex organisation like IBM, it is quite difficult for a single person to know everything that they need to complete their job; employees are much more dependent and co-dependent on each other in order to perform their jobs properly and on time; and knowledge transfer is seen as essential to complete the task. For example, a typical interviewee's response is: *"Why should we not transfer our knowledge?"*

Reciprocity. Interviewees appear generous in transferring their knowledge within the organisation. A large proportion of the interviewees report that they never imagine to expect any return for such transfer. A team leader states, *"It was not the case 'I am not going to transfer my knowledge if you do not do so'."* However, several scholars (e.g., Molam et al., 2000; Hendriks, 1999; Ipe, 2003; Nielsen & Ciabuschi, 2003) argue that reciprocity facilitates the transfer of knowledge. Knowledge-sharing appears embedded in the corporate culture in the sense that there is nothing like a *'giving-and-taking'* sort of game as far as knowledge transfer is concerned. A manager also remarks, *"I don't think we are so commercial in knowledge transfer."*

Although a knowledge-sharing element is embedded in the corporate culture, the principle of reciprocity in transferring knowledge can not be overlooked. A team leader states, *"If we are helpful to somebody we can assume he will also be helpful to us in future."* Most specifically, the organisation members help a prospective user so as to get technical help from the recipient if they really need some other advice in the foreseeable future. A manager also notes, *"If you give something I think people will also be willing to give you; some kind of mutual benefit that might apply."* At IBM, the underlying motive to help each other is also to get possible technical help in the future. As a respondent explains, *"As a developer, I help a tester when he asks; otherwise I cannot go to him for help any way."* Ipe (2003, p. 346) reinforces this point of view by suggesting that "reciprocity or the mutual give-and-take of knowledge can facilitate knowledge sharing if individuals see that the value-add to them depends on the extent to which they share their own knowledge with others".

Saving time. Collaboration is really an important thing to get the job done and ensures efficiency of work. Several interviewees report that knowledge transfer helps them in saving their time because they can use the solutions that have already been solved by another member of the organisation. As a team leader remarks, *"it [knowledge transfer] makes everybody's job easier [quicker]."* It is reported that when a colleague faces a problem, others come forward to help fix the problem. A team leader explains:

> *"Increase efficiency of work. We don't want someone to be wasting their time on a problem that has already been solved. If we find a person is trying to fix it, we usually voluntarily approach to help him. That is the way we actually transfer the knowledge and save our time."*

Helping others with technical advice actually helps them to achieve a common goal, by getting the job done as quickly as possible. As a software developer states, *"Knowledge transfer helps to get much speed and to avoid problems in future."* The respondents report that a knowledge-sharing culture expedites the regular transfer of ideas and knowledge among themselves. An interviewee reflects this view:

> *"I think a group of people can bring bigger thought than an individual can and somehow they bounce ideas of each other. At some point, these isolated ideas converge into collective knowledge."*

Building networks. Another factor that induces IBM employees to carry out the transfer of knowledge is their expectation of building a social network. Ipe (2003, p. 347) argues that "the relationship between the knowledge contributor and the knowledge user is one of the factors that influence the motivation to share knowledge". It is observed that helping each other voluntarily will expedite the building up of a network within the organisation. In this connection, an interviewee remarks, *"The more I help others with technical advice, the more I can expand my network."* So knowledge transfer helps enhance very good team spirit through building social networks. A CICS team leader says:

> *"We have been together working for a number of years. We know each other very well. I think we have team spirit amongst us and we are quite supportive with one another."*

Building relationships and networks are reported as important for future knowledge transfer. It is like a sequence of actions in the sense that knowledge transfer helps them to build social networks which, in turn, helps the organisation members to carry out the transfer of knowledge. A manager remarks:

> *"You know whose knowledge is valuable to you and they also know that you have valuable knowledge. So you build up a network and from that the information is shared."*

Career development. Sharing knowledge helps employees in their career development (Nielsen & Ciabuschi, 2003). At IBM, career prospect is found to be associated with the motivation for knowledge transfer. A team leader states, *"We are encouraged to tell what we really have been doing. Engaging in knowledge transfer also helps our*

careers." By becoming an expert and actively promoting the spread of knowledge in a particular area the person is valued by the company.

Protecting one's job through hoarding knowledge does not appear an issue. Instead, spreading knowledge among the organisation members is seen as helping to protect their jobs. A manager remarks, *"The more known your name is around the Lab, the more likely you will get a better opportunity to develop and advance. Knowledge transfer is probably driven by that."* Here the job is found to be more secure as long as an individual kept contributing their knowledge to others. A manager makes a similar observation:

> *"Because here nobody is trying to protect his position. Nobody worries about 'if I tell him that [knowledge] he will take my job', it isn't like that. People are always very open [collaborative]; if they know something they will tell you. They are not worried about their job here [IBM]."*

Showing off. Although interviewees feel happy to share knowledge, there are some elements of *showing off.* It is reported that a few employees attempt to show themselves as better than others, as a manager says, *"To show off a bit."* Some of them claim to do so in order to get management attention. Then management will view them as more knowledgeable than others and thereby valuable to the company. In line with this, a software engineer notes, *"By transferring my knowledge to others I am going to look good."*

Organisational loyalty. Some of the respondents, however, take the knowledge transfer activity as their moral obligation towards the company. Although their knowledge is not exclusively the company's property, they work for the company, so they believe it is typical organisational knowledge. Many of them also think that they are not going to serve the organisation forever, so it is better to transfer their knowledge to other fellow workers to continue the process. The following comment from one of the managers interviewed illustrates how organisational loyalty prompted him to transfer knowledge:

> *"I know a person who possessed knowledge but went on holiday then others couldn't do much further without him. My understanding is that if I spread it and if I am not there other members having the similar knowledge can do the*

same job. Loyalty, Yeah. So a dead kind of situation will not emerge. This is the thing that motivates me to share knowledge."

Such a response understandably appears more evident in those who work for the company for a very long time. A few respondents report that they engage in transferring knowledge out of duty, no matter whether the management encourage them to do so or not. As a team leader states, *"It is our moral duty to transfer knowledge"*. Another team leader remarks, *"It is just my feeling that it is our responsibility to help others within our organisation if we can."* A software tester also notes:

"Transferring knowledge is to the company's benefit at the end of the day. If no one transfers his secret [knowledge] then the company is not going to get it. If I am doing something in some specific area, if I don't tell it to others then the company is going to lose it."

4.3.5 Management actions that support knowledge transfer

The management actively participates to encourage employees to engage in knowledge transfer (Nielsen & Ciabuschi, 2003; Gupta & Govindaranjan, 2000; Quinn et al., 1996). Interviewees perceive management actions support to have a strong knowledge-sharing culture. The IBM Lab management pays special attention to understand individuals' attitudes towards knowledge transfer during the recruitment and selection process. Along with other qualities, e.g., education, skills and experience, of the applicants, their willingness to work in a team and their attitudes towards knowledge transfer are also considered at the time of hiring. A manager of managers (second-line manager) elaborates:

"It is because we hire those people who we find will transfer their knowledge. And the way in which the people are hired and trained helps to indoctrinate them not to hide and hoard knowledge."

From a managerial perspective, the respondents identify six aspects of management actions which influence knowledge transfer.

Active encouragement. The management basically encourages its members to carry out the transfer of knowledge for corporate benefit (e.g., Nielsen & Ciabuschi, 2003). Interviewees report that the management does not want to see one person emerging as the only expert in a particular field. Because there is no guarantee that the person will stay forever. If the person possessing the knowledge is not available for any reason, e.g.. on holiday or sick, others will be stuck. So the management keeps encouraging its employees to pass on the knowledge to other members by creating an environment where the people will be interested in transferring their knowledge voluntarily. A software developer working in the WebShare Department remarks:

> *"My manager periodically reminds us to make sure that our knowledge is available in written form. If someone is on holiday, his absence will not hamper others from carrying out his work. It should be there in the TeamRoom [interactive knowledge storage device within Lotus Notes]. Anyone within the TeamRoom can go to it and do his [the person on holiday] job."*

Incentives. Respondents have mixed views on incentives. One manager reveals, *"In my experience there is no specific incentive. It is considered as a part of the culture and job, we try to share information [knowledge] as much as we can."* Another software engineer states, *"I think managers recognise people who help others"*. However, there are indirect financial rewards as incentives. A team leader points out:

> *"Certainly. [IBM] likes those people who talk to their peers, talk publicly. ...Unfortunately, I am not one of them. If an employee talks about what he is doing, then management recognises that, there is financial reward not directly but in some way like promotion."*

Patent rights. "In 2004, IBM was granted 3,248 patents – an average of nine each day. For 12 years in a row, IBM has had more US patents issued than any other corporation. At IBM's UK lab at Hursley, invention disclosures in 2004 exceeded 400 and inventions published stood at around 100" (IBM, 2005). IBM is very proud of its patent rights, which are thought to be the outcome of its members' relentless efforts. So the software developers are encouraged to submit patentable ideas which are seriously taken into consideration for promotion to senior positions. While describing her experience, a manager mentions:

"Management's incentive, oh yes. But I can't find any formal incentive. If you give some idea which speeds up our work, I think you get recognition for this. Not for the usual business stuff. Clever ideas which people may start to use. We have a lot of recognition processes particularly if you can bring brand new ideas, then apply for a patent or something like that. Informally, your manager will be pleased. There is lot of informal recognition."

Supporting conference attendance. The employees are also encouraged to give talks at conferences, both inside the organisation or outside. As a team leader states, *"If I say 'I would like to present a paper in a conference', my manger will never say 'no'."* Rather the management provides logistic and financial support to make sure the person can attend the conference.

Publishing papers. Furthermore, publishing paper(s) in scientific journals receives high recognition. A manager states, *"If you publish things, then [you] get some benefits [career progression]."* A couple of interviewees report that several colleagues have already produced papers and published them in renowned journals. Although management support varies, the overall culture is for innovation and that is the message that comes from the higher level. "Innovation is at the heart of what IBM and its Business partners provide to thousands of clients" (IBM, 2005). A second-line manager also explains:

"They [management] reward us for publishing [scientific papers]. It is seen as innovation. And there is a very keen culture for innovation. We want to be seen as innovative. We know that in order to keep moving forward we need to innovate. And publishing is counted amongst that."

Moreover, the management always encourages them to put things on the intranet so that others can benefit. The employees who post material also get recognition from the management, because they have written down something that can be used by others.

Career progression. The majority of the interviewees report that managers promote those employees who transfer knowledge to other colleagues. A team leader states, *"Potentially if you are looking for senior posts, it [promotion] is a very big motivation for knowledge transfer."* It is observed that rapid promotion is a tangible sort of

incentive that an employee can expect. The more the engagement an individual has in transferring knowledge, the quicker the promotion he may expect. A manager tells a story about his promotion:

> *"I don't think immediate financial help except you get promotion. If I look at [IBM] and look at the people up here they engage in sharing knowledge. I think it has been recognised. I think that is the way that helped me to get promotion. So it is not like that 'you did this so this is your money for that.' But my career progression happened because I was much more open than other people."*

The interviewees perceive that the involvement in knowledge transfer activities is considered as a critical element in job evaluation of the people working at the IBM. A software engineer says, *"I think managers are aware of somebody who talks publicly and helps others with technical advice."* It becomes a part of the managers' jobs to monitor their team members. One organisational member elaborates:

> *"Yeah. There is. Our management assesses people annually; we also have regular feedback sessions with people obviously. If an employee is seen interacting well and helping others to share his knowledge then he is more likely to get recognition and eventually promotion. So it is not only helping the people in his own group but also helping across the boundaries."*

Several authors such as Gupta and Govindaranjan (2000) and Quinn et al. (1996) reinforce this point of view by suggesting that "there is the relationship between knowledge transfer and incentives". The managers keep assessing how interactive an employee is with other members of the team or organisation, sometimes asking other members of the team how helpful a particular individual is. A team leader states, *"Management will ask the whole team about everybody else."* There is a points system that is allocated for knowledge transfer as a part of performance appraisal. This supports the argument that the management is keen to see the employees involved in knowledge transfer and, in turn, gives rewards for doing so. This relationship between incentives and knowledge sharing is also further supported by Ipe (2003, p. 348) who argues that "real and perceived rewards and penalties for individuals that come from sharing and not sharing knowledge also influence the knowledge-sharing process".

4.4 Mechanisms used in knowledge transfer and storage at IBM

This part of the section will provide an analysis of the mechanisms revealed by the interviewees. Interviewees employ a variety of mechanisms including face-to-face interaction and computer-mediated systems to support its knowledge transfer activities. As a manager notes:

> *"There are varieties of ways people approach me to get my knowledge. I think people who know me as an individual would probably come and see me personally. You know if they are in the locality they would come and ask 'what about this, do you know about it'? They also come along with other mechanisms which are also appropriate."*

In addition to Lotus Notes, IBM utilises several other technologies, including Instant Messaging (SameTime) and Electronic Mail (Email). Each mechanism is considered in turn below.

4.4.1 Face-to-face conversation (F-2-F)

Since IBM is one of the world's top high-tech corporations, it is supposed that the company relies heavily on Information and Communication Technology (ICT) to carry out its knowledge transfer activities. However, F-2-F conversation is reported as the most popular way of transferring knowledge within the organisation. Several authors (e.g., Kraut et al., 1988; Olivera, 2000; Hislop, 2005) support this argument, contending that "organisation members usually like to have F-2-F interaction with people". This is further supported by the comment of Daft et al. (1987) who argue that executives spend a large proportion of their time communicating through traditional F-2-F.

IBM people perceive F-2-F meeting as the most effective medium among the mechanisms used so far for their knowledge transfer within the organisation. As a team leader states, *"The most powerful [effective] mechanism of knowledge transfer seems to be face-to-face interaction."* The respondents identify eight aspects while discussing about the benefits of having F-2-F interaction which are explained below.

Further clarification. Several interviewees treat F-2-F interaction as a flexible method whereby knowledge can be bounced around for further clarification. For example, if an individidual who actually articulates knowledge is not around to explain and clarify, then the prospective user may read it several times, and come up with several different interpretations. A manager interviewed also gives similar observations:

> *"You can read a note four times and get four different interpretations to understand it [written document]. So face to face tends to be much better way of understanding the meaning of the documents. I think."*

The benefits of having F-2-F conversation is the fact that the parties involved in the interaction may understand each other very well. The interviewees report that they prefer F-2-F interaction because they can better conceptualise the real meaning of the issue.

Quick solutions. F-2-F interaction also helps the organisation members in making quick solutions. A few interviewees report that Email is a very good mechanism in terms of speed in transmission but not in terms of speed in understanding. Transferring knowledge through F-2-F interaction is much quicker than doing it using Email, because both the contributor and user of knowledge are talking to each other and could find a gap and subsequently could fill it with each other's knowledge (Olivera, 2000). A software engineer reflects similar views:

> *"As a [knowledge] contributor, I like personally the face-to-face approach if I can because verbal interaction is more flexible and quicker, and I can allow them [potential knowledge users] to ask me several questions. The detailed things can be sorted out quickly. So a user can get a quick answer which he may really need."*

New idea generation. F-2-F conversation is perceived as most useful because people can explore new ideas. Because F-2-F interaction helps knowledge to be bounced back, and therefore generate new thought and knowledge. A manager explains the rationale behind using F-2-F interaction for knowledge transfer:

> *"Certainly interaction of people face to face is good in the sense that it sparks new ideas. So two people who talk about one thing might come up with a third*

idea that neither of them have ever thought of before. It is certainly a good idea."

Strong ties. Social ties is the kind of personal relationships that people develop when they interact with each other during their work over a period of time (Granovetter, 1992; Olivera, 2000; Hislop, 2005). The interviewees view F-2-F interaction tends to build strong ties among organisation members. However, social networks does not build overnight (Tsai & Ghosahal 1998, p. 464). Frequent F-2-F conversations can result in close social ties and in the longer term can expand the social network. Such socialisation is found to be very frequent between those employees who never happen to work together before. When people from different departments join a new team to work together, they keep visiting each other's offices so as to develop social ties. Furthermore, they also meet one another during lunch and thereby engage in socialising together. A team leader comments that:

"I think an actual visit to somebody's office is more effective. I mean inviting and visiting the place [office room] is something more effective for knowledge transfer."

The researcher observes that several people keep discussing issues related to their work using laptops side by side while having their lunch or tea in the canteen. A manager describes how she socialises:

"Oh yeah. we mostly work together in offices, we go to each other's offices and help each other when we need help. I certainly see them during lunch where we do social interaction as well as transfer knowledge. So there is a very good atmosphere in the team."

In order to explain how effective visiting one another's offices to build good working relationship, a team leader reports about a colleague based in Japan but who has also been over here on an assignment:

"Again I know him very well. He has emerged as a big help. While working with people around the world, actually meeting them face to face you build a better relationship, even electronically later on. You may have a better relationship with them than with somebody you have never ever met. I think knowing people, meeting with them, and talking to them are actually very important as a part of

the whole job. One day I took him to my home in a family gathering where he cooked himself a Japanese meal. He met with my family. ...I think we now have a very very good relationship because of that. Very good professional relationship as well."

Training. Interviewees report that another benefit of having F-2-F is during training where the participants, particularly the new recruits can learn more from a presenter (Olivera, 2000). "Around 70 new graduates have started work at the Hursley lab every year for the past 10 years" (IBM, 2005). Through such F-2-F interactive sessions, both the presenter and the audience can work together as a team which eventually help in building team spirit as well. While some sort of learning is going on at IBM, lecture sessions with F-2-F conversation are found to be effective. As a software developer remarks:

"A face-to-face lecture with question and answer sessions in a small group is always the most effective. I find the face-to-face mechanism best."

In fact, both parties are actually contributing in the sense that the outcome of the learning session is partly driven by the speaker and partly driven by the participants. A team leader states, *"Through F-2-F interaction two persons are interacting – one person is delivering and the other person is learning, and vice versa."* Parallel to this, a software tester says, *"I can ask any question and it is always good someone there to show me the way the job has to be done. It is like I have a technical mentor."*

Instant feedback. When the parties concerned in the knowledge transfer process use an F-2-F interface, the knowledge provider also gains some knowledge after having received a technical query and subsequent feedback from a prospective user. Daft et al. (1987, p. 358) reinforce this point of view by suggesting that "instant feedback allows questions to be asked and corrections to be made. F-2-F interaction allows rapid mutual feedback". As a result, the person who initially asks for technical help turns into a knowledge contributor since he (she) is giving back a piece of knowledge while communicating his (her) feedback. Furthermore, getting feedback through an F-2-F interaction also helps IBM employees to refine their existing knowledge. As one of the respondents states, *"While two persons are interacting, their knowledge is being refined."* A junior software developer also gives similar observations:

"I think when I joined the company I found face to face was the best way of doing things in terms of knowledge transfer, because it is quite good to have someone there to reassure me that I have really understood."

Trust. One of the major conditions for successful knowledge transfer seems to be trust between the actors involved in the transfer processes (Hislop, 2005; Bradach & Eccles, 1989; Gulati, 1995; Ghosal & Barlett, 1994; Tsai & Ghoshal, 1998; Nielsen & Ciabuschi, 2003). It is observed in IBM that F-2-F interaction is also recognised as an effective mechanism in building trust among the knowledge contributor and user. The interviewees report that F-2-F interaction greatly enhances in building trust. Riegelsberger et al. (2003) argue that "it is hard to develop trust with someone if the actors can not see F-2-F". A manager states, *"To start building trust among the team members, I think that [F-2-F] is crucial. Once you have started with it then other mechanisms are appropriate to use."*

However, trust does not build overnight. Frequent interactions between people are reported to be vital to develop trust. Since many people work in different places away from the lab, the trust of these people is thought to be important for effective knowledge transfer. The respondents view that they face no problem in working with people at a distance as long as they have built trust among themselves. This is also further supported by Riegelsberger et al (2003, p. 760) who argue that "codification approach to knowledge transfer requires more *a priori* trust which can come through F-2-F interaction".

Body language. Interviewees prefer F-2-F interaction because such interaction reveals body language. A manager states, *"I would prefer to allow people to ask me questions face to face. It is good to see people face to face."* Several respondents state that facial expression helps them to get a better understanding of whether the recipient gets the real meaning of the knowledge. As a manager notes, *"I am trying to see their facial expression to know what they are actually telling me."* The people based at IBM Lab in the UK have been working with other organisational members located at different parts of the world in different time zones. The IBM Lab invites an expert who works from California for a project [*Triggo*] to train its people at the Lab. The presence of the expert

makes F-2-F interaction possible. The manager responsible for a project remarks, *"It was very useful seeing somebody; and talking face to face makes a lot of difference."*

The actors engaged in F-2-F interaction can see each other's body language and facial expressions, which help them realise how effective knowledge transfer is. Daft et al. (1987, p. 359) observe "Face-to-face also allows the simultaneous communication of multiple cues. Head nods, smiles, eye contact, tone of voice, and other nonverbal behaviour can be used to regulate, modify, and control the communication exchange. Face-to-face communication also uses high variety natural language and conveys emotion".

The downside of F-2-F. Many advantages of using F-2-F conversation as a mechanism of knowledge transfer are identified by the interviewees. However, the majority of the respondents also report that F-2-F interaction have disadvantages. One downside of F-2-F conversation is that both the contributor and user may keep talking on top of each other. They end up with an awful lot of dialogue, leading to confusion and contradiction. The following quotes of a manager illustrate this concern:

> *"It largely depends on the personalities of the people who are doing that [interacting]. I was involved in some interactions where the people having a conversation were in fact having two conversations because they were so intent on putting their own view over others. They were adamant in putting their own view. And I saw occasionally people were talking on top of each other. So they were not really interacting, rather they just tried to enforce their own opinion, which was not necessarily good thing."*

Another important point revealed from the interviews is that both actors sometimes fail to meet in person because of a schedule clash. Some of them also report that there is sometimes interruption in the middle of work. A manager states, *"Due to face-to-face interaction, there is a possibility of interrupting us in the middle of our work. So it may not be the best way to keep visiting others' offices for trivial technical help."* A significant number of IBM people are working in geographically dispersed locations in which case it is difficult to have F-2-F interaction with people working apart. Furthermore, some of the respondents raise concerns relating to people's retention capacity because they sometimes forget the knowledge they possess. One senior

member of the organisation states, *"Downside is as time goes by you can find they have forgotten so many things. With an Email you can go back and refer to it quite often."* To overcome the forgetting issue, several interviewees suggest to use Email, a technology-focused mechanism which is discussed in the next part of the section.

4.4.2 Electronic Mail (*Email*)

As revealed from the interviews, Email is the next most commonly used mechanism for knowledge transfer. A team leader states, *"I use Email when we do not need instant response."* The respondents identify four advantages of using Email, which are explained below.

Less disturbing. Email is perceived as less disturbing in the sense that the recipient does not have to respond immediately, but is given time to think what sort of reply the person will make. Although IBM has a strong knowledge-sharing atmosphere, people work under severe time pressure. Helping with technical advice is an additional part of their job which they could do on their own time and respond accordingly. A team leader elaborates:

> *"When I have to ask for help from people of other departments, I use Email; because helping me is their secondary job. They can do it and explain it via Email when they have time to do so. I always prefer to send Email to people outside my team so that I don't have to grab their valuable time. While if it is within my team I just go and say 'please help me'."*

This is reflected by an employee working in UDDI:

> *"It is really better to be in Email. Because if I receive an instant messaging while I am doing something serious then suddenly I am interrupted then carry on what they are doing. I may have lost where I was. So Email is better."*

Follow-up mechanism. Email can also be used as a follow-up mechanism just for reminders. Daft et al. (1987, p. 363) contend that Email has the capacity for rapid response. An interviewee explains:

"Basically if I have to ask somebody to find some information for me I'll probably meet with him. I'll follow that up with an Email just to keep it in his mind because he may easily forget. So it is good to follow up with an Email."

Distant Proximity. Email is perceived as most convenient to communicate with those who work from geographically dispersed locations. Daft et al. (1987) contend that Email can be "quickly reach a large, geographically dispersed audience". Resonating with this, Constant et al. (1996) argue that "technology networks are being used by many organisations, making it relatively easy and inexpensive to ask distant acquaintances for advice via Email".

This corresponds well with Carbonara (2005) who contends that the ICTs have the capability to transfer a large amount of knowledge and to reduce the space barrier. The majority of the interviewees report that they prefer to use Email to communicate with a colleague with whom they have never met. In this context, a manager explains the rationale behind using Email instead of instant messaging:

"I'll not ask any query using SameTime [instant messaging] to a person whom I never ever have met before. If I do so, he then has to jump in the middle of his schedule [work]. That may not be his priority. Similarly, I would always expect others to use it [Email] to start with."

Knowledge storage. Interviewees can also store the transferred knowledge which earlier came as Email. One software tester says:

"of course when I get an Email it can be stored away and can be used another time. Whereas a bit of face-to-face conversation tends to be forgotten. So there is strength I think behind Email."

Having stored an answer in a computer, the contributor can keep sending the same technical advice as an attachment again and again via Email to the intended users. Gray and Meister (2004, p. 823) reinforce this point of view by noting that "Email can transfer documents as attachments".

The downside of Email. Several respondents report that the downside of Email is that the actors can not get the verbal component and body language of each other. In this

connection, Keong and Al-Hawamdeh (2002) remark that "using computer-mediated tool deprives people of one another's non-verbal communication – facial expressions and gestures, which provide clues to their colleagues' opinions, attitudes and emotions".

Another difficulty in using Email is that the contributors fail to receive a request in person and gain more about the context which seems to improve their expertise. An interviewee comments:

> *"If I have been asked to help by an Email, I lose some inputs of the query. I also lose the context why they are asking so. There is an element here whereby if I am perceived to be an expert in particular piece of software development, process or whatever, and you come and ask me about it then you bring context, and I get better idea about 'what' and 'why' you really want. This will increase my knowledge as well. So when next person comes with the same query, it will be quicker for me to respond with an answer. Because I could immediately understand what sort of technical help the other person is looking for. Expertise grows partly as a result of interactions. My conversation with him is likely to enhance my knowledge as well as his."*

4.4.3 Interactive messaging systems: *SameTime*

Another frequently used mechanism of knowledge transfer in IBM is an interactive messaging system known as *SameTime*. Like MSN Messenger, it gives a prospective user a chance to quickly ask a question. A manager states, *"It is just some kind of replacement of face-to-face interaction"*. The majority of the respondents report that *SameTime* is just another way of transferring knowledge without using a telephone. A manager explains:

> *"SameTime becomes very useful for us because I mean at least I can exchange messages in real time rather than sending an Email where I may not get a response the same day. So it is quite useful for that."*

Furthermore, such an interactive system is not seen as intrusive as a phone call and faster than Email. Another advantage of *SameTime* is that it helps to know whether the person to be interacted is available or not in his (her) office. If the individual is not

logged on to his (her) computer, then the message bounces back. If someone is logged on to the system, then it will pop up on his (her) screen. However, the recipient is not compelled to reply immediately; it is at his (her) discretion to respond or not to respond. A CICS team leader remarks:

> *"SameTime is synchronized in which somebody sends something and gets back with technical advice later on. We use it a lot. It is possible to get people's response very sharply and quickly. I have noticed that people tend to communicate with others using instant messenger with whom they already talked face to face."*

On the other hand, a few respondents express their unwillingness to use *SameTime* as a mechanism of knowledge transfer, because it interrupts their work. During the interview sessions, frequent pops up are observed on the interviewees' computer screen by the researcher. Another disadvantage of using *SameTime* is that it fails to provide facial expression of the actors during knowledge transfer. One of the interviewees expresses her feelings:

> *"The nature of the SameTime tool is such that it is virtual face to face. However, there is something beyond this; I can't see his body language. Since we cannot see his face, it is not possible to understand how he is taking the interpretation of my knowledge."*

A few interviewees mention that they do not use *SameTime* to communicate with an individual who they have never met before. A software engineer states, *"I think I'll not probably chat with a person who I never met."* Reflecting this view, a team leader remarks:

> *"As a colleague I know him well, instant messaging tends to be most preferable medium for me to transfer knowledge. As I said if I do not know the person I'll probably use Email. But if the person needs immediate help [urgent], then probably I'll allow him to come to me or send me an Instant Messaging saying 'help me'."*

4.4.4 Lotus Notes (*Team Room Plus*) software

Lotus Notes application (*TeamRoom*) is found to be an interactive system for the people working within a project or department of IBM. The Team Room lifecycle started in May 1997 with the launch of the "Work Room". This was quickly replaced by "*TeamRoom*" in July 1997. The current "*TeamRoom Plus*" format was introduced in May 2001 which is claimed to be one of the most favourable and widely used tools among the employees. The *TeamRoom* can list all documents by projects, by categories or whatever. A team leader states, *"Lotus Notes is the main vehicle as the main repository for databases and stuff like that."* Lotus Notes *TeamRoom* also is found to be a very useful tool to store data. A manager points out:

> *"We use Lotus Notes software as an electronic repository; we call it 'TeamRoom.' It is a big database, which stores our documents and which we can retrieve information from and add comments on to it and so on."*

Lotus Notes is also employed internally to store knowledge. Gooijer (2000, p. 309) reinforces this point of view by suggesting that Lotus Notes team room –

> "an intranet system that enables access to internal and external information; resources of an electronic library storing departmental documents and objects; communities of practice; and, personal practices in which knowledge resources are identified, created, contributed, captured and organised, accessed, shared, applied, weeded and archived by individuals in the normal course of daily work."

Since *TeamRoom* is a part of Lotus Notes, it can not work outside the organisation. Only the authorised members of the *TeamRoom* could get access to the stored knowledge available in the knowledge repository or could publish documents. Lotus Notes also facilitates a database to maintain security, ensuring that only authorised people can access to it because their names are in the Access Control List (ACL).

The majority of the interviewees report that *TeamRoom* is used as an electronic tool to serve two purposes simultaneously: transferring knowledge to others and storing knowledge to a repository. A team leader states, *"One of the striking features of the Lotus Notes TeamRoom is that it can be used not only to help accomplish knowledge*

transfer but also to help retain knowledge in the TeamRoom for future use." That's why, as Olivera (2000, p. 829) reports, "organisations place a heavy emphasis on the use of Lotus Notes". The people within *TeamRoom* could post questions, respond with technical advice, and modify answers. A manager elaborates:

> *"Most of the time it is just like having a meeting in a room with people staying apart. We have a situation where we have to deal with people who are working from North America, Far East or whatever. We end up with using one of our Team Rooms. And the disadvantage is that we don't have the visual components there."*

4.4.5 Telephone

Interviewees report that the telephone is less frequently used as a mechanism for knowledge transfer. Telephone conferencing is really a virtual F-2-F meeting between two persons. As a manager states:

> *"Sometimes you cannot avoid it [telephone]. If I have to talk to somebody in [California] then I can hardly walk down to him to talk. In this situation, I have only a few options like the telephone."*

The best thing about using telephone is that either party could ask a further query in the middle of their conversation. They could get more clarification on the query as well as the answer. One team leader explains the way in which he solves a problem through talking to one of his colleagues over the telephone:

> *"I have a colleague next door to me and we work extremely well together. I can remember one day working from home I rang him up and asked about a problem. We were on the telephone for over an hour, and we both sensed that we were both closer and closer to a solution...must be happening as well. You know we suddenly realised what the solution was. Neither of us could solve the problem alone on our own because we didn't have enough knowledge. If we did it through an Email it could have taken a very long time because we would have to type everything. So sometimes talking over the ideas around and putting them together we can probably solve the problem very quickly."*

One reported downside to using the telephone is the absence of the body language. A manager of the Lab explains:

> *"One of the frustrations is that we are working in the projects from different parts of the world. In such a situation, how do you have the social interaction, that is a very tough thing to achieve. We cannot walk down to others' site frequently so how we compensate for that. So we end up with having telephone conversation but it is not quite the same. I can't express body language."*

This is supported by a study by Daft et al. (1987, p. 399) who argue that "using the telephone individuals rely on language content and audio cues such as tone of voice messages, but visual cues and body language are filtered". The interviewees also note that the telephone is the most intrusive and interruptive medium since the person on the receiving end normally has to pick up the phone to respond. A manager remarks that:

> *"It [telephone] is always intrusive. I don't want to be interrupted in the middle of my work. The telephone always interrupts because I have to pick up the receiver [of the telephone set] when it is ringing; it is horrible, worst."*

4.4.6 The electronic bulletin board: *IBM Forum*

The majority of the respondents report that they use an electronic bulletin board ("*Forum*") as a tool for exchanging ideas or solutions. It is an informal way of inviting other colleagues electronically saying, 'I've got a problem, can any of you help me?' By using the mechanism they are formally posting a technical problem, having an idea in mind that at least an organisational member will respond through the Forum. A team leader of a department states, "*I always send an open request 'I am working in this problem and can any of you help me in this particular part of the problem?'*"

A manager remarks, *"Forum makes things quicker and less hassle for all the people involved in it."* While a request is posted, many people within the company keep responding with suggestions or technical advice. Another employee remarks, *"The idea is I post a question, I can expect to get answers from 20 different people."*

Forum is open to all the members of the organisation; anyone can join, read the information available on the electronic board, and make comments which can be stored away automatically in knowledge repositories. The discussion thread generates discussion among those who are interested in a topic. As a software developer states, *"It [Forum] goes pretty well. If you don't have immediate solution but you need the right answer, then you can go to Forum and ask for help."* Reflecting this view, a team leader remarks:

> *"We have got Forum like a Yahoo group forum! Best place to go to explore an answer. I am quite sure that I'll get an answer or at least a few responses [ideas]. There are people who are proud of their knowledge and often interested to share their knowledge. So they post their knowledge into Forum. It is very much people oriented. Forum is still powerful."*

4.4.7 BluePages

The majority of interviewees believe that knowledge transfer starts with identifying the right person who possesses knowledge and might contribute to technical advice or help. *BluePages* is a technology-mediated 'employees directory' which initially launched simply as a telephone directory. With the passage of time, it becomes a very sophisticated tool which acts as a repository of knowledge about IBM employees' profiles. As a software tester states:

> *"BluePages contains the profiles of the people and their picture. Everybody can get access to it in finding contact address along with much other relevant personal and expertise information about each and every member [of the IBM]."*

"BluePages is IBM's Web-based expert location tool that lists every employee and their particular talents and experience" (IBM, 2005) Access to some confidential data is limited. An interviewee says that:

> *"BluePages is basically an online directory based on a web application. It simply started as a telephone directory but it is much more than that. It is a repository about the [IBM] people. They are encouraged to put more and more*

information about themselves into the system to inform others [within the IBM]."

With its help, an employee could search within the organisation for the right person having expertise knowledge to help. "The ability to find the expert with the right skills in real time is proving highly successful, saving employees average two hours each month" (IBM, 2005). An interviewee acknowledges that, "*We use BluePages directory to know more about our people.*" *BluePages* itself is a good example of computer-mediated tool that helps to transfer knowledge. A software developer says:

"To get an answer of a query, the best way is to find somebody who has knowledge. Either he will reply with an answer or will say 'oh I don't know it but I know who knows it'. Then the right person – the knowledgeable person – is there to help."

BluePages has emerged as a hub or source of knowledge; it is now common practice in IBM to use it to identify the right person who might provide a technical help. "Using *BluePages*, employees can access expert advice from anywhere in the world" (IBM, 2005). A software engineer explains:

"People still need to know where to go. They have to know sometimes finding out who to ask, where they are based or whatever. BluePages, which is brilliant, helps to find the person [who possesses knowledge and can help]."

Several scholars, such as Constant et al. (1996) and Olivera (2000), contend that company yellow pages and directories (*BluePages*) are designed to help organisational members to locate expertise in the organisation. "From one Web page, this innovative tool allows 320,000 IBM employees around the world to find each other and hok up via phone, email and instant online messaging" (IBM, 2005) However, one downside of using *BluePages* is that, as it is observed while visiting the IBM, the profiles of some of the employees were not updated.

4.4.8 Other mechanisms

Video conferencing facilities and Third Generation (3G) videophones are available at IBM to have electronic F-2-F conversations between people working apart. However, the interviewees report that such facilities are least preferred mechanisms of knowledge transfer. The interviewees who mention about 3G videophone or video conferencing as a means of knowledge transfer, they report the negative aspects of their use. Regarding 3G videophone, a manager remarks:

> *"We have Third generation videophones where you can send a video message. But we don't use it because it is very expensive and picture is very fragmented. It does not add that much of interaction. You have to say always 'Can you hear me? Can you see me?' It is quite strange."*

Regarding video conferencing, a software developer states, *"People thought that video conferencing will be going to be great. Unfortunately video conferencing dream has not yet really worked out. I don't have video conference in my desk so I can't just connect immediately with others. For a face to face conversation I can do with a person who is two doors down."* Reflecting this view, a second-line manager comments:

> *"It [video conferencing] is horrible. ..... It is not appealing. Sometimes it distracts you from what you are saying. There is time delay sometimes in the speaking. The technology is not mature enough. Picture breaks up. 'Who said that', then the camera moves. Other thing about it is that if we want to arrange a video conferencing we can't do it just on our desk. We need time to do that. You have to book a room first. It takes the spontaneity out."*

Although there are several mechanisms available at the IBM, the most frequently used mechanism to carry out the transfer of knowledge is face-to-face (F-2-F) conversation. Among the computer-assisted technologies, a web-based software system, Lotus Notes, is predominant. The tabulation of all the mechanisms and their attributes are demonstrated in Table 4.1.

Table 4.1 Reported attributes of knowledge transfer mechanisms

	Positive side	Downside
F-2-F	It is flexible so ideas bounce back; It helps to build social ties; It helps develop trust; New intakes could learn more (training); The actors can get the verbal component and body language of each other.	During F-2-F conversation, actors talk on top of each other, ending up with an awful lot of dialogue; Actors sometimes fail to meet in person because of a schedule clash; F-2-F interaction is difficult while working in geographically dispersed locations; People's retention capacity is limited (forgetting).
Email	It is a less disturbing mechanism; People get enough time to respond; It is sort of follow-up mechanism; It works well in geographically dispersed locations; The transferred knowledge can easily be stored.	It fails to have body language; The contributors miss the opportunity to learn more about the context as the request comes on line.
Instant Messaging	It is possible to get people's response very quickly; It works well in geographically dispersed locations; The transferred knowledge can be stored.	It is more intrusive and interruptive; It is not effective to use with a person who is never met before; It fails to provide facial expression of the actors.
Lotus Notes (TeamRoom) software	It seems to be user friendly; It works well in geographically dispersed locations; It facilitates the transfer of knowledge and also the storage of knowledge.	It fails to provide the facial components.
Telephone	It is always a synchronised one-to-one conversation; It is possible to get more clarification on the query.	It is the most intrusive and interruptive medium. There is no scope to comprehend the body language.
Bulletin Board	It helps to bounce the ideas back through several persons' response electronically; It works well in geographically dispersed locations; It facilitates the transfer of knowledge and also the storage of knowledge.	It fails to provide facial expression of the actors. It is not possible to get people's response very quickly;
BluePages	It helps to know the experts and their expertise.	It is less dynamic in a sense that contents are not updated.

4.5 Factors emerging as determinants of knowledge transfer mechanisms

This section of the chapter attempts to explore and explain the variables behind selecting a particular mechanism of knowledge transfer at IBM. Although the study reveals that the majority of the respondents prefer to employ the personalisation approach, particularly F-2-F, for their knowledge transfer, an array of media is found to be used to carry out the transfer of knowledge among interviewees. Since IBM employs both personalisation and codification approaches to knowledge transfer, the question remains to explore why and when organisation members use which mechanism to carry out the transfer of knowledge. Eight variables have emerged from the interviews which can help determine an appropriate approach to knowledge transfer to meet various different situations. These factors as determinants of knowledge transfer mechanisms are listed below in no significant order.

- Tacitness of knowledge
- The nature of the query
- Status of the actors
- Personal preference
- Social ties
- Proximity
- Trust
- Urgency

These factors of the knowledge transfer mechanism are not fully independent. The factors that are revealed in the study are explained in turn.

4.5.1 Tacitness of knowledge

The majority of the respondents recognise that knowledge has both tacit and explicit components. As a manager states, *"I think there are different types of knowledge. Each has to be dealt with separately."* However, the primary factor that influences the choice of knowledge transfer mechanism at IBM is the tacitness of knowledge.

During conversations with the interviewees, most agree that their choice of a means of knowledge transfer is eventually determined by the tacitness of knowledge. Tacit knowledge resides in the human brain, and may be ambiguous. Buchel and Raub (2001) maintain that "knowledge may be ambiguous as a result of the diverse interpretations of different organisation members". Weick (1979, cited in Buchel & Raub, 2001 p. 519) defines ambiguity as *the existence of multiple and conflicting interpretations by various individuals about a phenomenon within the organisation.* As the evidence shows, IBM people attempt to reduce the ambiguity of knowledge through F-2-F conversation. Buchel and Raub (2001, pp. 519-520) put it:

> "Development of these shared interpretations may be achieved through negotiation of a solution based on accumulated experience in order to establish mutual understanding."

It is quite impossible to transfer tacit knowledge from knowledge contributor to knowledge user without direct interaction. Hence, the majority of respondents argue that F-2-F conversation is the effective way to transfer such knowledge. In this context, a manager argues that, "*The more tacit the knowledge is, the more likely it needs face-to-face interaction to transfer.*" The following quote of a team leader is illustrative:

> *"If it is tacit, I'll prefer to have a meeting with that person. Because it seems to me that I could make some clarification about what he exactly wants to know. There might be some questions after. Whereas sending him an Email, I might discover he needs to know more. So seeing me allows him to have some conversation with me. He probably would get a huge amount of information from me as well rather than me sending him an Email. I guess."*

Tacit knowledge that is not well defined requires more interpretation. The empirical finding of this research supports the argument of Buchel and Raub (2001, p. 521) in which they point out that "tasks with a high degree of ambiguity require organisation members to choose media that are rich". Lengel (1983) defines the term 'richness' as "the ability of media to change human understanding by clarifying ambiguous issues". Gupta and Govindaranjan (2000, p. 77) suggest that the ability to transfer tacit knowledge requires rich transmission channels, such as face-to-face communication and the transfer of experts.

Interviewees recognise that tacit knowledge does not always remain tacit; a large portion of such knowledge is articulated in some way and subsequently stored for future use so that it becomes easier to transfer. Knowledge available in a repository is thought to be a more formal way of transferring knowledge which is actually explicit in nature. A significant proportion of respondents argue that codified knowledge is best transferred using technology-focused mechanisms such as TeamRoom and Email, although technology-focused mechanisms inhibit social interaction. A team leader points out:

> *"I think at a personal level I tend to find it easier to learn from someone else there saying things rather than me there reading things. If information is written down and then stored away, I'll consider it as reference. It is good for initial understanding."*

Several respondents also argue that the richness of stored knowledge, that is explicit in nature, depends upon how much explanation and commentary there is in the knowledge. In this situation, F-2-F interaction will be vital for further clarification. The interviewees report that knowledge can not be completely codified in explicit form in the sense that some tacit components can not be articulated. As a team leader states, *"I think it would be a great mistake to think that we could convert everything into explicit"*. Against this backdrop, the importance of F-2-F interaction as a mechanism cannot be ignored. A manager explains:

> *"The usefulness of explicit knowledge and its appropriateness for an impersonalised [codification] mechanism will vary with how easily we can comprehend it. Such a mechanism is alright if it has a lot of commentaries. Otherwise, we have to look for the original person."*

Figure 4.3 shows the tacitness of knowledge and its impact on the selection of knowledge transfer mechanism. Several researchers (e.g., Connell et al., 2003; Gupta & Govindaranjan, 2000; Lam, 1997; Storey & Barnett, 2001) suggest active direct communication between individuals as a means of tacit knowledge transfer and F-2-F interaction is recommended as the most suitable for facilitating the transfer of tacit knowledge. Connell et al. (2003, p. 141), for example, argue that transferring tacit knowledge depends on direct participation of both the transferer and the recipient of

knowledge. On the other hand, explicit knowledge can be transferred through a codification approach (Hansen et al., 1999; Zack, 1999a, b; Earl, 2000).

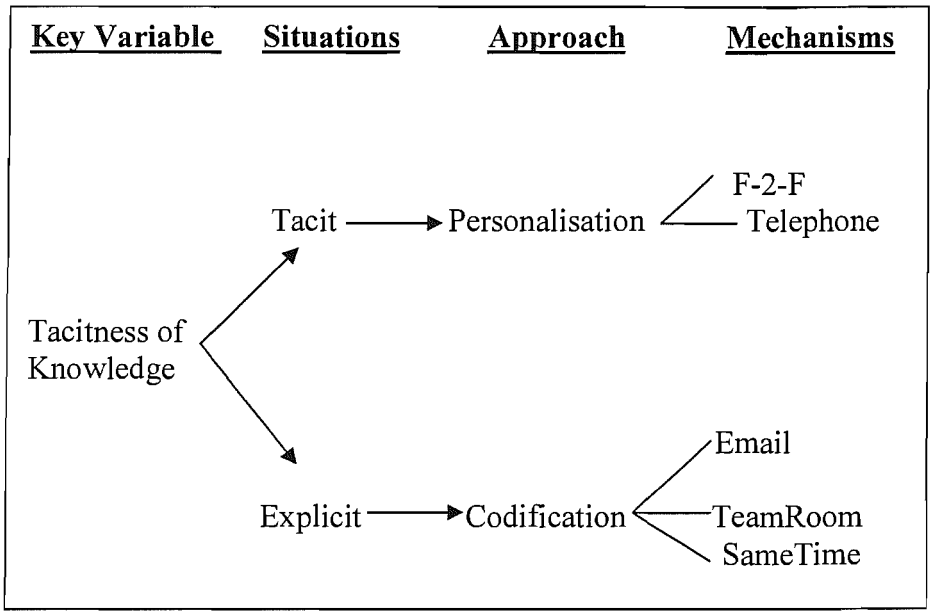


Figure 4.3 Tacitness of knowledge and knowledge transfer mechanisms

4.5.2 The nature of the query

The nature of the query has a significant influence in selection of knowledge transfer mechanism (von Hippel, 1994). Gupta and Govindaranjan (2000, p. 79) also argue that "to be both effective and efficient, the transmission mechanism must be tailored to the type of knowledge being transferred". The study reveals that the nature of the query is an important factor that has a significant effect on the mechanism selection of knowledge transfer at IBM. As a manager points out, "*The nature of the job [query] will determine the means of knowledge transfer.*" A second line manager states,

> *"Multiple ways depending upon the nature of query. If it is technical subjects then it may be via Notes [technology]. But when people need something more detailed [complicated], that will normally be done face to face."*

There are different types of information, i.e., straight forward and complicated, that are required to be used in the case organisation. When there is a need for detailed

discussion, interviewees prefer to go to a colleague. The personalisation approach is thought to be the most appropriate if the nature of the query needs much effort for further explanation. On the other hand, the technology-focused mechanism is found suitable if the query is straightforward in nature. The following quote of a software tester is illustrative:

> *"The choice of media depends upon what they [knowledge users] are after. If they are after experiential types of information, then they are quite likely to come and talk to you. It requires some sort of conversation. If it is some sort of 'yes no answer' typically then it may be done over the phone or by Instant Messaging which is interactive as well."*

For a technical query, much of the knowledge is explicit; it might be written notes electronic messages (Lotus Notes *TeamRoom*). As a manager says, *"It depends what we are trying to do. If it is a broad search then I would suggest to go to the Internet."* Using the web, technical knowledge, which is a sort of explicit knowledge, can be retrieved electronically. A team leader states, *"Generally for technical knowledge through the web and for non technical complicated stuff [personal experiential knowledge], I'll ask somebody who I know."*

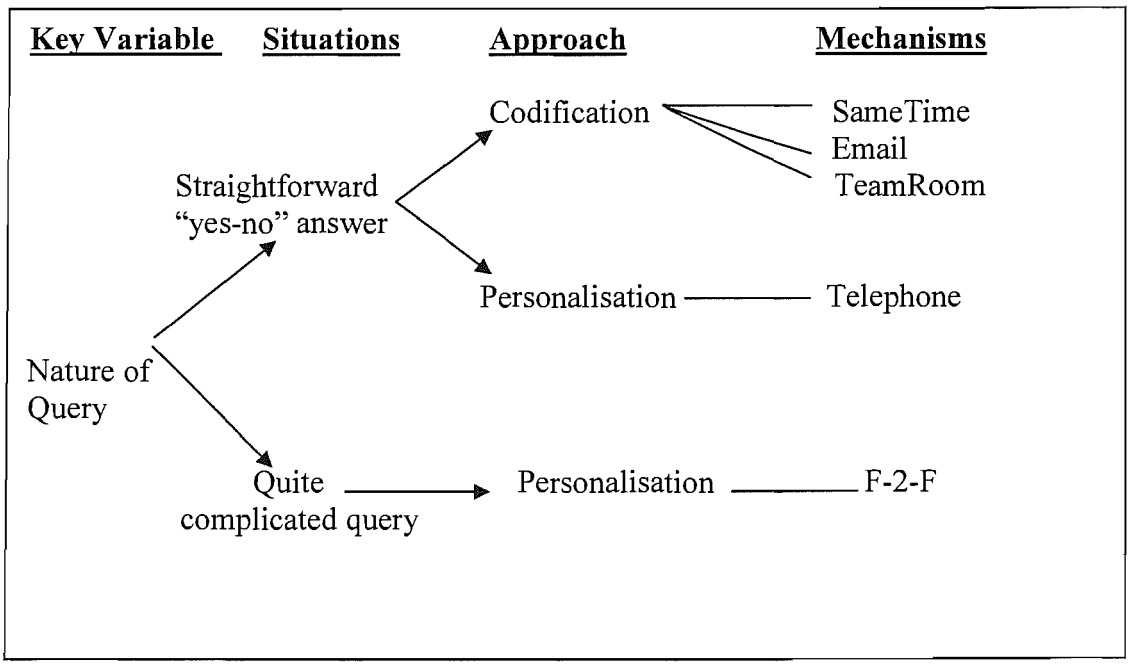


Figure 4.4 The nature of the query and knowledge transfer mechanisms

Figure 4.4 depicts the nature of the query and its impact on knowledge transfer mechanism selection. Szulanski and Cappetta (2003) point out that "the potential actors, particularly the recipients, may require explanations of the nature of knowledge to decide whether it meets their needs". Several researchers, most notably Simonin (1999), Argote et al. (2000), and McEvily and Chakravarthy (2002), argue that the more complex the technical advice is, the more difficult it becomes to accomplish the transfer of knowledge. As revealed from the present research, when the complicated problem which calls for a detailed discussion, the people-focused approach, such as F-2-F interaction, seems to be preferred most.

4.5.3 Status of the actors

The majority of respondents argue that the status of the actors is a significant element in selecting a medium to carry out knowledge transfer. The interviewees identify that they interact with other IBM people who belong to any of three levels: (i) engaging in software developing and testing; (ii) managing a team or department (i.e., immediate boss); and (iii) managing other managers (second-line manager).

The respondents also note that an approach to knowledge transfer depends upon the status of a knowledge contributor. Generally speaking, when a knowledge user and a knowledge contributor have similar status, they interact among themselves employing any mechanism that they perceive suitable. However, respondents admit that that they usually prefer to visit each other's office, if they can, for a technical help. The F-2-F interaction is the most popular medium of knowledge transfer among people having the same position in IBM, followed by instant messaging (IM). A software engineer says:

> *"While working with the same level of colleagues, I just welcome him [user]. Because my office is next to him – just around the corridor. Basically sit down together in my office, run the test and we both look through the results of it. Rather than running it alone or communicating it with colleague using SameTime or Email; inviting someone is different."*

If the knowledge contributor is a senior member of the organisation, then it is more convenient to start with the technology-mediated approach. The majority of the

respondents feel that it would be appropriate to send an Email to senior members of staff so that they could read it and reply back at their convenience. A manager remarks:

> *"If he [contributor] is a senior person then I will prefer to adopt the formal [technology-mediated] approach. If someone I know very well, I may employ more informal [people-focused] approach. If someone I think I have to take their time seriously I probably send an Email. If he is someone within my team or located nearby I will probably visit him and ask for technical help."*

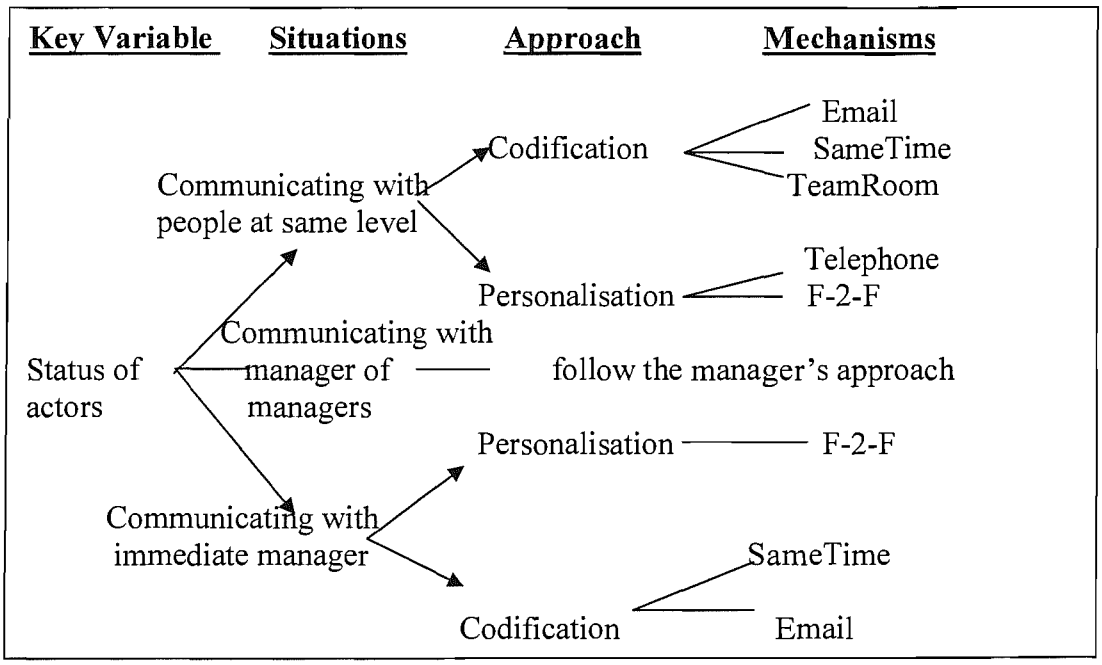


Figure 4.5 The status of the actors and knowledge transfer mechanisms

Figure 4.5 illustrates the role of status in the selection of the transmission mechanism for knowledge transfer while other things remain constant. All the managers (high status actors) interviewed report that although they prefer where possible to carry out knowledge transfer using a people-focused mechanism, circumstances sometimes demand the use of both people-focused and technology-mediated approaches. Sometimes there is a need for having interactions between a software developer and a second-line manager. Interviewees report that when they have to interact with a second-line manager or a member of senior management, they try to get information about the personal preference of the manager in the first place.

4.5.4 Personal preference of knowledge contributor in mechanism selection

Several respondents highlight the importance of perceived personal preference as a determining factor of selection of medium of knowledge transfer at IBM. Some people like to handle documents, others prefer to use Email, some others to talk. A significant portion of the interviewees mention that their choice of mechanism depends upon who the other party is and how he (she) likes to be approached. Subsequently they prefer to follow the mechanism that the contributor prefers to use. An engineer interviewed states:

> *"part of it depends upon who you are and how you like to be approached. If you [senior member] prefer Email, I'll also go with an Email. This is most likely medium for me.*

The preference of a knowledge contributor, particularly knowledge contributor at the senior level, has a significant impact on a prospective knowledge user's choice of a mechanism. It is reported that when the contributor is the user's manager or the manager of his (her) manager, the user would always like to follow their personal preference. A team leader points out:

> *"If they [contributors] are my immediate boss or boss of my boss; if I know what their preference is then I'll definitely follow their approach in a way that perhaps most convenient to knowledge transfer."*

Several interviewees report that there are a very few individuals within the IBM Lab who are relatively conservative, tend to be more formal, not frequently seen around and appear to be less accessible. The respondents feel such people might view frequent interactions as interruptions. To communicate and get some knowledge from them, a prospective user is more likely to employ a technology-focused approach preferably using Email. A unit manager emphasises that:

> *"I would say mechanism of knowledge transfer is influenced by the personality [how easily approachable] of the knowledge contributor. Depending upon who I have to deal with. I'll find some people who are open [friendly] and don't mind being interrupted. I just drop into their office and then a discussion goes on. There are other people around us who aren't approachable as such. And better way of dealing with them is sending them a note via Email."*

The majority of the respondents report that the personal preference of an individual concerned also goes with the nature of the relationship. Having strong social ties, for example, between the actors they could communicate according to their own preferences, no matter what their status is. As a team leader states, *"If the contributor and user do have very good social ties, they can go according to their own personal preference."* Otherwise they have to take into account one another's preference and match accordingly. New recruits give much consideration to the personal preference of knowledge contributors when deciding an approach to knowledge transfer, tending to select a more formal technology-focused approach. Figure 4.6 depicts the perceived personal preference effect of knowledge transfer mechanism selection.

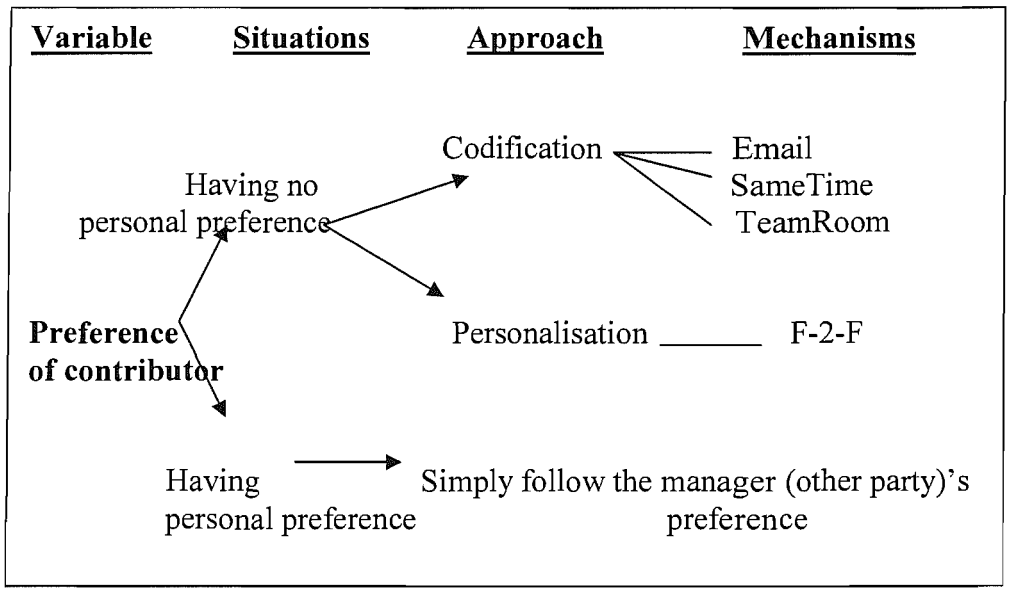


Figure 4.6 Personal preference and knowledge transfer mechanisms

4.5.5 Social ties

Social ties are one of the most powerful determinants in selecting a mechanism to transfer knowledge in an organisation. Tsai and Ghoshal (1998, p. 467) argue that "social ties themselves are channels for information and resource flows". Several scholars (e.g., Cross et al., 2001; Rush, 2001; Olivera, 2000) also explain the importance of social networks and the transfer of knowledge in an organisation. Olivera (2000, p. 815), for example, mention that "network ties are useful predicators of how

information flows in organisations". As revealed in the study, social ties are thought to be a critical element in knowledge transfer.

Bouty (2000) claims that "the closer the relationship between the knowledge provider and knowledge receiver, the more knowledge the provider is willing to transfer". Leonard-Barton and Sinha (1993) contend that strong ties often allow for a two-way interaction between the source and the recipient of knowledge. Before approaching anybody, IBM people would like to be sure what type of social ties they do have. However, as a respondent argues, *"Social networks are not built overnight."* This is also supported by Granovetter (1992) who contends that the kind of personal relationships that people develop when they interact with each other over a period of time. A personal network is a powerful way in which organisation members can find a potential contributor of knowledge.

The respondents identify two aspects of social ties: building network and strength of ties. To find a source of the knowledge in the first place, it is important to build the network. A software developer states, *"If I know you, then probably I'll ask you to give an answer or to tell me the right person who to ask. So it is potentially difficult to find the contact otherwise."* Interviewees do build social networks through F-2-F interaction which facilitates the accomplishment of successful knowledge transfer. An interviewee asserts, *"Social network is a great strength of [IBM]."* A team leader of the organisation says:

> *"I use my personal network if I know someone working on those areas or I know that he may know another person working on the area I am looking for. We always build a close network and also expand the network."*

This is reflected by the comments of a manager:

> *".....There are other people who prefer to have personal touch. Prefer to have direct contact. Even if knowledge is available in a place [knowledge repository], there are very good reasons to talk to the individual who knows the answer. Because we want to start a rapport and to broaden our horizons. One of the things we have to do at [IBM] is not just to interact with our little team but also to build networks with people from other departments."*

The respondents view social ties as the extent to which the actors are becoming acquainted with each other. The study reveals that there are two situations in terms of social relationship that prevail in the organisation: (i) strong ties and (ii) weak ties (Kraut et al., 1988; Newell et al., 2002). Parallel to Hansen's (1999, p. 82) definition, the respondents hold the view that "strong ties are the close and frequent interaction between the actors in a sense that it requires frequent visits to and meetings with others on a regular basis, whereas weak ties are distant and infrequent relationships".

Kraut et al. (1988) support this argument, contending that "organisation members usually like F-2-F interaction with people having strong social ties". A major portion of the respondents report that media selection actually depends upon how socially close the actors engaged in the knowledge transfer are. Hansen (1999 p. 82) reinforces this point of view by suggesting that "weak ties impede the transfer of complex knowledge, which tends to require a strong ties between the parties to a transfer. Intimacy among the parties engaged in knowledge transfer is reported as crucial".

This is further reinforced by several authors, most notably Krone et al. (1987) and O'Reilly (1978), who find that the relationships between individuals involved in knowledge transfer process influences how knowledge is transferred. People having strong ties seem to be indifferent in selecting a mechanism for knowledge transfer, because as Hansen (1999) argues, "the success of knowledge transfer depends to some extent on the strength of the tie that is detectable in the 'intimacy' of the relationship". When ties are weak, the majority of the respondents report their reluctance to employ a personalisation approach to knowledge transfer, preferring to use a technology-focused mechanism like Email. A software developer explains the rationale:

> *"The selection of mechanism also depends upon how well I know the person; I mean 'intimacy'. Because a lot of people ask me about knowledge and it takes a lot of my time. People I never have heard of if they ask me a question through instant message and if it takes a long time to answer, then it would irritate me. They are jumping in the middle of my schedule. That may not be my priority. So I expect them to use Email that I would prefer most [personal preference]. If I know them quite well it can be more informal. If it is a quick query then I'll not mind if they come to me with whatever approach they like."*

Most of the interviewees perceive computer-mediated tools, particularly Email, as most effective in a situation where the actors of the knowledge transfer processes are not known to each other. However, arranging F-2-F interaction among those with weak ties also help build up social ties as time passes. In this regard, a manager says:

> *"Giving an appointment for a meeting and discussing things face to face help build up a social relationship with people with whom we do have less acquaintance."*

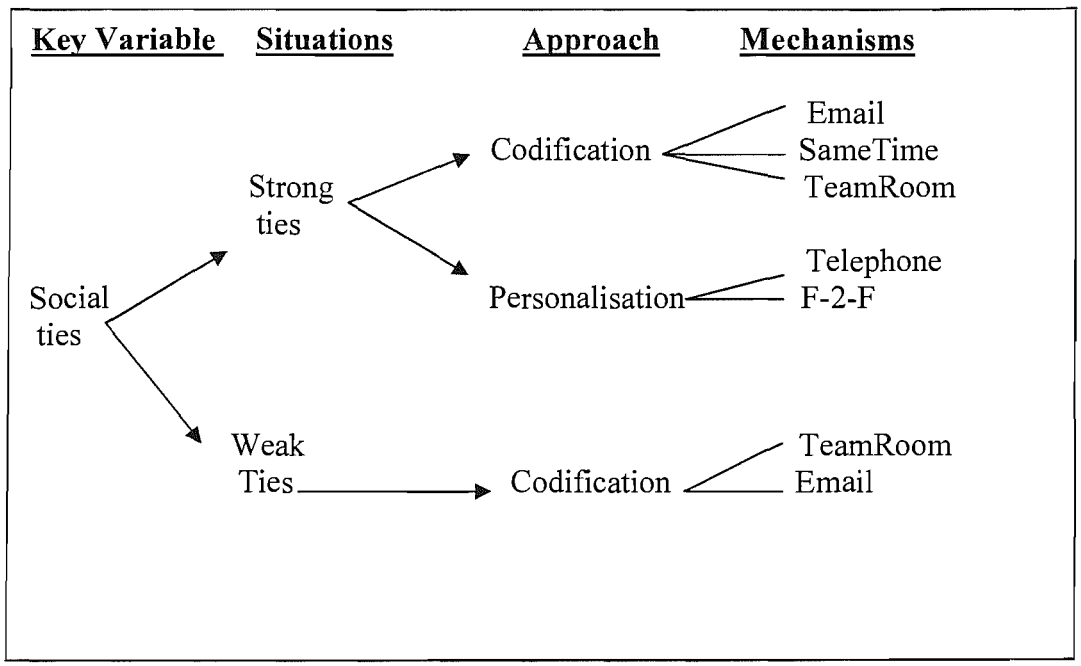


Figure 4.7 Social ties and knowledge transfer mechanisms

Figure 4.7 demonstrates the social ties effect of the mechanism selection. Szulanski and Cappetta (2003) argue that this consideration highlights the importance of social ties as a criterion for selecting a medium of knowledge transfer.

4.5.6 Proximity

The selection of mechanism also depends upon proximity of the actors involved in the knowledge transfer process. IBM is a multinational corporation whose members work across distance, time zones, and continental boundaries. As revealed from the study, there are two perceptions in terms of proximity: (i) close location and (ii) distant location (Constant et al., 1996; Choo & Auster, 1993; DeCarolis & Deeds, 1999;

Carbonara, 2005). Choo and Auster (1993, pp. 284-285), for example, argue that "knowledge users prefer sources that are local or close at hand because for them the perceived accessibility of a knowledge source is more important than its perceived quality". The respondents consider close location to mean within the IBM Lab, whereas distant location is the case when people are working together but split by geographical location.

Styrh (2000) claims that computer-based systems are useful tools when distributing codified knowledge between the employees of two parts of a team split by a long distance. Several other scholars, most notably Monge et al. (1985) and Kraut et al. (2001), also explain "the effects of proximity on collaboration, arguing that technology has a great role in supporting remote collaborative work". Interviewees report that the proximity of the actors of knowledge transfer plays a significant role in understanding mechanism selection. They argue that F-2-F interaction is the most often used medium when employees are in close proximity. When the prospective user and contributor within IBM are in close proximity, they can talk to each other because they can get contextual and technical advice. A software developer remarks:

> *"We can have a face-to-face conversation with a person who is two doors down saying 'hi, what about this, do you know?' It works quite well. I can't do it with an individual who is in a different location."*

DeCarolis and Deeds (1999) mention that "close proximity promotes the natural exchanges of ideas through the networks established, whereas the 'distance' makes technical advice through F-2-F interaction problematic or impossible". Among other mechanisms, Email is perceived to be the most appropriate medium of knowledge transfer if the actors are at distant locations and, to a lesser extent, the telephone. A manager points out:

> *"I do use Email a lot because he [contributor] is in America now and I am here. Because that communication is more convenient to be in Email. If he is here I probably talk to him because there is something about context."*

This is reflected by a software developer:

> *"using face-to-face conversation is the best way of knowledge transfer. But you know practically it is an expensive way of doing [knowledge transfer] because*

the person has to travel if he is not available around. So I'll send him an Email."

Several researchers (e.g., Loeb et al., 1998; Carbonara, 2005; Constant et al., 1996), argue that technology has the capability to transfer a great amount of information, reducing the space and time barriers. Loeb et al. (1998 p. 297), for example, point out that "since technology-mediated mechanisms enable coordination across geography and time, it makes sense to use such mechanisms to logically integrate data spread all over the world". The use of technology confirms the work of Constant et al. (1996) who argue that "technology networks are being used by many organisations, making it relatively easy and inexpensive to ask distant acquaintances for advice via Email". A software engineer says:

"While positioned apart, it is difficult to work together face to face, we cannot have ping pong ideas and thoughts. We basically have only one or two mechanisms like Email, SameTime or whatever. As you know we are split geographically another sensible means of knowledge transfer with us is telephone conversation call. We do use all of these things [mechanisms]."

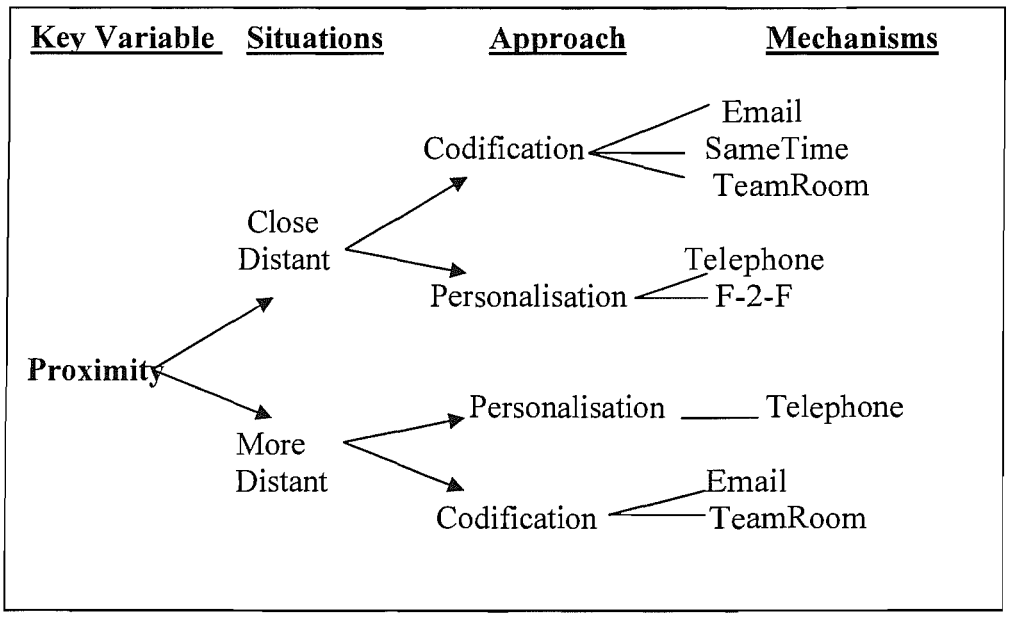


Figure 4.8 Proximity and knowledge transfer mechanisms

A few respondents argue that a disconnected relationship works well if the parties have some sort of F-2-F interaction at some point to build a stronger relationship. For example, a manager describes an occasion when a visit by an expert from another location (California) is arranged so as to engage in social interaction, which has helped to improve subsequent knowledge transfer. Figure 4.8 depicts how proximity helps influence media selection of effective knowledge transfer, *ceteris paribus.*

4.5.7 Trust

Interviewees report trust to be an important issue in the choice of knowledge transfer mechanism. Trust is defined as "a set of expectations shared by all those in an exchange" (Zucker, 1986, as cited in Nelson & Cooprider, 1996). Trust between individuals has been shown to be a pre-requisite for the successful transfer of knowledge. Early empirical research efforts have begun to shed light on trust and the knowledge transfer process (e.g., Huemer et al., 1998; Keong & Al-Hawamdeh, 2002; Bouty, 2000; Nelson & Cooprider, 1996; Ashleigh et al., 2003).

Ashleigh et al. (2003, p. 11), for instance, argue that trust and knowledge transfer are interlinked, while Keong and Al-Hawamdeh (2002, p. 55) contend that an environment of trust is conducive to knowledge sharing. Nelson and Cooprider (1996, p. 413) also claim that trust has a major impact on knowledge transfer, suggesting "trust encourages a climate conducive to the sharing of knowledge". Parallel to this, Bouty (2000) makes a similar comment saying that "trust is crucial in the sense that the provider needs to trust the receiver not to exploit the shared knowledge for purposes other than those agreed upon, implicitly as well as explicitly". Davenport and Prusak (1998) assert that greater levels of trust tend to promote higher levels of knowledge transfer.

Kramer (1999, p. 163) argues that "trust is a critical factor that influences the way knowledge is transferred within an organisation". Building trust among organisation members is thought to be a necessary condition for an organisation's success. A significant number of interviewees indicate that successful knowledge transfer seems to depend upon trust between the actors involved in the transfer processes, which eventually acts as a powerful determinant of mechanism selection of knowledge

transfer. Trust among organisation members appears prevalent at IBM. As a team leader says:

> *"It is a two-way thing: if you help somebody, next time he will help you. So you build up a network of trust with your colleagues that helps knowledge to be transferred."*

Without trust among its employees, an organisation will be less likely to survive longer. Interviewees appear to recognise two situations with respect to trust: (i) high trust and (ii) low trust (Riegelsberger et al., 2003; Newel et al., 2002; Zucker, 1986; Nelson & Cooprider, 1996). The interviewees perceive high trust as a situation in which there is a set of high expectations shared by all those in an exchange and low trust is a situation in which there is the absence of such expectations.

When the employees of a company are collaborative and open with each other, they are indifferent in selecting a mechanism for transferring knowledge. Trust encourages open communication and rapid information exchange (Powell, 1990 as cited in Karamanos, 2003, p. 1978). It is reported by the respondents that due to lack of trust, people (i.e., the prospective user and knowledge contributor) will prefer to have explicit knowledge transfer using a technology-focused tool to start with. A large proportion of the respondents mention that lack of trust encourages them to select a technology-focused approach to transfer knowledge. A software engineer states that:

> *"Sending something by Email or SameTime is also good because text can be stored and the big point is that there is no dispute between the parties. I can look back and see if it is written down, I can prove it. While talking, there is no proof."*

Trust is especially important when the company's employees are located in different parts of the world. A team leader states that:

> *"After joining the company [IBM] first thing we have to have is face-to-face interaction because we don't trust them and they don't trust us. They are frightened of us. Reality is that we are normal people, we want to get along with everybody. So the way to do is to meet them, invite them to dinner, talk to them and work with them when they come. If we show them we are normal people and we also like countryside. They warm to us we warm to them and thereby build*

up rapport and trust that is the key. Once I know who I am talking to; then electronic media is fine."

When they have high trust, personalisation approaches, such as F-2-F interaction, seem to be most used because either party is willing to transfer knowledge by talking to each other in person. When a lack of trust prevails in the organisation, the codification approach using Email or Instant Messaging is used more, other factors remaining constant. The trust impact of knowledge transfer media choice is depicted in Figure 4.9.

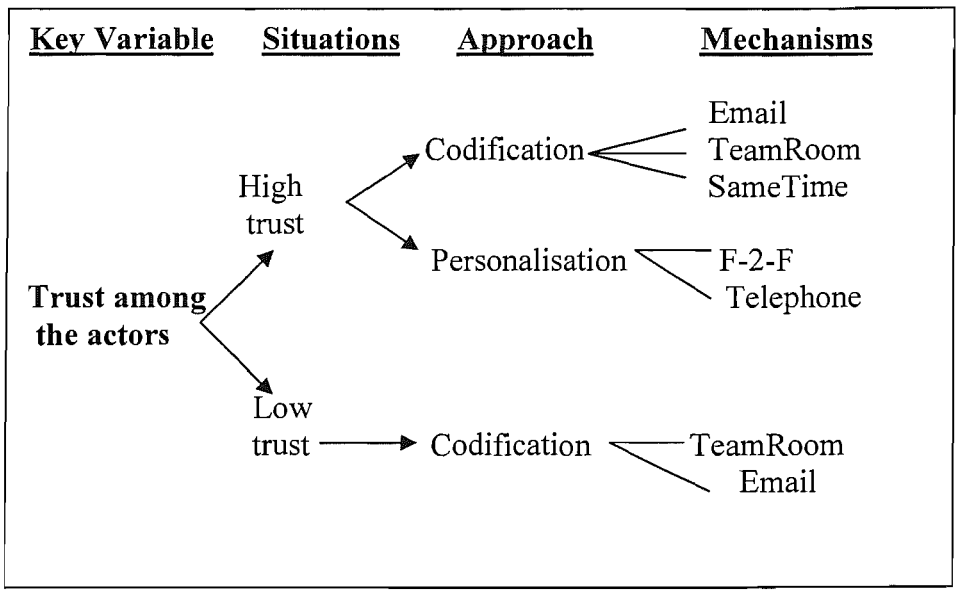


Figure 4.9 Trust among the actors and knowledge transfer mechanisms

A few respondents also report that it is harder to develop trust with someone if the actors can not see F-2-F (Riegelsberger et al., 2003). They claim that frequent F-2-F interactions help develop social ties, which eventually results in building trust among them. A team leader remarks, *"It was a bit of both."* As a team leader states, *"There is an element of trust at [IBM] which grows over a period of time."* Several interviewees prefer F-2-F interaction to transfer their knowledge so as to develop trust among themselves. Nandhakumar (1999) reinforces this point of view by suggesting that organisational members interact F-2-F with other members to develop a personal type of trust.

Parallel to this, Ipe (2003, p. 349) contends that "F-2-F communication allows for building of trust, which in turn is critical to sharing knowledge". The interviewees feel that occasional F-2-F interaction can help to build trust and thereby use codification approach. A manager stated, *"To start building trust among the team members, I think that [F-2-F] is crucial. Once you have started with it then other mechanisms are appropriate to use."* This is also further supported by Riegelsberger et al. (2003, p. 760) who argue that codification approach to knowledge transfer requires more *a priori* trust that develops through F-2-F. Because ICTs are not adequate for either development or maintenance of trust in working relations (Nandhakumar, 1999).

4.5.8 Corporate urgency

Urgency is an important issue to knowledge transfer (e.g., Nielsen & Ciabuschi, 2003; Markus, 1994). Interviewees identify corporate urgency (time criticality) as the most significant determinant in selecting a knowledge transfer mechanism. A second-line manager states, *"The approach to knowledge transfer depends upon whether the knowledge is time critical."* Although every interviewee considers this to be the most significant, strangely it is the last thing they mention; during the interview most of them mention it towards the end.

The employees interviewed report that they keep receiving queries from their customers. Some of them are related to fixing customer's problems which need quick response immediately. Such problems have high priority, solving these problems receive attention by the organisation, particularly by the CICS people. As a manager states, *"If I want to discuss something real urgent either I'll go to a person who really can help me or he will probably come to talk about that."* IBM people are allowed to communicate with others irrespective of status, proximity, social ties, preference, or whatever, using the most suitable mechanism to get an urgent reply, for example, to fix a problem or to meet a customer's requirement. A team leader notes:

> *"It depends upon the urgency of the knowledge. If you need information which is very much time critical, then you have to get an answer quickly so you can go to an expert whosoever. Get the answer quickly and interactively with an expert."*

This is reflected by a manager working in CICS:

> *"If it is some customer-related problem and it is so crucial that you need a quick answer then you are allowed to go to any person whosoever, whether you have an intimacy with the person or not. It does not matter what his position is – may be your boss or boss of your own boss [second-line manager]."*

This finding partially supports Markus (1994) who argues that Email is used as a primary medium in situations involving time pressure. The urgency effect of knowledge transfer mechanism selection is shown in Figure 4.10.

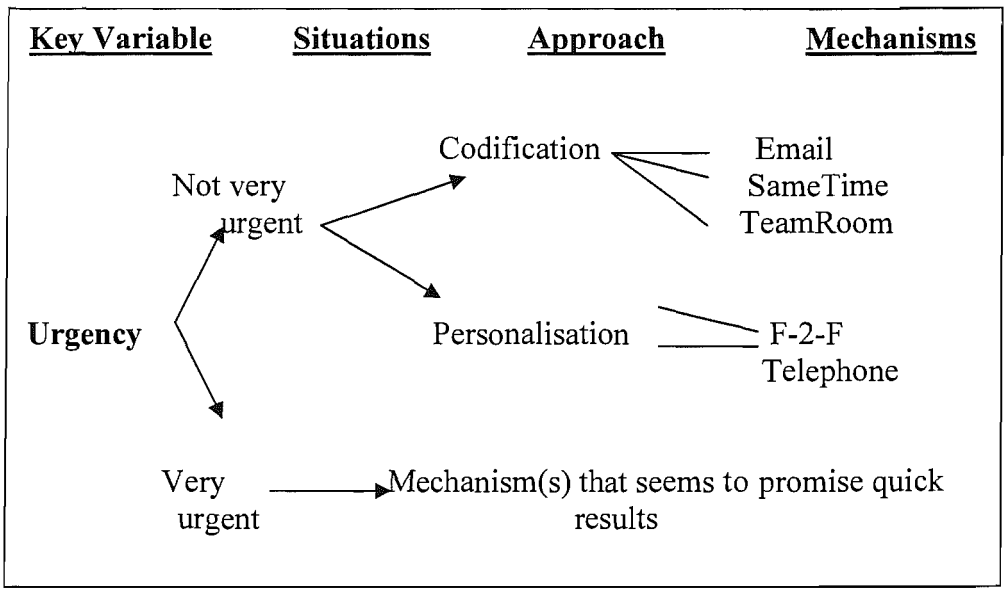


Figure 4.10 Corporate urgency and knowledge transfer mechanisms

As revealed from the study, face-to-face interaction is recommended as the most suitable for facilitating the transfer of tacit knowledge. But circumstances sometimes warrant the use of both people-focused and technology-mediated approaches. F-2-F conversation is most commonly used in most situations, followed by Email if the actors of knowledge transfer are working in different parts of the world. These eight variables will be considered further in Section 5.2. So far, the empirical data has been analysed to explore the possible factors of the choice of knowledge transfer mechanism to address the first research question. The rest of the chapter addresses the second research question, relating to knowledge storage and the knowledge administration.

4.6 Hybrid approach to knowledge transfer

The interviewees report that there are strengths and weaknesses in all the mechanisms available for the transfer of knowledge. To overcome such difficulties, some respondents mention a "hybrid" approach to knowledge transfer. The following section describes different examples of such a hybrid.

By hybrid, the interviewees mean a combination of personalisation and codification approaches. In this context, the argument of Gupta and Govindaranjan (2000, pp. 79-80), for example, is very relevant, in which they put it thus:

> "To be both effective and efficient, transmission mechanism must be tailored to the type of knowledge being transferred. When it comes to transmission mechanisms, "effectiveness" refers to whether the receiver actually receives what the sender has sent; "efficiency" refers to the cost and speed of the transmission channels. Document exchange is a highly effective and efficient mechanism for sharing codified knowledge. It is often highly ineffective, however, for transmitting tacit knowledge. Conversations and the transfer of people, by contrast, are relatively inefficient mechanisms for sharing codified knowledge. But, for transferring tacit knowledge, they may be the only effective mechanisms."

While asking whether they like to choose any particular mechanism, most of them question how effective one specific mechanism would be to meet all situations of knowledge transfer. Because both the personalisation and codification approaches have positive and negative sides for accomplishing knowledge transfer (see section 4.4). In this regard, one of the managers elaborates:

> *"There are strengths and weaknesses of both really. If you exclusively rely on what you have on web sites .....then you have to be sure that it is updated. After reading it if you require more ....., then you can never ever ask to the website...."If you speak to someone you can do that more interactively. The weakness .....is that both the parties have to be available to interact physically. .....If the person is in other part of the world then .....it is better to use electronic media; generally speaking, I think the best way is to go with a hybrid of the two."*

A large portion of the interviewees perceive personalisation approach, particularly F-2-F, as the most effective and efficient mechanism of knowledge transfer in some situations. At the same time, they report that Email and telephone are used when they work as the two parts of a team split by a long distance. A team leader states, *"If distance is a factor, then face to face is difficult. Probably our initial contact will be by Email or over the telephone."* This is reflected in a software tester's statement, who remarks:

> *"Although for certain situations, face-to-face interaction seems to be most efficient and effective, we cannot go face to face all the time with our colleagues who work from another country. Hybrid, I think, is the only way to help transfer knowledge."*

In this regard, Loeb et al. (1998 p. 297) point out that since technology-mediated mechanisms enable coordination across geography and time, it makes sense to use such mechanisms to logically integrate data spread all over the world. Carbonara (2005, p. 213) also supports it, contending that "ICTs have the capability to transfer, collect, and manage a large amount of knowledge and to reduce the space and time barriers".

There is a strong argument in favour of a "hybrid" mechanism of knowledge transfer. A manager remarks: *"I probably think mixture...I think it is difficult to find one way that will fit in all situations. To me it is hybrid. I use both methods definitely."* A team leader explains why she uses more than one mechanism:

> *"People can search through the Internet and can find the document they are looking for. If there is some confusion or ambiguity, then they can resolve it through personal interaction with me [contributor]....there are benefits to both. I don't think one approach really is better than the other. I think we need the mixture. We need a mixture of these things [mechanisms] for passing knowledge directly and distributing documents electronically. The level of complexity and the nature of problems may compel us to address a hybrid approach. We cannot go either way."*

This is reflected by another team leader:

> *"Again I think that the best comes face to face because you can see whether people understand. One of the strengths of talking to somebody is I can often*

realise whether they understand or not. Downside is as time goes by it is most likely they will forget something. With an Email you can be quite explicit about what needs to be done and you can go back and refer to it quite often. Sometimes you need both. Sometimes you actually better to talk to them and then send them Email which is quite explicit."

Several researchers, most notably Hansen et al. (1999), Zack (1999a, b) and, Earl (2000), argue that tacit knowledge can be transferred employing a personalisation approach, while explicit knowledge can be transferred through a codification approach (Bolisani & Scarso, 2000). As revealed in the study, employing any particular mechanism, be it a people-focused or a technology-mediated, will not guarantee effective knowledge transfer in all situations. The majority of respondents feel that knowledge transfer can not be accomplished well by depending upon only one particular mechanism. An employee interviewed states, *"Neither approach alone can yield good results in terms of knowledge transfer."* This is supported by Figure 4.11 which also displays knowledge transfer mechanisms at IBM incorporating *hybrid* approach.

The employees interviewed also report that the company employs a *hybrid* approach in some way or other. The knowledge transfer activities at IBM is not confined to one particular approach, be it the codification approach (technology-facilitated) or the personalisation approach (e.g., F-2-F interface). Sometimes a people-focused mechanism is followed by another technology-assisted mechanism or vice versa. That is, knowledge transfer will start with verbal inputs and end up with formal comments, which may be in written form. As a team leader notes, *"Descent from less rigorous to very rigorous."* The hybrid approach to knowledge transfer will be considered further in Section 5.3.

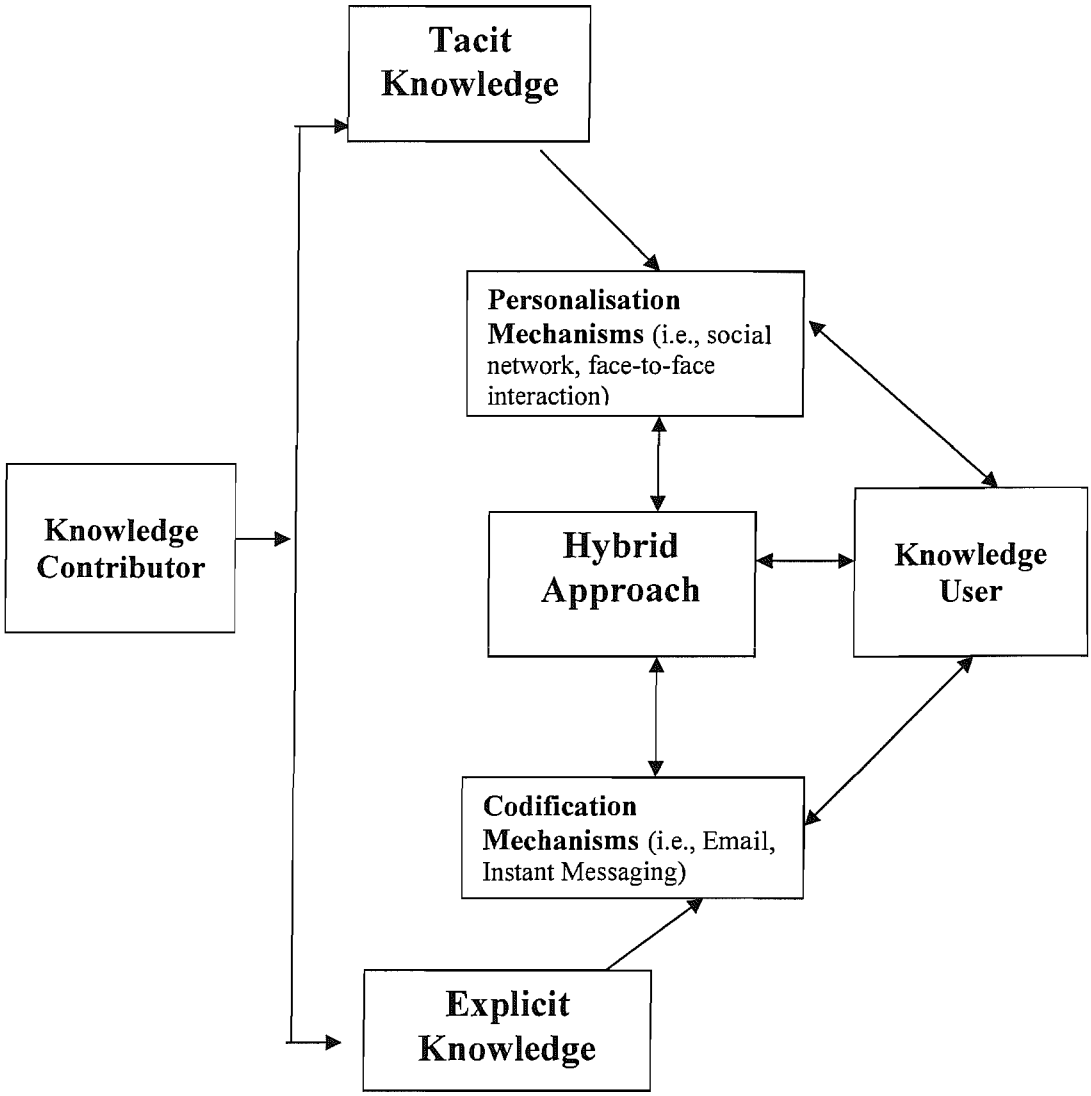


Figure 4.11 Framework of knowledge transfer

4.7 Knowledge storage

Knowledge storage in an organisation includes preserving knowledge and getting access to the stored knowledge for future re-use. Douglas (2002) argues that knowledge that is in the head of a person has limited value. Its value increases when it is stored and reused. Similarly, knowledge that is created and passed on to a user directly without being recorded and stored in a repository represents a waste of resources, because prospective users will have to solve old problems again (Gray & Chan, 2000; Stein, 1995).

The organisation under study has recognised the need for and advantages of knowledge storage. Interviewees take the view that the stored knowledge available in any repository is an element of the knowledge transfer process because one actor deposits knowledge into a repository and others retrieve it from the repository for reuse. As a result, transfer of knowledge is carried out via the knowledge repository. A manager observes:

> *"I think storing knowledge as much as possible that makes lot of sense. Next time someone comes to me if it is documented then either I can read it for explaining [to recall] or [can] tell him to read the document before coming to me. It is very very important. Time spent storing the stuff and retrieving it outweighs just starting again from scratch."*

Interviewees prefer to use the knowledge available in the organisational repository in the first place. As a CICS member notes, "*My job tends to make use of the existing knowledge after getting it from a person or machine, not to reinvent the wheel*". So they usually search using computer-assisted technologies, in order to fix technical problems, for example. Failing that, they seem to approach and contact fellow colleagues to get technical advice. In other words, the tendency is that most of them go to the knowledge repository at the outset with the aim of exploring and re-using existing solutions. As soon as they realise relevant solutions are not available in the repository, they tend to go to other colleagues and ask for help. As an interviewee says:

> *"Initially I prefer to do things by myself. If I lack expertise, I try to find it in a place [knowledge repository]. If it is not there, then I go to people who I ask. I just go out of my door and say 'Can I have a few minutes?'"*

At IBM, the development team writes codes and passes them on to the testers for functional verification. If team members keep using existing solutions, then it can ensure efficiency of work by saving time. A team leader explains:

> *"We should stop wasting their [user] time and our [contributor] time. If an employee is found fixing a problem which has already been solved and is now available in a repository, we tell him to get that piece of knowledge from there [knowledge repository]. It definitely saves everybody's time."*

The study also reveals that there are dangers in relying on an individual's knowledge; which is not the case if the knowledge is stored in a machine. A software developer elaborates:

> *"I think that's right because I can go to somebody and ask 'do you remember what we have decided?' The person I think as 'knowledge storage bin' there is no guarantee that he is still around. He may have moved [to another department] or he has left [IBM]. Or he may be on holiday at the time of our need. When it is in a machine [computer-assisted repository] I can hope it can be retrieved."*

The majority of the respondents report that after having interactions with a knowledge contributor, they prefer to write information down and store it away so that other prospective users can access it from knowledge repository. Having stored knowledge in an organisational repository, it is a form of permanent storage of data that can be referred back time and time again. The respondents recognise the importance of knowledge storage and identify a number of potential benefits of knowledge storage which are set out in the following section.

4.7.1 Perceptions of the usefulness of knowledge storage

The discussion of the usefulness of knowledge storage experience in IBM is an essential starting point to understand and explore the nature of the choice of storage devices available in the company. Actors engaged in knowledge transfer perceive advantages to storing knowledge in an organisation. Interviewees advocate having knowledge storage devices and retaining knowledge in those devices for the benefit of both the knowledge contributor and prospective user. The benefits are discussed below, taking the perspectives of the contributor, the user and the organisation.

4.7.1.1 Storage of transferred knowledge: Contributors' perspective

The respondents at IBM agree that, although one of the locations where organisational memory resides is with individuals, having knowledge stored in some artefacts is necessary because an individual's memory capacity is limited. The majority of the

interviewees acknowledge an advantage of writing down and storing knowledge in a repository which helps avoid interruption: if any user needs technical advice, the individual can look it up in a knowledge repository. One knowledge contributor remarks:

> *"I think it is important but not urgent. It is always useful to put the inputs of same query in the storage bins so that people can go through it rather than coming to me because I am busy. If I have more time I would allow people to ask me questions. Having put knowledge in a place saves my time actually."*

Similarly, as one departmental head notes:

> *".....Then I can spread out my time doing other things rather than answering the same question several times to many different people everyday. So I can avoid some kind of irritation. You know I'll be bored answering the same question every time so writing down and storing into a repository is a good thing to do."*

4.7.1.2 Storage of transferred knowledge: Users' perspective

The majority of user respondents report that they prefer to go in the first place to a knowledge repository where explicit knowledge may be available for solving their own problems. Only contacting the original writer or their colleagues if the intended users feel the stored knowledge is not sufficient or it needs further clarifications. However, stored knowledge allows them to do some *homework* before approaching the original writer. Describing the usefulness of stored knowledge, a software developer points out:

> *"My initial approach is when I am having some job related problem, rather than going and bothering people straight away, let me invest a little bit of time to understand [retrieving knowledge from a repository]. Because I find there is nothing worse than going often and asking a naïve question. Then realise that 'well, had I got and read the paper properly in the first place I would have found the answer'. So I try to avoid that situation."*

This is reflected in the comments of another employee working in WebSphere:

> *"It would be very good idea to look at what knowledge has been stored before asking someone about it; I can gain insight into something. And if I still don't understand it or if I need more information, interpretation or whatever, then I*

have higher level of understanding already to be able to ask questions somebody."

The respondents state that knowledge storage facilitates getting a quick response since the prospective users do not need to wait for answers to their queries. If the answers to their queries are available in knowledge repositories, then the answers can be quickly retrieved from there with the help of a computer-mediated tool. A software tester remarks:

"It is interactive yourself rather than people sending you information. You don't have to wait for people's response with knowledge. If you want something you can go for it in the Web at least; I myself start with that. The problem is: there are so many bins [repositories] to find."

As several interviewees state, there is a possibility of forgetting things very quickly. A lecture session is a very good example of transferring knowledge through one-to-many conversations, much of which is quickly forgotten. After having gained knowledge, the prospective user can preserve it in a repository so that it can also be looked back on, safeguarding it against being forgotten. A team leader explains:

"I transfer knowledge to people and they walk out with knowledge in their heads, none of us can remember [everything] for more than ten minutes anyway. So they need some kind of reference aid."

4.7.1.3 Storage of transferred knowledge: Organisation's perspective

The storage of organisational knowledge benefits the organisation. A team leader outlines the rationale for knowledge storage:

"So you got to carry forward quite a bit of knowledge for re-use purpose. For future re-use, future reference and also for future revenue. We cannot make money if we forget everything we did in the past."

This part of the section will outline the perceived importance of storage of transferred knowledge from the organisational perspective.

Vulnerability. IBM will be vulnerable if its knowledge is kept only in its employees' heads. The person who possesses the knowledge may leave the organisation. Most of the interviewees opine that an organisation can not exist for long without having written its knowledge down and stored it away. A team leader states, *"We cannot afford to lose it"*. A second-line manager explains the importance of knowledge storage in an organisation:

> *"We cannot survive without knowledge storage. We will be paralysed without it. For our company it is crucial. It should be written down and stored away, no matter how or where. As long as I have the answer in it. We got access to it. We always need all kind of knowledge all the time."*

New joiners. IBM recruits new members every year who are given on-the-job training involving knowledge acquisition. As a software developer comments, *"Since most of the organisational knowledge is somehow stored, it brings someone up to speed."* The majority of the interviewees argue that it will be difficult to describe everything about the company to new recruits, as this would be time-consuming. So at the corporate level, management encourage people to write down frequently asked questions (FAQs) and make them available to new joiners.

Corporate requirements. Another reason for storing knowledge at IBM is to meet corporate requirements such as preserving organisational knowledge for audit purposes. A manager interviewed states, *"We keep things in our databases because we have to prove that we follow certain process; so I need to refer it in future."*

Integrity. A few respondents state that writing things down and storing them helps prevent the corruption of knowledge. Preservation protects it from being corrupted and makes it available to other people over time, and also keeps its accuracy. A manager states, *"Writing things down and storing them away helps prevent them from being corrupted."*

From the above discussion, the need for storage of knowledge is clear. It is perceived by the respondents as critical for the organisation's survival.

4.7.2 Architecture of knowledge storage at IBM

The architecture of the existing knowledge storage at IBM is based on computer-assisted technology in which the computer itself becomes a powerful enabler in storing knowledge electronically. A software tester remarks:

> *"We do use several mechanisms to transfer knowledge beyond face to face most definitely. We have a database, for example, where we can send out requests for information. Or we can post information in the database which gives us all the information. Sometimes it is automatically sent out to the interested parties' list."*

A software engineer makes a similar observation:

> *"I archive my data through Lotus Notes in my inbox. I always keep things in a data-base with an aim to use it in future as a kind of local cache. The most of the things we do is to use TeamRoom databases."*

Interviewees prefer to see the storage mechanism as machine-focused, tending to store their knowledge in explicit form in their databases. Since Lotus Notes *TeamRoom* has a facility to store knowledge automatically, people can get back to it and read it later on. A manager remarks:

> *"I think we store most of our knowledge in computers. I don't trust my memory I mean it cannot remember everything. Rather I would prefer to write it down. Most of the time I write it down in manuals or notebooks. Or I'll document them and stick them somewhere in my machine [computer]."*

This is reflected by an employee interviewed:

> *"Knowledge storage goes with machine. Here there are various ways of storing knowledge. Yes we have predominantly electronic mechanisms one form or another. It is natural that we forget things. We end up with Emails, end up with databases and we end up with archives. We are totally dominated by computer, I suppose."*

IBM has a variety of formal knowledge storage mechanisms. As noted earlier, Lotus Notes *TeamRoom* and Email are found to be popular and formal mechanisms for

retaining information and for transferring knowledge. However, the majority of interviewees perceive *TeamRoom* as the most effective mechanism, because it performs knowledge transfer and knowledge storage simultaneously.

The architecture of the existing knowledge store at the IBM is free format because each functional area can decide what databases and *TeamRooms* it wants. Each department or project is allowed to design its own architecture that works for it. As a manager remarks: *"I think it depends. You could see Team Room as a storage bin is owned by CICS or owned by WMQ; owned by Sue's [second line manager] product centre area."*

Therefore, IBM's storage architecture is based either on projects or on functional areas. A second-line manager elaborates:

> *"We have Team Rooms not only for projects but for test community across the Lab, for example. So the tester who works on CICS [is] sharing ideas with the tester who works on Sue's product centre. A tester who works on WMQ or who works on Java because they are test community, they share their ideas about testing methodology rather than product related things. So you see both links are going on. They are also going on in separate Team Rooms. Because you set up Team Rooms dedicated for test community; you set up another Team Room dedicated for CICS projects; one set up dedicated for WMQ release. So you got lots and lots of online Team Rooms not physical Team Rooms. Some of them will be product related; some of them will be discipline related."*

4.7.3 The linkage between knowledge transfer and knowledge storage

A limited literature provides isolated descriptions of the significance of the integration of knowledge transfer and knowledge storage (e.g., Gray & Chan, 2000; Argote & Ingram, 2000; Douglas, 2002; Connelly & Kelloway, 2001; Kalling, 2003). Some organisations attempt to improve knowledge transfer among their employees through the creation of a 'knowledge repository' (Connelly & Kelloway, 2001). Ruggles (1998) contends that organisational members can contribute their expertise electronically to the organisation in a way that can be accessed by other employees. Interviewees also recognise the advantages of such integration.

The majority of the respondents take the view that knowledge transfer and knowledge storage are interlinked. Interviewees state that the computer-mediated communication devices that are used privately for knowledge transfer could also be used effectively for knowledge storage, for instance, using a Lotus Notes *TeamRoom*. As a software developer states, *"Electronic devices such as Lotus Notes TeamRoom facilitate the storage of answers"*. Another interviewee remarks:

> *"Lotus Notes software provides an electronic repository we call 'TeamRoom' which is like a big database where our documents are preserved, which helps to get access to information later on and add comments on it and so on."*

Whenever they transfer knowledge using Lotus Notes *TeamRoom*, they can immediately store it electronically for future use. Their idea of preserving knowledge is to make it available for the future. An intended user can search into a knowledge repository before approaching a potential knowledge contributor who has deposited knowledge. A team leader working in the CICS Division remarks:

> *"I guess you can say intertwined because it is the same information that needs to be transferred and also stored for future transfer to occur. They are two parts of the same thing. I may get knowledge from both parts: from what is being stored in the storage bins and again what is being transferred to me directly by colleagues so they are integrated."*

Documents available in the knowledge repository are thought to be a more formal way of transferring knowledge that is explicit in nature. Interviewees also report that they prepare notes relating to technical advice and store as frequently asked questions (FAQ). A manager interviewed explains the integration of knowledge transfer and knowledge storage in the following ways:

> *"Lots of things I have seen as FAQs. Previously in the past lot of people asked the same question. I mean lots of people have the same query, now we store it. And people can look back; instead of me explaining the same thing numerous times. Obviously storing knowledge is something that leads to knowledge transfer in future. So knowledge is stored away in a repository to retrieve and to accomplish future transfer for future use. Since it can be stored online and subsequently accessed as well which is a lot more efficient, because nobody is taking away other's time."*

A significant proportion of the interviewees view knowledge storage as *deferred transfer of knowledge* in one way or another, arguing that organisational knowledge is stored in knowledge repositories to accomplish future transfer of knowledge. A manager notes that:

> *"The person who wrote and stored knowledge in a repository may be dead. We can get explicit part of knowledge from the repository without interacting with the knowledge contributor since he is already dead. In such situation a storage bin acts as a proxy. When we receive the knowledge from the repository, we actually receive indirectly from him, be he alive or not. Knowledge repository is really acting as a proxy for the person who initiated the transfer - the contributor of the knowledge."*

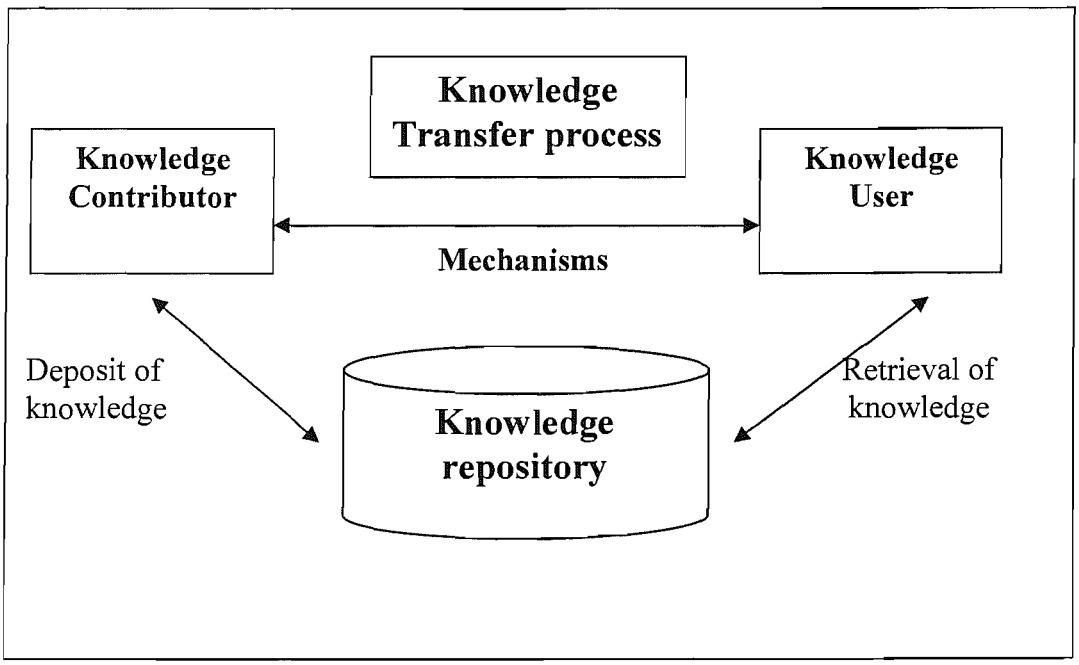


Figure 4.12 Linkage between knowledge transfer and knowledge storage

Figure 4.12 illustrates the interplay of knowledge transfer and knowledge storage. The underlying relationship between knowledge transfer and knowledge storage can be conceptualised by the "bathtub" metaphor coined by Dierickx and Cool (1989) which illustrates the connections between knowledge flows and stocks. They maintain that "the level of water (flow of knowledge) in a tub indicates the stock of water (stock of knowledge) in the bathtub". As a result, this stock of knowledge is the cumulative result

of the flows of knowledge into the knowledge storage. Along similar lines, DeCarolis and Deeds (1999) note that "stocks of knowledge are accumulated by knowledge assets which are internal to the organisation and flows of knowledge are represented by knowledge streams into various parts of the organisation which may be assimilated into stocks of knowledge". Similarly, the interactions between knowledge contributors and knowledge users can add to the stock of knowledge.

4.7.4 Problems associated with knowledge storage

Although most of the interviewees are in favour of having an integrated approach to knowledge transfer and knowledge storage, there is some resentment among them in regard to the way the knowledge is stored in knowledge repositories. The knowledge storing process is not seen to be as systematic as might be expected from a mature, IT-based organisation like IBM, hampering an effective knowledge transfer process. A manager states that:

> *"I think it [knowledge storage] is one of the things that we don't do particularly well here. It becomes difficult to navigate knowledge unless it is properly controlled [categorised]. This is incredibly unwieldy. There is a vast amount of information in this database which is very very difficult to find. Although it is not lost but very difficult to search. It takes a lot of time to search. So when we try to navigate the whole thing it can be very time consuming."*

This quotation is typical of many which identify three basic issues associated with knowledge storage: where to search for it, how to search, and which answer to accept as valid. Addressing these questions could help knowledge storage to be efficient. These issues are discussed in turn below.

4.7.4.1 Finding the exact location of stored knowledge

At IBM, knowledge is stored in many different places, which makes the searching task difficult. As a team leader states, *"The biggest problem is finding exactly where the knowledge resides; exactly where it is stored because there are multiple places we put our knowledge."* The interviewees report that when a new graduate intake joins a

department, he (she) has to spend a couple of years finding and reading things and looking at the designs and codes before he (she) really becomes productive. As a team leader remarks: *"We need to have [a] right location [and] just say 'Go there [a particular repository] and read through the documents'."*

The manuals containing background information are also seen as haphazard. Interviewees feel that tracing the source of knowledge is a very difficult, if not impossible, job even with the assistance of technology. As an interviewee points out:

> *"The first problem someone joining the organisation faces is, of course, finding out where the knowledge is. Although it is nice to see the computer as a storage bin, the way in which knowledge is structured and stored is very complicated."*

Interviewees have bitter experiences of trying to identify the exact location of knowledge utilising Lotus Notes *TeamRoom*. The only way to know about *TeamRoom* is from the people who are linked to it. Only the organisation members of a *TeamRoom* are authorised to access the knowledge, to know who owns it, what they are doing inside it, and what sort of knowledge is being retained in it. A manager remarks:

> *"Knowledge repository is complex really because knowledge has been stored in different ways in various locations in different times. Since there are hundreds of thousands of TeamRooms available in various corners of the storage systems, these repositories have to be integrated and listed so as to unearth the right location to search for stored knowledge."*

4.7.4.2 Navigating process for accessing knowledge

The majority of the respondents also report that the knowledge storage devices used at IBM are complicated. An interviewee admits, *"One of the hindrances people face is difficulty in retrieving knowledge electronically."* They are not happy with the way knowledge is being retrieved from repositories, because the search engine is not efficient. A software developer states, *"The most important thing for a user is how quickly he gets it [knowledge] and how well storage device [engine] is to search [knowledge]."* There is no defined way of preserving knowledge. A team leader describes his experience:

"The [IBM] is not good in search engine. Google is excellent in finding things out there. The fact is that [IBM] search engine is not so good. If we need to retrieve knowledge from a repository like TeamRoom, we get thousands of hits of which many are irrelevant and old."

Although organisational knowledge is retained with the help of computer-mediated devices, another drawback is that knowledge is stored without having been properly categorised and indexed, making it difficult and time consuming to navigate the relevant knowledge. A software tester comments:

"Well I am aware that so much [knowledge] out there. I spend my time drowning in a sea of information. Drowning in a sea of information. So much knowledge is out there. It is sometimes hard to find things because it is not indexed properly. I think it would be nice to have a search engine with which stored knowledge could be retrieved."

This is reflected in the comments of a manager:

"The other problem is how you are searching to find it. We got a massive range of different systems. How I navigate to get answer of those queries. They may be probably out there but how I can find it. To me I think a bit navigation is the biggest challenge. So we have to find a process to classify it [stored knowledge] in such a way that I can sensibly get speed."

Several respondents report that they use keywords to find specific technical advice but fail to get the right answer, even if it is available in the knowledge repositories. They report that they like to have more formal ways to search providing an easy route to find relevant knowledge. A manager states, *"If it is well-structured, it is most likely to save our time"*. A software engineer comments:

"Perhaps I'll say I want a good search engine. Knowledge is not hard to find, it is all out there. Give me a good search engine. It will not give me 900 answers. It will give one answer perhaps 10 answers at most. Lot of knowledge is out of date. I just want to be able to ask a very simple question and get back reasonably quickly a limited number of answers. That makes sense!"

4.7.4.3 Finding correct and relevant knowledge from the repository

Another problem associated with storage of knowledge is identifying the correct piece of knowledge. Even if the knowledge is stored and retrievable, the respondents point out that they can not be sure about the quality of stored knowledge. A manager remarks:

> *"The disadvantage of storage devices [knowledge repositories] is that information available is not necessarily good quality or may be wrong, it may be opinionated, or may be misleading. We have to look very carefully at the sources to decide how trustworthy the information really is."*

The downside of transferring knowledge electronically is that it is difficult to judge the quality of the technical advice because the prospective user does not have any quality control over the answers. A team leader states, "We *get conflicting information; we cannot judge it always."* A tester says that:

> *"I think there are challenges of storing it. One of the big ones is its validity. How I can know it [piece of stored knowledge] is right. There might be some other documents in some other places or with somebody else....One of the big problems is the surety that it is the right piece. Again how to know that it is current version. You might find that here is one version and there is another version on the web Internet site. Which one is right if they differ then which one is accurate. Which is the definitive source that we can trust or the way in which we could get rid of this big problem."*

These respondents also note that a major portion of stored knowledge is not updated. As a software developer states, *"I am not entirely sure how knowledge is being updated. Downside is, stored knowledge is not up to date."* Interviewees claim that a good number of hits that appear on the screen are dead links. A team leader elaborates:

> *"I need to know how I can claim the IBM health insurance scheme....It gave me all the bizarre stuff. Lot of them are dead links which are frustrating, disappointing and annoying. Finding such information should not be difficult because it was very simple question; it was not complicated question either. Google is very good in doing that. It seems to me that [IBM] search engine is not very good. On the positive side [IBM] is getting a lot better now than 10 years ago when I joined."*

4.8 Knowledge administration

At IBM, nobody is found to be exclusively responsible as such to manage the stored knowledge available in the databases. Organisations require certain people within an organisation with a clear responsibility for managing knowledge (Davenport, 1997). Several researchers, most notably Davenport and Volpel (2001), Liebowitz (1999), and Earl and Scott (1999) mention that a Chief Knowledge Officer or equivalent role is appearing in many companies. They report that the knowledge that is available in the repositories of IBM is not regularly updated. The organisation members keep storing the documents in Lotus Notes databases without classifying them which makes finding the exact location difficult. The interviewees irrespective of their status point out that IBM databases are becoming unmanageable and difficult to search. Knowledge requires archiving to optimise the use of computer space. Moreover, if knowledge is allowed to grow without some organised format, then searching the right material would become more difficult task.

Against this background, the majority of the respondents express their dissatisfaction with the way in which the knowledge is stored in a repository. The respondents are in favour of having an individual or a group of individuals responsible for ensuring the relevancy, currency and location of stored knowledge for each project and can guide others in finding the place from where the required knowledge can be easily retrievable. Such a person can sort out and thereby advise the owner of the document to delete or tidy them up. He (she) can regularly send Emails to update documents or archive documents which have not been used for a long time. A manager states:

> *"Very recently, suggestions are coming to archive knowledge in order to optimise the use of our space. It is found that many databases are piled up with information. As a result, databases are becoming unmanageable and difficult to search so unnecessary things need to be cleared."*

A software developer notes:

> *"There is so much available here. If I search for solution of a problem I go to our Web, TeamRoom or whatever first. There is so much stuff available. If you are new [recently joined] then you might be confused. There is no one [Knowledge Administrator] as such who should be there to help us in finding the right stuff."*

Interviewees identify several aspects of knowledge administration. They suggest that the knowledge administration task will be a role assigned to someone within each project. A knowledge administrator having such a functional role can oversee the whole storing process. A manager interviewed elaborates:

> *"We can store knowledge in various places by multiple ways. Organisation [knowledge administrator] can tell us 'you are only allowed to store knowledge in this place or that place. And you are not allowed to use any other places.' That is very good way of consolidating storage of knowledge."*

This will not necessarily be the person who has deposited the knowledge in the first place. The interviews suggest that an attempt needs to be made to employ someone to update the available knowledge regularly and keep telling others within the project to update their files. A team leader working in the WebSphere department remarks:

> *"The person updating may not be the person who originated the document in the first place. Possibly we should have a person other than the originator who could assume responsibility to do that [updating task]."*

The respondents feel that such a person could also act as a focus connecting knowledge contributors and intended users so as to ensure efficient knowledge transfer. A software engineer says, *"I don't know the source but I want to know somebody [Knowledge Administrator] who is well connected. So I can talk to him and hope that he will act as a switchboard for me."* The interviewees suggest that he (she) can be someone among the organisation members having a functional role to guide new entrants with the source of knowledge. A manager elaborates:

> *"It would be quite good if there is someone among us who actually knows where to find the things [technical advice] and how things are stored. Then it will be probably a good idea for anyone starting new or leaning something new, goes to*

him [knowledge administrator] asking 'do you know where I can find it'....Someone in charge of the storage may know exactly how to help him [new recruit] and give quite a right direction."

Several respondents suggests that such a person will be responsible for gathering knowledge about 'who knows what' so that he (she) can help others in finding the right person who can provide technical advice. A team leader says that:

"It would be quite good if there is someone who actually knows where to find the things I want. Who has knowledge about the sources of knowledge."

Interviewees feel that that the administrator does not need to know the details of all the knowledge resources available in a database, but needs to organise and delete materials perceived to be outdated and irrelevant, and to regularly review. A team leader points out:

"If you allow volume to grow without tidying up or clearing up on a more regular basis, then it is really a hard job to manage. So we need someone like knowledge administrator who will do the job. And even if he does not need to have enough technical knowledge to do it. But he has to know what the requirements are for archiving something versus deleting it etc."

A software developer remarks:

"He should ensure annual review cycle, put next review dates, and allow enough time so that the owners of the documents can review and chop the irrelevant part of it."

The interviewees also feel the need of someone like a mediator who can help extract knowledge from dialogue or encourage others in knowledge transfer. Davenport and Prusak (1998) propose "having a knowledge network facilitator that links with the tasks to be performed to implement knowledge transfer". A knowledge administrator is not expected to mediate in all F-2-F encounters. As a team leader remarks:

"That does not mean controlling of knowledge but to facilitate and manage the efficient transfer and storage of knowledge. He will be like a librarian who helps others to find books for use rather than writing books for others."

The majority of the respondents report that the managers and team leaders are performing the knowledge administration functional role informally. A team leader states, *"The managers around us are playing the knowledge administrator role and they tend to look at the processes that we use."* Davenport and Prusak (1998) provide a list a new set of professional job titles, such as knowledge manager, knowledge coordinator, and knowledge network facilitator, who will help to implement KM. Such person may engage in developing a knowledge management strategy, and managing knowledge content for the company (Mckeen et al., 2002).

4.9 Concluding summary

This chapter has provided an analysis of the interviews supported by other inputs gathered from observations and documents. The chapter presents the empirical findings derived through the interpretation of accounts. It starts with an overview of the case organisation. The respondents perceive there is a supportive atmosphere at IBM in which its members are encouraged to carry out the transfer of knowledge. Due to the nature of the job, interviewees think knowledge transfer is crucial for the company's survival and strength. A number of motivations behind the knowledge transfer at the research site are also identified in the chapter.

The chapter also provides a detailed account of the mechanisms used to carry out the transfer of knowledge at the IBM Lab. The mechanisms are classified into people-focused approach and computer-mediated approach to knowledge transfer. The collected data are analysed to explore the factors influencing choice of knowledge transfer mechanism, to address one of the research questions. The determinants that emerged include tacitness of knowledge, nature of query, status, personal preference, social ties, trust, proximity, and corporate urgency. Since both approaches tend to be used simultaneously, it can be argued that at IBM knowledge transfer approach is *hybrid* in nature.

The rest of the chapter focuses on the relationship of issues of knowledge storage and knowledge administration to address the second research question. Interviewees

perceive that knowledge storage is an important element of the knowledge transfer process. In such a scenario, one actor deposits knowledge into a repository and the other retrieves it from the repository in the sense that the transfer of knowledge occurs via the knowledge repository. Computer-assisted technology emerges as a powerful mechanism in storing knowledge explicitly. However, interviewees are not happy with the way knowledge is stored. They also identify three problems associated with knowledge storage. Interviewees also perceive a need for a knowledge administration function to facilitate knowledge transfer and to maintain the knowledge repository.

Chapter Five

Discussion

5.1 Introduction

The objective of this chapter is to discuss the extension of existing knowledge transfer theory derived from the themes and their interrelationships which were analysed in the previous chapter. The theoretical framework is developed based on the main phenomena that emerged from the analysis of empirical investigations at the research site, supported by a review of literature on knowledge management, particularly knowledge transfer. This chapter describes how the researcher follows the "continuous, iterative process" of Miles and Huberman (1994) to further reduce the data and display them in network formats in order to draw conclusions and verify them (see section 3.6). Miles and Huberman (1994, p. 100) state that conclusions can be drawn through noting patterns which is followed by the verification of the conclusions drawn.

This chapter represents the "confirmatory" part of the study in which the displayed data are examined with caution, by conducting a second phase of interviews (see section 3.5.1) in order to confirm research findings. Such interviews are "more focused theory-driven" (Miles & Huberman (1994, p. 35) because the respondents are invited to make comments on aspects relating to the choice of knowledge transfer media and the components of knowledge transfer framework. This is done with the help of the displayed data (i.e., the networks) guided by a second interview protocol (see Appendix-B). The interviewees participated in drawing two conclusions. In line with the two research questions, what emerged in detail during the second round of interviews was a focus on explicit, non-urgent transfers of knowledge (see Figure 5.2), and an integrated framework of the knowledge transfer process incorporating additional components (see Figure 5.4).

The chapter consists of five sections organised in the following way. Section 5.2 discusses the overall implications of the determinants in choice of knowledge transfer mechanism along with discussion of a decision tree of media use for different transfer situations. Section 5.3 proposes a framework of knowledge transfer incorporating additional constructs, namely knowledge storage and knowledge administration, within the knowledge transfer process. Section 5.4 reflects upon a number of principles described by Klein and Myers (1999) to shed some light on the evaluation, particularly validation and generalisation of the research findings.

5.2 Determinants of the choice of knowledge transfer media

Several researchers, including Zack (1999a, 1999b), Sanchez (1997), Hansen et al. (1999), Earl (2000), and Connell et al. (2003), suggest two very different approaches in order to transfer organisational knowledge: the personalisation approach and the codification approach. Hislop (2002, p. 166) contends that "different features of knowledge (e.g., tacitness) significantly influence the ways in which the transfer of knowledge can take place".

In the personalisation approach, the emphasis is on transferring tacit knowledge between individuals in a synchronised way. Brown and Duguid (1998) point out that "the methods for facilitating the transfer of tacit knowledge among organisation members are not transparently obvious". Day (1994) argues that the transfer of tacit knowledge is perhaps more critical than the transfer of explicit knowledge. Several other authors (e.g., Haldin-Herrgard, 2000; Lam, 1997; Huysman & De Wit, 2004; Storey & Barnett, 2001) suggest active direct communication between individuals as a means of tacit knowledge transfer. Haldin-Herrgard (2000), for example, contends that the most common way of transferring tacit knowledge is F-2-F. It helps build strong ties and high trust among organisation members (Ipe, 2003). Researchers (e.g., Roberts, 2000; Rolland & Chauvel, 2000) compliment this point of view by discussing trust as a prerequisite for tacit knowledge sharing.

Similarly, social networks are important for the transfer of tacit knowledge. Huysman and De Wit (2004) assert that social networks support tacit knowledge sharing.

Davenport and Prusak (1998) argue that "organisations hire smart people to talk to one another, using the water cooler room as an example of a place where tacit knowledge can be transferred". Consistent with this, the respondents during the second phase interviews report that the case organisation regularly uses the personalisation approach to transfer tacit knowledge.

The codification approach facilitates an organisation to transfer explicit knowledge using technologies. IBM invests heavily in ICT tools in order to increase its ability to carry out knowledge transfer electronically. It is revealed from the study that the codification approach is employed at IBM to transfer explicit knowledge using technology-mediated mechanisms (*SameTime* and Email). This finding is reinforced by studies (e.g., Scarbrough et al., 1999; Alavi & Leidner, 2001; Bhatt, 2001; Huber, 2001) suggesting that sophisticated computer-mediated tools often play a central role in the transfer of the explicit knowledge of an organisation.

However, it is not only the "tacitness" of knowledge that determines exclusively which approach an organisation adopts in carrying out the transfer of its knowledge. In addition to the tacitness of knowledge, seven other factors that impact on the selection of knowledge transfer mechanism have emerged from the interviews. The variables as perceived by the interviewees are: the nature of the query, the status of the actors, personal preference, proximity, social ties, trust, and urgency (see Figure 5.1). The interplay among these factors and their impact on the choice of knowledge transfer mechanism are confirmed during the second phase of the interviews.

The interviewees claim that there is a positive relationship between social ties and close proximity; again between social ties and trust. The interviewees admit that the knowledge contributor's preference is less important when the actors feel they have strong ties, supporting previous studies (e.g., Monge et al., 1985; Kraut et al., 1988; Choo & Auster, 1993). The respondents report that they prefer F-2-F interaction with people having strong social ties, which also develops with close physical proximity. The interviewees report that all or some of the factors jointly or independently impact in some way or other in selecting a mechanism(s) that promises effective knowledge transfer. These variables will be discussed showing how the interviewees' perception of each help to develop a decision tree.

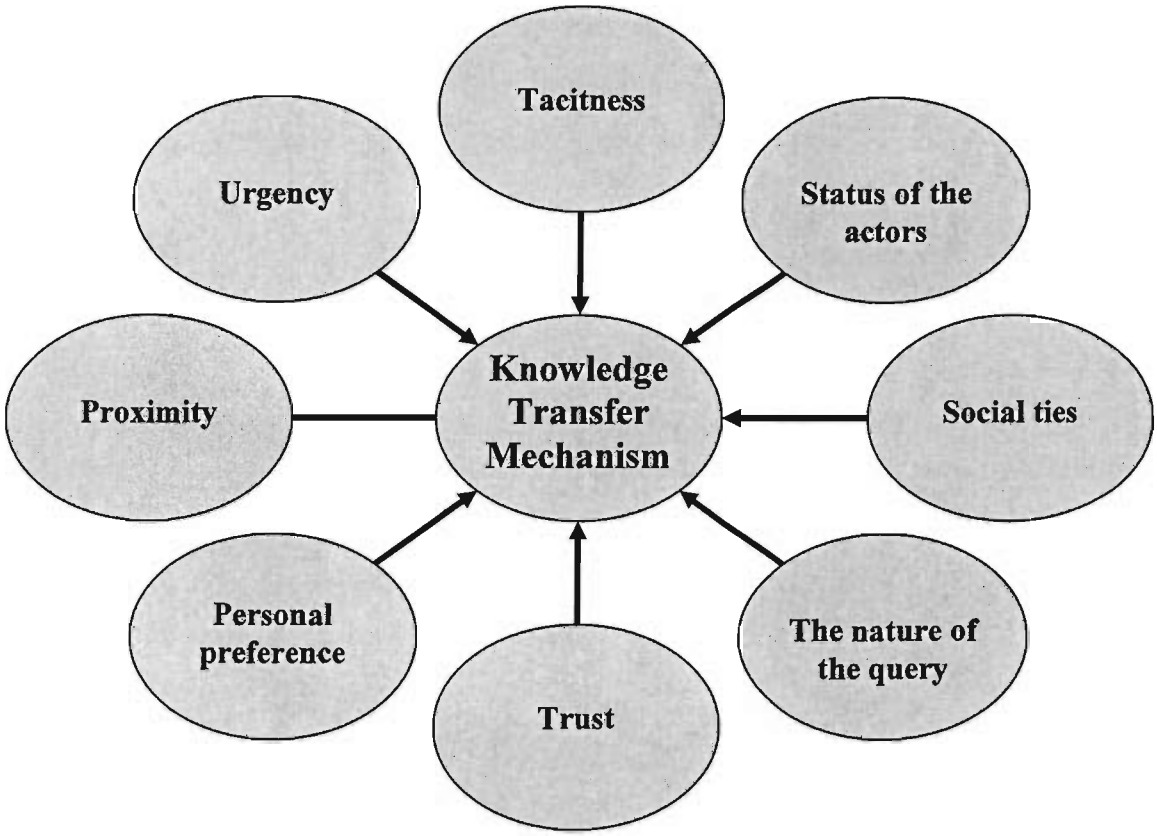


Figure 5.1 Determinants of knowledge transfer mechamism

5.2.1 Decision tree of media user for different transfer situations

As mentioned earlier, during the first round of interviews, eight factors identified by the respondents arose spontaneously. Accordingly, these factors were analysed and listed as determinants of knowledge transfer mechanisms, in no significant order (p. 110). The second round of interviews was conducted to confirm the findings revealed from the first round of interviews. While showing the emerged variables to the 'elite respondents' (p. 68) during the second round of interviews using another interview schedule (Appendix B), they were asked to rank them in importance. All of them invariably picked up four factors, namely tacitness of knowledge, urgency, status, and preference of the top management, as the most important factors. They reported that these factors at some point override other variables. For example, when knowledge is tacit in nature, they straight away look for a personalisation approach without

considering other variables. Similarly, when a query is time critical, they attempt to find a mechanism that they perceive promises quick result, ignoring all other factors.

Following the discussion of the various determinants of knowledge transfer mechanisms, it is also apparent that some factors are reported to interact with one another while deciding a suitable mechanism for knowledge transfer. An explanatory factor may not always directly influence the choice of knowledge transfer mechanism. As noted earlier, in certain cases there are factors which override. For example, tacitness of knowledge, urgency and personal preference of managers override other factors in transferring knowledge. If urgency is the factor then other factors do not get considered. Respondents claim that sometimes one variable is considered first followed by other variable(s) in making the final decision of choice of knowledge transfer media.

During the second phase interviews, the respondents are also asked how these variables can directly and indirectly interact to influence their decision about a suitable means of knowledge transfer. Some of the interviewees link the variables in a sequence that helps to decide a preferred mechanism. This helps to draw a 'decision tree' of choice of knowledge transfer mechanism. Figure 5.2 shows the likely strategy and choice of communication mechanism based on seven variables. The Figure also represents the interactions of these factors.

Among the explanatory factors, urgency is ranked highest, following tacitness of knowledge. The majority of the interviewees treat the "urgency" as its most powerful factor in the sense that if a technical query appears time critical, it becomes a corporate requirement to exchange knowledge as quickly as possible, and other variables become less important.

The interviewees reveal the status of the actors as the next most important factor to be considered. Respondents claim that several other determinants may interact with status in a sequence to decide a convenient mechanism of knowledge transfer. For example, status is reported to have a direct and positive relation with actors' personal preference. When the actors have the same level of status, they can go along with their personal preference to select a mechanism of knowledge transfer. However, personal preference of people having higher status has a predominant effect on the media choice.

The interviewees identify the nature of the query as the next deciding factor of mechanism selection. When a query is straightforward, the codification approach is used, whereas if the query requires further clarification, a personalisation approach is preferred. Social ties between the actors also have significant impact on the selection of knowledge transfer medium. Accordingly, the choice of media may vary due to strong ties and weak ties. The respondents also indicate that when there are no social ties between the parties, a codification approach to knowledge transfer is found appropriate. However, strong social ties do not always ensure a personalisation approach. In organisations that are geographically dispersed, actors having strong social ties cannot meet F-2-F to transfer knowledge in such situation, leading to other explanatory factors, such as proximity being taken into consideration in choosing a knowledge transfer mechanism.

From the above discussion, it is clear that a decision to select an appropriate mechanism depends upon several variables; some of them override others, others are interlinked, and sometimes one factor follows the other factors. The decision tree (Figure 5.2) is a conceptualisation of the decision process. More specifically, it is actually not a representation of their real-time decision process, but it is a model of underlying logic of the process.

However, the question remains why seven factors have been taken into consideration in building the decision tree, rather than considering all the eight variables that emerged as determinants of choice of knowledge transfer mechanism. The only variable that is ignored and does not enter into the decision scheme is trust. The respondents during the second phase of the interviews argue that social ties and trust are so closely connected that an increase in either one stimulates an increase in the other (van Wijk et al., 2003). Tsai and Ghoshal (1998) reinforce this point of view by suggesting that "social ties stimulate trust and perceived trustworthiness, and as two actors interact over time, their trusting relationship becomes more concrete and they are more likely to perceive each other as trustworthy". Therefore, it can be said that social ties are an antecedent of trust. There is no strong argument from the interviewees to consider trust as an independent criterion for selecting a medium as long as strong social ties exist. That is why trust is not in the decision tree.

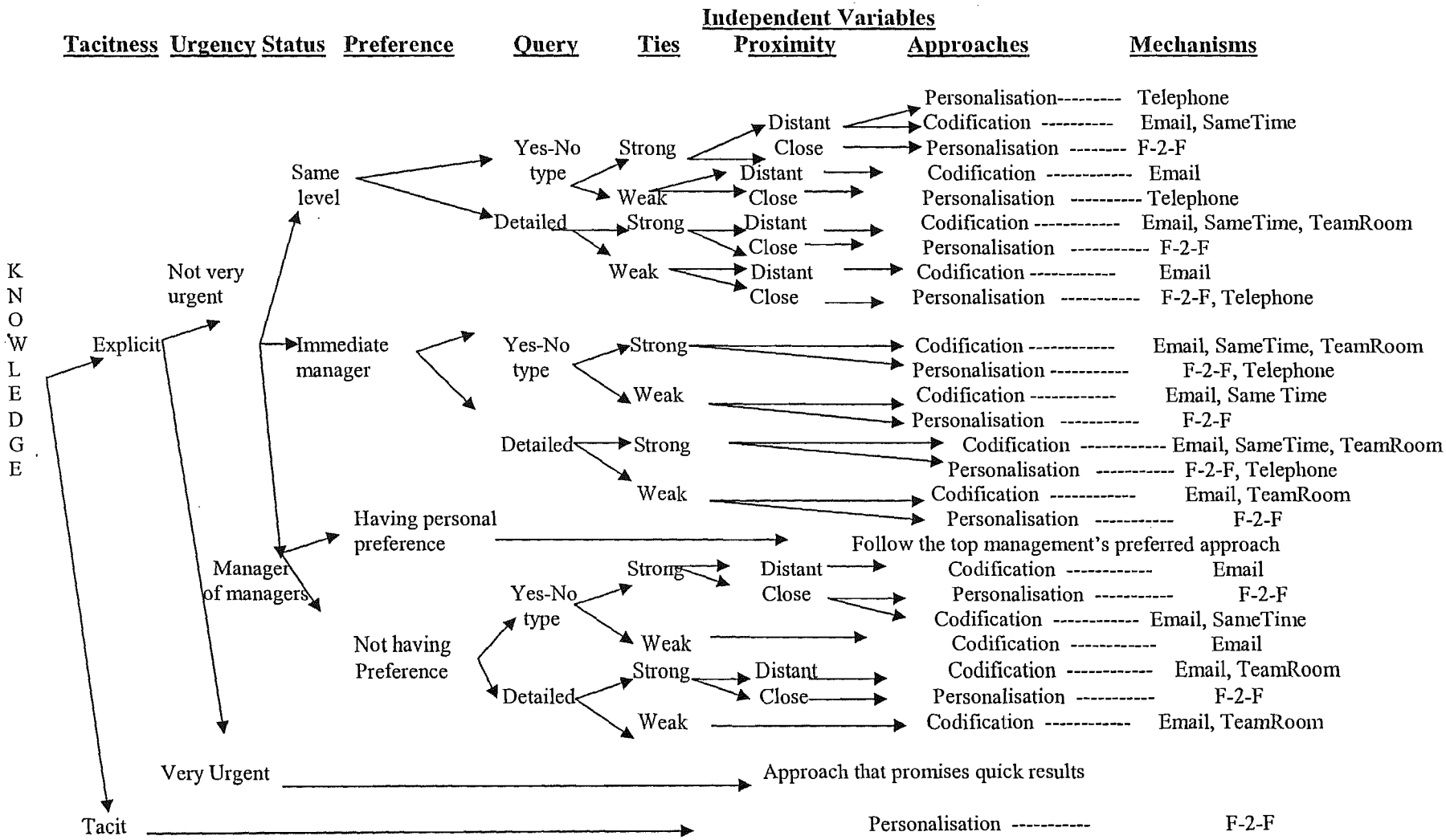


Figure 5.2 Decision tree for different transfer situations

5.3 An integrated framework for knowledge transfer

Having discussed various facets of knowledge transfer, including the determinants of media choice, a knowledge transfer framework is suggested that supports the connectivity of knowledge storage and knowledge administration within the knowledge transfer process. While articulating the theory of knowledge transfer, scholars, most notably, Kalling (2003), Albino et al. (1999), Hansen et al. (1999), Zack (1999a, b), and Connelly and Kelloway (2001), have concentrated their focus mainly on the nature of knowledge, the actors involved in the knowledge transfer, and the mechanisms used to transfer knowledge. In those frameworks, there is little mention of the importance of knowledge storage and knowledge administration that may help to carry out the transfer of organisational knowledge. Using the insights from the existing literature and the inputs derived from the empirical work at IBM, a knowledge transfer framework is developed which reflects such integration.

A few examples in the literature (e.g., Gray & Chan, 2000; Argote & Ingram, 2000; Douglus, 2002; Connelly & Kelloway, 2001; Kalling, 2003, Zack, 1999a, 1999b) consider the significance of incorporating 'knowledge storage' within the knowledge transfer model. Similarly, several researchers, most notably Davenport (1997), Loeb et al. (1998), McKeen et al. (2002), von Krogh (2003), and Davenport and Volpel (2001), point out the role of having someone like a knowledge administrator to facilitate the transfer of knowledge.

Respondents view five interrelated aspects as integral parts of a knowledge transfer conceptual framework. Accordingly, the knowledge transfer process is explained in a framework which is provided to identify and prescribe these key components of the process. These five main components of the proposed framework are as follows and are explained in turn:

- the actors engaged in the transfer of organisational knowledge;
- the knowledge that is exchanged between the actors;
- the mechanisms (*hybrid approach*) by which the knowledge transfer is carried out;
- the repositories where knowledge is stored; and

- the knowledge administrator-equivalent who is responsible to manage and maintain knowledge.

5.3.1 Actors

Hogberj and Evinsson (1998, p. 81) claim that "people are the source of knowledge creation and knowledge transfer". Most of the literature in knowledge transfer has identified the involvement of two parties in the knowledge transfer process: knowledge provider and knowledge receiver.

Several terms are used by researchers to identify the actors involved in the knowledge transfer process: knowledge source and knowledge recipient (O'Dell & Grayson, 1998; Leonard-Barton & Sinha, 1993), knowledge carrier and need carrier (Connell et al., 2001), knowledge provider and knowledge seeker (Holtshouse, 1998), knowledge owner and knowledge reconstructor (Hendriks, 1999), knowledge provider and knowledge receiver (Bouty, 2000), knowledge donor and knowledge collector (van den Hoff & van Weenen 2004), knowledge source and knowledge receiver (Weggemen, 2002), knowledge carrier and knowledge requester (Oldenkamp, 2001), knowledge carrier and knowledge seeker (Hendriks, 1999), the transferer and the recipient of knowledge (Connell et al., 2003), and knowledge donor and knowledge receiver (van der Rijt, 2002).

Whatever the label, one party is the knowledge contributor who possesses knowledge and provides it to others, and the other party is the knowledge user who seeks the potential contributor's knowledge to use it. Accordingly, the proposed framework underlines both the direct and computer-assisted indirect interaction between knowledge contributor and knowledge user.

5.3.2 Organisational knowledge

As has already been discussed, knowledge can take tacit or explicit form (Polanyi, 1966; Nonaka, 1994). Since tacit knowledge is the knowledge that is embedded in the human mind, it is difficult to separate from the employee who possesses it. As a result, it is found to be relatively difficult to codify and transfer (Larsson et al., 1998). Several researchers (e.g., Huber, 2001; Kalling, 2003; Hendricks, 1999) argue that the salient features of tacit

knowledge, i.e. complexity and ambiguity, have a great influence on the knowledge transfer process. Because tacit knowledge *per se* is a factor in knowledge transfers that explains the stickiness of the transfer (Szulanski, 2003; Mooradian, 2005). Such characteristics also dictate how such knowledge will be transferred (i.e., mechanisms of knowledge transfer) and eventually affect the efficiency and effectiveness of knowledge transfer in an organisation (Soekijad & Andriessen, 2003).

Explicit knowledge can be articulated and stored in a repository. Roberts (2000) asserts that explicit knowledge is relatively easily and cheaply available to large numbers of people. Explicit knowledge has been the focus of the majority of formal knowledge transfer initiatives within IBM, largely because it is captured and transmitted electronically. However, Dixon (2000) suggests that most organisational knowledge has both tacit and explicit components and will most likely be a combination of the two. This is the case at IBM. Accordingly, the proposed framework incorporates both tacit and explicit knowledge.

5.3.3 Mechanisms

The mechanism of knowledge transfer is the vehicle by which knowledge is transmitted between a knowledge contributor and a knowledge user. Davenport et al. (1998) report that one of the eight critical success factors for implementing knowledge projects is multi-channel knowledge transfer. Several researchers, most notably Huber (2001), Hansen et al. (1999), Kalling (2003), and Hendricks (1999), focus on the transmission mechanisms of knowledge and their influence on the knowledge transfer process. As revealed in the current empirical work, the selection of an appropriate mechanism is central to knowledge transfer.

Broadly speaking, knowledge transfer in organisations can take place in many different ways. The empirical evidence finds that at IBM the mechanisms used for organisational knowledge transfer are based on both personalisation and codification approaches. Hansen et al. (1999) maintain that organisations apply a personalisation strategy to transfer tacit knowledge, mainly technology-assisted person-to-person contacts (e.g., telephone) or through direct F-2-F interaction. This is also reflected by Connell et al. (2004, p. 184) who assert that "stories are used as a medium for tacit knowledge transfer".

At IBM codification approach focuses on technology-centric repositories of explicit knowledge. This is supported by studies (e.g., Huber, 1991; Alavi & Leidner, 2001; Hendriks, 1999; Hlupic et al., 2002; van den Hoff & van Weenen, 2004) arguing that the computer-assisted mechanisms help transfer explicit knowledge among the organisational members. A significant proportion of respondents also report that computer-mediated tools are the most convenient means when knowledge is explicit in nature and the actors are working in two parts of a project split by distance. Most specifically, Email, *SameTime*, and electronic bulletin boards are perceived as effective means to carry out the transfer of explicit knowledge at IBM. Gray (2000) reinforces this point of view by suggesting that "a codification strategy is very much document-driven while personalisation strategy is dialogue-driven".

In considering tacit knowledge, Dixon (2000) warns against using technology to replace F-2-F interaction in knowledge transfer. Although IBM has invested heavily in computer-mediated mechanisms for knowledge transfer, the F-2-F interface is found to be used extensively, and is perceived the most effective mechanism for successful knowledge transfer by its employees. In this regard, Pan and Scarborough (1998) argue that organisations need to accomplish a healthy balance of the personalisation and the codification approaches so as to carry out the transfer of knowledge effectively. Reflecting similar views, Bhatt (2001, p. 74) presents social systems and technologies as being equally important in managing knowledge, saying:

> "To sustain long-term competitive advantage, a firm needs to create a fit between its technological and social systems. Technologies can be used to increase the efficiency of the people and enhance the information flow within the organisation, while social systems such as communities of practice improve on interpretations, by bringing multiple views on the information."

The empirical evidence revealed at IBM shows that no single approach is sufficient to ensure successful knowledge transfer in all situations. As explained in the previous section, eight variables directly as well as indirectly influence the choice of knowledge transfer mechanism. This implies that a mixture of several mechanisms needs to be used in complementary ways depending upon these variables. This leads to the argument that an organisation needs to adopt a *hybrid* approach to transfer knowledge. Almost all the

respondents confirmed that IBM has adopted a *hybrid* approach to knowledge transfer, supporting earlier studies (e.g., Davenport, 1997) which assert that effective management of knowledge requires a *hybrid* of people and technology. Accordingly, the proposed framework underlines the importance of a *hybrid* approach to knowledge transfer.

5.3.4 Knowledge repository

As evident from the interviews, one of the central components of knowledge transfer is the knowledge repository. The majority of the interviewees report that there is a need to have company-wide knowledge storage facilities, where the organizational members could store codified knowledge. Beckman (1999, p. 3) notes that there are several knowledge storage media in which knowledge can reside, such as the human brain, documents, and computers. IBM repositories are based on computer-assisted tools such as the web based system Lotus Notes, confirming studies (e.g., Hansen, 1999, Dierickx & Cool 1989; DeCarolis & Deeds, 1999) which contend that "a Web-based knowledge repository provides a unified access point and helps reduce knowledge search costs".

The respondents, during the second phase interviews, does not only mention advantages that can be derived from knowledge storage, but also report that the incorporation of a knowledge repository within a knowledge transfer framework can ensure *win-win* situations for both the actors in the knowledge transfer process. In this connection, several researchers (e.g., Dierickx & Cool 1989; DeCarolis & Deeds, 1999) illustrate the connections between knowledge transfer and knowledge storage, with the interactions between knowledge contributor and knowledge user resulting in a stock of knowledge in a repository. Other users may search for knowledge in such a repository and also can store in it new inputs based on context. Hence, knowledge stored in this way is *deferred transfer of knowledge* (see p. 141) because it may eventually help accomplish future transfer of knowledge within the organisation. This confirms studies (e.g., Alavi & Tiwana, 2003) which claim that "such a repository encourages knowledge sharing internally" (p. 109).

Figure 5.3 shows the addition of the knowledge repository into conceptual model illustrating the interplay of knowledge transfer and knowledge storage. The benefits of this relationship between knowledge transfer and knowledge storage are supported by studies

(e.g., Connelly & Kelloway 2001; Argote & Ingram 2000) maintaining the fact that 'knowledge storage' needs to be incorporated within the knowledge transfer process so as to ensure successful KM implementation. Accordingly, the proposed framework underlines that a knowledge contributor voluntarily deposits knowledge resources to a specific repository bearing in mind that prospective users will visit the repository to find required technical advice.

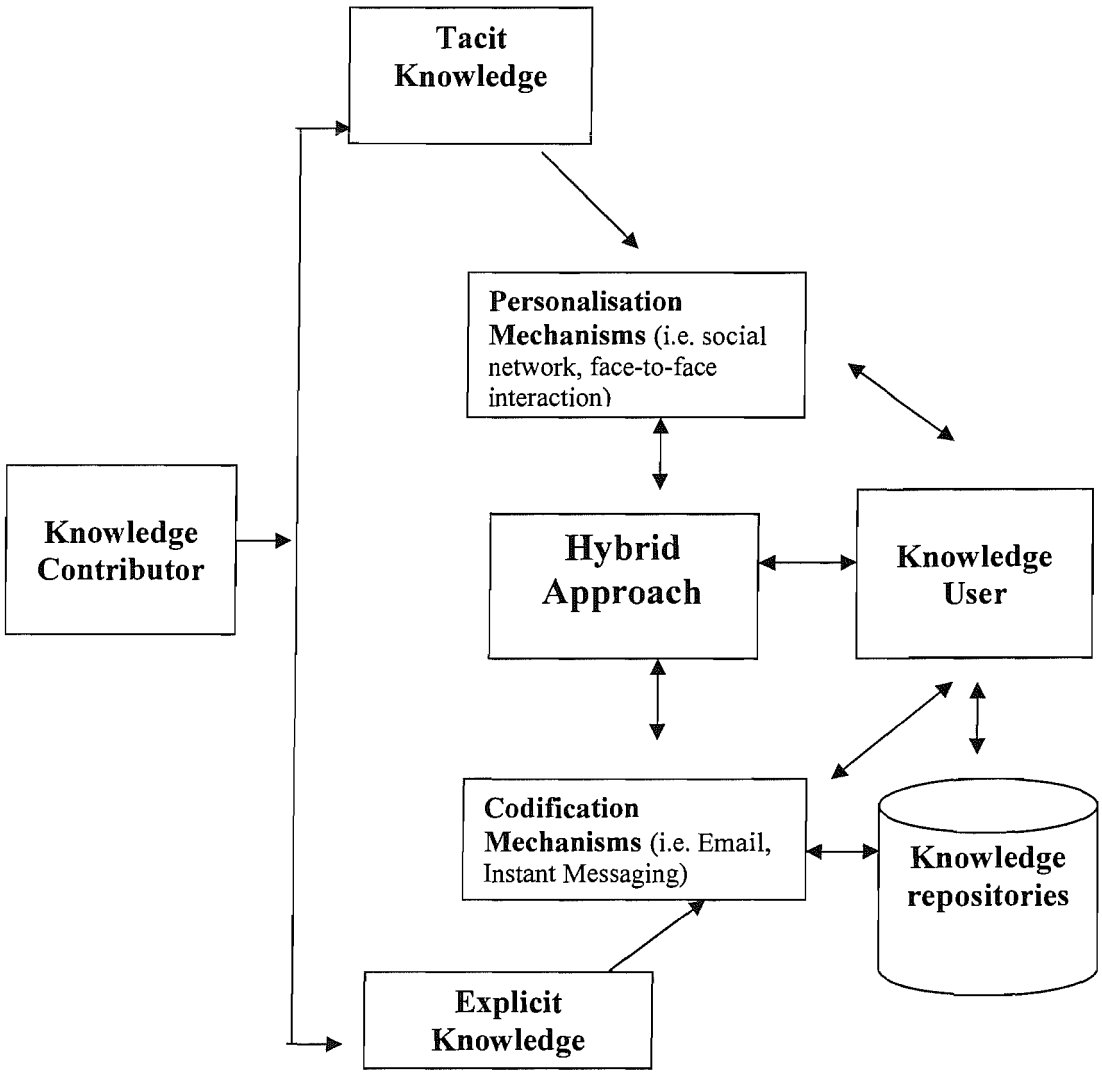


Figure 5.3 Linkage between knowledge transfer and knowledge storage

5.3.5 Knowledge administration

Many knowledge transfer frameworks have considered that there are two actors in the knowledge transfer process (Albino et al., 1999; Holtshouse, 1998; Hendriks, 1999; van den Hoff & van Weenen, 2004; Weggemen, 2002; Oldenkamp, 2001; Connell et al., 2003; van der Rijt, 2002). The present research suggests an additional actor, the knowledge administrator in the knowledge transfer process. The respondents report the need for a knowledge administration function, which might be the responsibility of an individual, who in a sense will be treated as a third actor in the transfer process.

Such an individual can carry out responsibilities ranging from repository management to facilitation of knowledge transfer. As revealed from the study and supported by literature, among a broad collection of tasks that such a knowledge administrator can perform are:

- encouraging employees to carry out knowledge transfer within the organisation (Davenport & Volpel, 2001; Raub & von Wittich 2004);
- facilitating the knowledge transfer process (Ruggles, 1998; Mckeen et al., 2002; von Krogh, 2003);
- acting as a moderator during F-2-F dialogue (von Krogh, et al., 1997; von Krogh et al., 2000);
- structuring, categorising and indexing knowledge resources regularly and then archiving them to ensure quick retrieval (Davenport, 1997; Ruggles, 1998);
- deleting knowledge resources that are dead links and outdated (Davenport & Volpel, 2001);
- updating stored knowledge on a regular basis so as to make it relevant and current (Loeb et al., 1998).

In addition to the above functions previously mentioned in the literature, respondents identify additional five functions:

- acting as an informant in telling potential users about the right person to provide relevant advice;

- identifying items available in knowledge repositories which require maintenance or revision;
- putting in next-review dates periodically so that owners can review their documents;
- notifying the knowledge author to identify if knowledge needs archiving, deleting or expiry date alteration.
- helping others in finding the right information from the proper knowledge repository through
  (i) telling the exact location of knowledge within repository, and
  (ii) searching the correct, current and relevant knowledge.

The research reveals the value of a knowledge administrator or equivalent to play a role in helping the transfer of knowledge as well as in maintaining the knowledge repository. Accordingly, the proposed framework outlines the existence of such a functional role by incorporating it within the knowledge transfer process. Eleven functions of a knowledge administrator have been identified from the interviews, six of which confirm those found in the existing literature and the remaining five are the additional functions derived from this research. The question remains how such functions will be carried out.

The main tasks of knowledge administration can be accomplished at workstations, as it is the case at IBM (p. 58) so the main activity requires machine interaction in order to maintain electronic knowledge storage. Despite that, there is a great deal of interaction with other organisational members, be it knowledge contributor or user, and involvement with non technical activities. Knowledge administration involves frequent interaction with other people with and without using technology. The knowledge administration task could be a role assigned to someone within each project or department who has been working for quite a long time, say one year or so, and has the organisation's background knowledge. Such person is expected to have a wide social network and is what Davenport and Prusak (1998) term "having a knowledge network facilitator".

5.3.5.1 Challenges of knowledge administration

Realising the importance of knowledge administration function, a knowledge administrator or equivalent role is appearing in many companies (Davenport & Volpel, 2001; Liebowitz, 1999; Earl & Scott, 1999). However, there are a few challenges which seem to be faced in implementing the notion of knowledge administrator. Ruggles (1998, p. 86) argues that there is an ongoing debate about the need or value of such a person. Since the respondents did not specifically mention how the functional roles of such a person would be operationalised and the downsides of a knowledge administrator, such issues seem to be a potential area for future empirical research (see section 6.7). Nevertheless, some of these challenges are noted below.

Full-time role vs. part of everyone's role. More and more organisations realise the importance of a knowledge administration role (Stewart, 1998; Gopal & Gagnon, 1995; Reynolds, 1998). The question remains whether a full-time management position should be created. Gopal and Gagnon (1995, p. 7), for example, propose for the appointment of senior-level executive to carry out the role of full-time knowledge administrator. However, there is no single person found at the research site who is exclusively responsible for performing the knowledge administration task. The majority of the respondents report that the managers and team leaders to some extent perform that functional role informally. The creation of a position to exclusively play such a functional role is not considered a necessity. Rather an individual or a number of individuals within the organisation may be assigned to play the role in addition to their current jobs. The respondents feel that an individual within the organisation can include knowledge administration task as a part of the job.

Impossible to know everything. The interviews suggests that a knowledge administrator is expected to know the source of all knowledge and able to explain such knowledge. In reality, it is very difficult for a person to know everything happening in the organisation. However, when an employee asks for a technical help, the administrator should be able to tell where it is available, be it human or machine.

The number of knowledge administrators. Although the respondents recognise the need for such a person, there is no clear cut understanding about their number. It may happen

that only one knowledge administrator is enough to facilitate knowledge transfer and maintain knowledge storage for the whole organisation. Or the knowledge administration task will be a role assigned to someone within each project or department. All of the interviewees stress the importance of a knowledge administrator, advocating the need to facilitate knowledge transfer and maintain stored knowledge within a project or at department level. If this is the case, then the company will contain a huge number of knowledge administrators.

Incentives to perform such job. The respondents report that people don't like to be dictated by others. Davenport (1997, p. 188) contends that one of the tasks that a knowledge administrator may perform is "monitoring the use of knowledge", while von Krogh (2003) argues such person's task is "to direct and oversee knowledge transfer". Since a knowledge administrator is supposed to keep monitoring others' use of knowledge and asking others to maintain their knowledge storage, such a person will be neither very welcomed nor popular. As a result, nobody will be happy to take such responsibility willingly. Hence there need to be some incentives to encourage organisational members to accept this task.

Gaining support from management. There is a need to gain top management support to create a position to perform such functions, or assign someone within the organisation to do the job. Raub and von Wittich (2004) supports this, arguing that "gaining support from line mangers" is crucial in this regard. If the person involved in knowledge administration job is doing it in addition to his current job, interviewees acknowledge that management need to allocate enough time so that the person concerned can perform such tasks properly.

5.3.6 Dynamics of the knowledge transfer framework: An interactive and dynamic process

Taking inputs from the extant literature and drawing on the empirical work at IBM, the emergent theory of knowledge transfer explains the integration of the key components of the process that may help enhance the effectiveness of knowledge transfer within an organisation. Figure 5.4 outlines the emerged framework of knowledge transfer, and provides a holistic picture of the knowledge transfer process. Such an integrated and

holistic framework represents an interactive and ongoing process which supports the connectivity of knowledge transfer, knowledge storage and knowledge administration using the social and technological networks. The model incorporates the five critical issues surrounding the knowledge transfer process and describes the interplay among them.

As shown in Figure 5.4, either party may be the initiator to start the knowledge transfer process. Knowledge contributors can either provide knowledge voluntarily to other organisational members or deposit it to a knowledge repository. Again, intended users can seek required knowledge from any other members of the organisation or retrieve it via a repository. Accordingly, this framework stresses the dynamic interaction between the actors in knowledge transfer. This model emphasises the dynamic conversion between tacit knowledge and explicit knowledge. Two approaches are being employed independently, simultaneously, or jointly for knowledge transfer. The personalisation strategy focuses on tacit knowledge transfer and the codification strategy on technology-centric repositories of explicit knowledge. The framework identifies a *hybrid* strategy recognising the importance of the interplay between the two mechanisms.

The proposed framework also underlines the existence of a knowledge repository where a knowledge contributor deposits knowledge for future use and thereby an intended user can pick up knowledge electronically. Based on this discussion, it is argued that knowledge storage should not be separated from the knowledge transfer process. It appears to be good practice for organisations to use an ICT tool, such as Lotus Notes, which strengthens the argument for having an integration between knowledge transfer and knowledge storage.

The framework has also positioned the knowledge administrator in a way that such a person is connected with the two major actors of knowledge transfer process along with connecting themselves to the knowledge repositories. The proposed framework legitimises the widespread presence of knowledge administrator-equivalent in Fortune 500 companies (Abell & Oxbrow 1999). Furthermore, the relationships among the components become dynamic and complicated as the ongoing interactions are predominant and do not rest on a single directional flow of organisational knowledge.

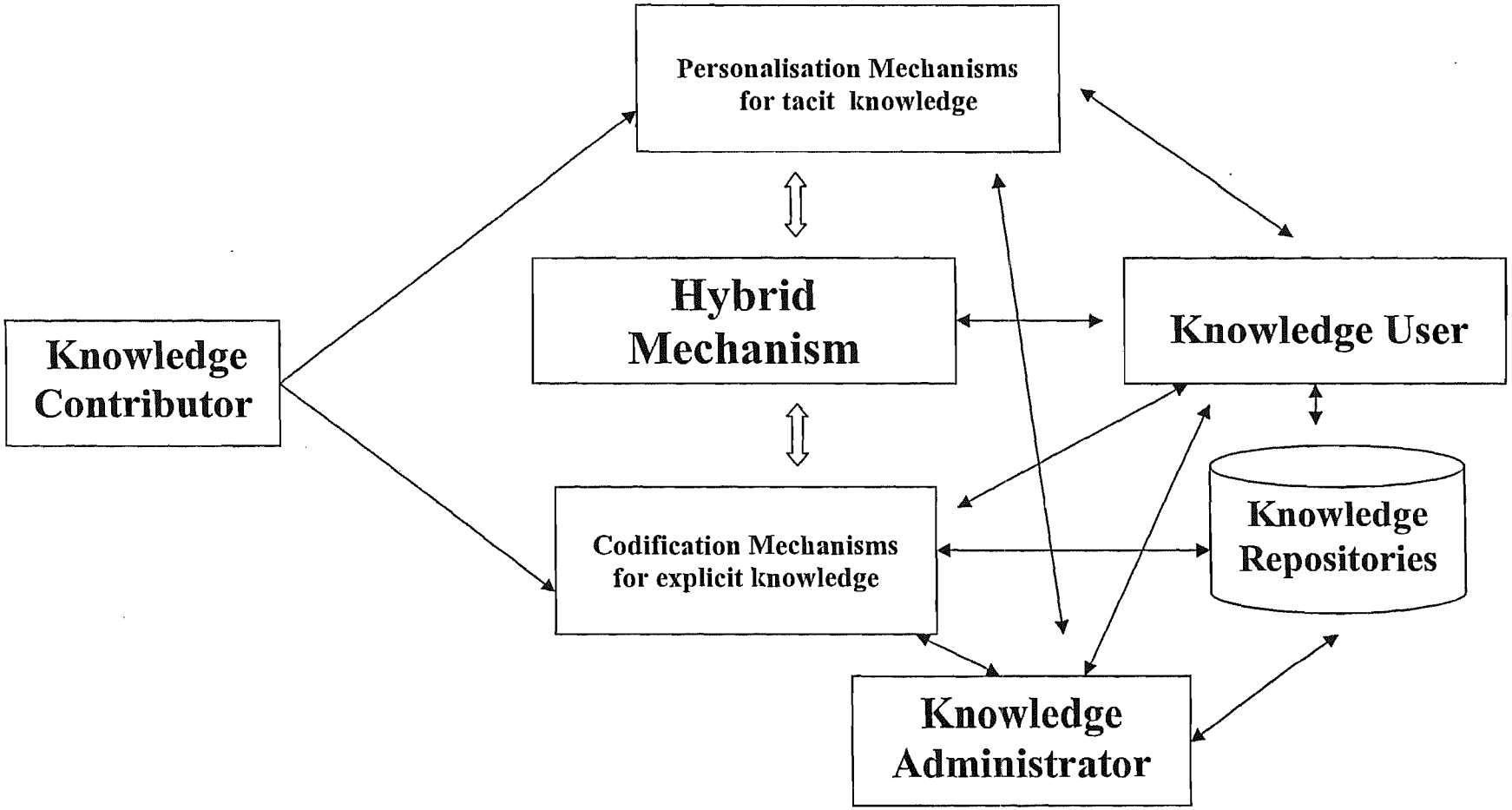


Figure 5.4 An integrated framework of knowledge transfer

5.3.7 Salient features of the resultant framework of knowledge transfer

The proposed framework is an extension of existing knowledge transfer theory (e.g., Hansen et al., 1999; Zack, 1999a). Zack (1999a), for example, talks about two types of application associated with managing organisational knowledge, which he calls integrative application and interactive application: integrative applications focus primarily on the repository of the explicit knowledge, and interactive applications focus on the interactions among organisational members with tacit knowledge in which the repository appears to be the by-product of interaction and collaboration. However, the present proposed knowledge transfer model does not separate the applications described by Zack (1999a). Instead they are both embedded under the five basic elements of knowledge transfer and their interactions.

The proposed knowledge transfer framework is a combination of the descriptive and prescriptive models. Such a framework is descriptive (Apostolou & Mentazas, 1998; Anderson Consulting, 2000) in a sense of a 'system approach framework' (Wong & Aspinwall, 2004), because it addresses the question of 'what is', providing a descriptive analysis of the perceptions of what happens in the case organisation regarding knowledge transfer. At the same time, the proposed framework is prescriptive (e.g., Wiig, 1993; van der Spek & Spijkervet, 1997; Davenport & Prusak, 1998; Probst et al., 2000; Gupta & Govindaranjan, 2000) in a sense a 'step approach framework' (Wong & Aspinwall, 2004), because it also addresses the question of 'how to', identifying organisation members' perception of effective ways to carry out knowledge transfer. It prescribes ways for organisations to engage in knowledge transfer activities through incorporating two additional components into the existing knowledge transfer framework. The constructs of the emerged framework are depicted in the form of a diagram or visual representation in Figure 5.4. In summary, the salient features of the resultant framework of knowledge transfer are highlighted below.

- While the existing knowledge transfer literature (Albino et al., 1999; Connell et al., 2003; O'Dell & Grayson, 1998; Holtshouse, 1998; van den Hoff & van Weenen, 2004) describes the two actors in the knowledge transfer process, the present framework adds one more actor. That is, there may be three actors who

are involved in the knowledge transfer process: knowledge contributor, knowledge user, and knowledge administrator.

- Neither personalisation approach nor codification approach is enough to carry out the transfer of knowledge in all the situations. In reality, these approaches can work simultaneously or one follows the other to accomplish successful knowledge transfer which appears to be *hybrid* in nature. The emerged framework of knowledge transfer actually emphasises the importance of such an approach to knowledge transfer.

- Knowledge transfer and knowledge storage are interlinked. The connectivity of knowledge transfer and knowledge storage gives an opportunity to the knowledge contributors to deposit the knowledge they possess into a computer assisted repository and to the knowledge users to retrieve knowledge from the repository without having any interaction between them.

- The existence of a knowledge administrator-equivalent is not simply an additional actor of the knowledge transfer process to facilitate knowledge transfer and maintain a knowledge repository, but also to help operationalise the framework *per se*. The knowledge administrator can take a more active role in encouraging organisational members to take part in knowledge transfer activities through: (i) advising knowledge contributors to deposit knowledge in a repository; (ii) asking knowledge contributors to update the stored knowledge, and (iii) helping prospective knowledge users in finding the right source, be it knowledge contributor or knowledge repository.

5.4 Reflection on the research process and findings

Having discussed the integrated framework of knowledge transfer, the remainder of the chapter addresses a reflective evaluation of the research process and findings. Miles and Huberman (1994, p. 35) contend that within a given study, there can be both exploratory and confirmatory aspects in which "exploration often called at the outset and

confirmation near the end". Since the study has both exploratory and confirmatory aspects, the research starts with exploration during the first phase of the interviews and ends with confirmation at the second phase of the interviews. Reflection on the research process and findings incorporates several issues including validity and generalisability of the research findings.

5.4.1 Validity of the research findings

'Validity' of a qualitative research is defined by Easterby-Smith et al. (1999, p. 41) as "the extent that the researcher has gained access to the knowledge and meanings of the respondents". Miles and Huberman (1994) contend that a case study approach, which is employed in the present research, might produce valid findings – certain circumstances within which the data are collected, for example. In this regard, Miles and Huberman (1994, p. 268) list the circumstances when data will be called "stronger data": (i) collected later, or after repeated contacts; (ii) seen or reported firsthand; (iii) observed behaviour or activities; (iv) field worker is trusted; (v) collected in informal setting; (vi) respondent is alone with field worker. In line with this, the data of the present research can be called stronger data because it fulfils some of these requirements. For example, data is collected in two phases with repeated contacts, seen firsthand. Moreover, during the interview, the respondents are alone with the researcher and data are collected in informal setting.

Eisenhardt (1989, p. 534) notes that a case study approach calls for the collection of data by using interviews, field observations, documents or a combination of these methods. This is the case in this research which also collects data from multiple sources. Hence, in the present research the use of multiple data sources, which Denzin and Lincoln (1994, p. 2) call 'Triangulation', helps secure an in-depth understanding of the phenomena in question and also enhances construct validity and reliability.

During the first phase of the interviews, several respondents are interviewed more than once in order to get further clarification of their interviews. Having transcribed the interviews, validation of data before data analysis occurs when the interviewees are shown transcripts of the respective interviews which helps to check the collected data, to identify transcription errors, and to verify the transcripts.

The data quality and credibility of the study have been reasonably assured through several visits and cross-checking. The second phase of the interviews is conducted in order to validate and confirm the preliminary findings derived from the first phase interviews (Miles & Huberman, 1994). These interviews help to refine the research findings. Miles and Huberman call such interviewees the "confirmatory" part of the study. This part of the field research allows the researcher to develop deeper understanding of the research findings, which eventually leads "the resultant theory to be empirically valid" (Eisenhardt (1989, p. 547). Since the data analysis procedures employed are a continuous, iterative process in which the researcher goes back and forth to reduce the data, display them using a format, and then draw conclusions and verify them, such procedure itself enhances the validity of the substantive theory of the present research. Eisenhardt (1989, p. 547) supports this argument, saying "the likelihood of valid theory is high because the theory-building process is so intimately tied with evidence that it is very likely that the resultant theory will be consistent with empirical observation". Furthermore, the duration of interviews and the breadth of the issues that addressed in the present research provide significant insights to draw conclusions and allow verification (Desouza & Evaristo, 2003).

5.4.2 Klein and Myers' (1999) principles for the evaluation of the research findings

Klein and Myers (1999) suggest a set of principles that are useful to evaluate the findings of qualitative (interpretative) research in information systems. Their principles for the evaluation of qualitative field research include (i) the fundamental principle of the hermeneutic circle, (ii) the principle of contextualisation, (iii) the principle of interaction between the researchers and the subjects, (iv) the principle of abstraction and generalisation, (v) the principle of dialogical reasoning, (vi) the principle of multiple interpretations, (vii) the principle of suspicion. The quality of the findings of the present research is assessed using these principles, which are elaborated in turn.

(i) The fundamental principle of the hermeneutic circle. The hermeneutic principle requires that all human understanding is achieved by iterating between considering the interdependent meaning of parts and the whole that they form (Klein & Myers, 1999, p.

72). The findings of the present study are the outcomes of the researcher's understanding of the meaning of the interpretations of the interviewees on the social phenomena as his understanding moves from the individual parts of the phenomena to the whole.

(ii) The principle of contextualisation. This principle suggests that the subject matter be set in its social and historical context so that the intended audience can see how the current situation under investigation emerged (Klein & Myers, 1999, p. 73). The thesis incorporates the organogram, objectives and activities of the organisation under study, and also discusses the knowledge transfer environment and the nature of the job of the respondents. Based on the context of the research setting, an attempt is made to understand the meaning of the respondents' interpretations. The overview of the case organisation (see chapter 4) provides sufficient levels of detail in deriving the findings of this research. One of the responsibilities of the researcher is to remain objective throughout the period of the research.

(iii) The principle of interaction between the researcher and the subjects. This principle requires critical reflection on how the research materials (or "data") are socially constructed through the interaction between the researcher and participants (Klein & Myers, 1999 p. 74). In the present research, social reality is not independent of human perception, rather the facts (or "data") are socially constructed as a result of human interactions with it. The researcher collects data in the natural environment of the phenomena in which the research materials are produced as part and parcel of the social interaction of the researcher with the participants.

(iv) The principle of abstraction and generalisation. This principle emphasises that the findings of the research are applicable and generalisable in many other situations and organisations (Klein & Myers 1999, p. 75). The term 'generalisability' of a research refers to "the likelihood that ideas and theories generated in one setting will also apply in other settings" (Easterby-Smith et al., 1991 p. 41). Since the findings are drawn from empirical work based on a single organisational setting, it will be difficult to argue potential transferability of the substantive theory to other organisational settings. Moreover, in line with the definition of the substantive theory, the researcher does not claim the integrated framework of knowledge transfer can be generalised across

organisations. However, Miles and Huberman (1994, p. 279) suggest that if the characteristics of the original sample of persons, settings, processes etc. are fully described in sufficient detail, such description allows assessment of the potential transferability of the theory to other organisational settings. Furthermore, since the existing literature of knowledge transfer complements the research findings, the findings of the present research receive some credibility for the potential transferability of the resultant theory to other research settings. Nevertheless, the proposed knowledge transfer framework needs to be investigated to test its applicability and utility in other organisational settings so as to ensure its transferability and generalisability and thereby to guide its further development.

(v) The principle of dialogical reasoning. This principle requires the researcher to confront his (her) preconceptions that guides the original research design with the data that emerge through the research process (Klein & Myers, 1999, p. 76). The researcher's preconceptions are based on the existing theory of knowledge transfer. After looking into the literature the researcher has consciously gone into the case organisation with a view to looking at things which the literature has overlooked, for example, for alternative phenomena that contradicts with the existing literature. As a result, additional constructs, such as knowledge storage, the knowledge administration, hybrid approach within the knowledge transfer process, have been incorporated into the model.

(vi) The principle of multiple interpretations. This principle requires the researcher to examine the influences that the social context has upon actions under study by seeking out and documenting multiple viewpoints of multiple agents (Klein & Myers, 1999, p. 77). The present research focuses on people involved in software development, but the views of other interest groups, namely managers and manager of managers working in various departments and projects, are also presented in order to provide a broad representation of those involved (see section 3.4.1).

(vii) The principle of suspicion. The suspicion principle suggests that the researcher does not take informants' views at face value (Klein & Myers, 1999, p. 83). During the interviews, the researcher examines the views and actions of various interest groups. Rather than merely accepting the words of a respondent, the views of other respondents

are taken into consideration (Walsham & Waema, 1994). During both phases of the interviews, the collected data and emerged key issues are also verified and cross checked in order to get further clarification and to eliminate doubts.

5.5 Concluding summary

This chapter examines the relationships among the themes and concepts based on descriptions presented in the previous chapter. The chapter discusses the interplay among the eight variables, namely tacitness of knowledge, status, personal preference, proximity, nature of query, social ties, trust, and urgency as criteria for selecting an appropriate medium.

Drawing on this discussion, a *decision tree* is built to display their sequential relationships in selecting a suitable mechanism from amongst several mechanisms of knowledge transfer. It is a conceptualisation of the decision processes rather than a model of what they actually do. The factors that can influence a mechanism are in linear sequence. It is argued that a *hybrid* approach may be used to carry out knowledge transfer in the sense that no single approach, be it personalisation or codification, can alone serve the purpose of facilitating knowledge transfer activities in all situations.

In order to address the second research question, the two main phenomena – knowledge storage and the knowledge administration – have been discussed in this chapter. Using the extant literature and drawing on the investigation of the various facets relating to knowledge transfer at IBM, a conceptual framework of knowledge transfer is developed which describes and prescribes people's engagement in knowledge transfer activities. The interplay between knowledge transfer and knowledge storage, and the perceived importance of the knowledge administrator or equivalent in facilitating knowledge transfer and maintaining knowledge storage, have provided a basis for viewing knowledge storage and the knowledge administration as crucial elements in the knowledge transfer process.

Accordingly, a comprehensive framework is prescribed, integrating knowledge storage and the knowledge administration as a part of the model for carrying out effective

knowledge transfer drawn from the contextual aspects of the interviews and observations undertaken at the case organisation. This integrated framework encompasses five components: the actors engaged in the transfer of knowledge; the typology of organisational knowledge that is transferred between the actors; the mechanisms by which the knowledge transfer is carried out; the repositories where explicit knowledge is retained; and the knowledge administrator-equivalent having a functional role of managing and maintaining knowledge.

The resultant framework is a combination of the descriptive and prescriptive, addressing the questions of 'what is' as well as 'how to' in a sense describes, characterises, prescribes knowledge transfer in the form of providing a systematic and step-wise perspective on knowledge transfer implementation. The key constructs and elements in the model are depicted in the form of a diagram or visual representation by putting them together to provide both an overview of their relationship and a means of fully understanding the key issues in a unified manner.

Finally, the issues of validity and generalisability of the research findings are reflected upon. A set of principles prescribed by Klein and Myers (1999) is employed to evaluate, validate, and generalise the research findings. Based on the discussion on the evaluative principles given by Klein and Myers (1999), it can be argued that the integrated and holistic theory of knowledge transfer has a reasonably high level of validity. However, the emergent theory of knowledge transfer can not be generalised and fully transferable in other organisational settings.

Chapter Six

Summary and conclusions

6.1 Introduction

This final chapter provides a summary and conclusions of the study, indicating the contributions it has made to theory, methodology, and practice. The chapter starts by restating the research objectives. This is followed by a summary of the methodology used and the findings of the research, including the determinants of selection of knowledge transfer mechanism and a holistic view of the integrated knowledge transfer framework. The chapter ends by pointing out the limitations of the study as well as providing directions for further research. The summary and conclusions of this research are outlined below.

6.2 Recapitulation of the research objectives

The present research inquires into the current understanding of the theory and practice of knowledge transfer through

- the empirical assessment of the transmission mechanisms by which organisation members carry out the transfer of their knowledge;
- the identification of the factors that influence the choice of knowledge transfer media, the discovery of the perceived role of knowledge storage and of the knowledge administration within knowledge transfer processes; and
- the exploration of an integrated and comprehensive framework that might indicate successful knowledge transfer.

These objectives are attained in the context of the IBM's UK software development laboratory.

6.3 Summary of the research activities

6.3.1 Navigation map. To obtain insights from the existing literature in KM and consequently to formulate the research questions, the relevant literature, particularly the literature on organisational knowledge, knowledge transfer, knowledge storage, and the knowledge administration, is surveyed and reviewed. The key constructs are pulled together to identify research gaps. A navigation map is designed to demonstrate how the research topic has been narrowed down to a workable size, which helps to set out the research questions. This navigation process has been made available to the wider KM research community and beyond (Jasimuddin et al., 2004).

6.3.2 Research methodology. Qualitative research investigates social phenomena by exploring the experiences of the actors involved in the real situation. Such a research perspective is suitable for the present study, because the research also focuses on how organisational members perceive things happening within the social situation. A case study approach within a single research setting is chosen because the nature of the research questions is to explore the key variables relating to knowledge transfer and the focus of the research is on contemporary organisational issues (Yin, 1994). Yin's (2003) approach of case study is drawn upon as the 'central' research method, with certain tools and techniques for data analysis drawn from Miles and Huberman (1994). The present case study possesses a number of the characteristics mentioned by Yin (1994, pp. 147-152) that exemplify case study research. For example, the present case study is significant in a sense it explores some social phenomena which Yin terms "revelatory in nature", and has taken into account sufficient evidence from different perspectives which eliminates a critical reader's suspicions (Yin, 1994; Klein & Myers, 1999).

6.3.3 Choice of case organisation. One large multinational corporation drawn from the high tech computer-related field is chosen purposefully. The research questions identify a number of issues arising from the literature as potential influences on knowledge transfer: the tacitness of knowledge, personalisation and codification approaches to knowledge transfer, the importance of knowledge storage, and the functions of knowledge administration. IBM Laboratory, the chosen research site, has those characteristics along with a stated motive to actively encourage knowledge

transfer among its members and to store it in a repository to make effective use of it in future.

6.3.4 Data collection and analysis. Data collection through interviews, observations, and documents took place in a natural setting. 41 interviews were undertaken using a semi-structured interview schedule. Each was recorded and subsequently transcribed. The transcribed data were verified with the respondents at a later time to cross-check and validate the collected data. Observations were less formal (e.g., any observation made during a field visit) (Yin, 1994, p. 87). For example, while the researcher was waiting to conduct interviews or in the restaurant inside the IBM Hursley Lab, the respondents were also observed in a non-participant manner. Observation was used to verify or elaborate the interview data. The transcripts were coded to extract common themes and patterns using procedures of data analysis recommended by Miles and Huberman (1984). Subsequently, these were interpreted to give greater understanding of the issues and eventually to derive answers to the research questions.

6.4 Summary of the research findings

6.4.1 Work environment. Knowledge transfer is widely recognised as crucial for an organisation's survival (Argote et al., 2000; Nonaka, 1994; Styhre & Kalling, 2003). The case organisation reports having an environment in which employees are encouraged to transfer knowledge spontaneously. The respondents consider knowledge transfer as being an important part of their job. The tasks and sub-tasks at the organisation are interlinked in the sense that people can not do their job properly without the help of other members of the organisation. For example, a developer needs other developers' technical help when he (she) engaging in writing software code. The respondents view IBM's corporate culture to be very much knowledge sharing, collaborative and discussion-oriented.

6.4.2 Motivations of knowledge sharing. Unlike the conventional views available in the literature (Hendriks, 1999; Ipe, 2003; Gupta & Govindaranjan, 2000), IBM respondents report that they are not protective about the transfer of knowledge. Although the majority of the respondents' attitudes towards knowledge transfer appear to be favourable and spontaneous, a number of motivators underlying knowledge transfer at IBM are

identified: (i) jobs are interrelated – no one can complete their job without others' technical help; (ii) reciprocity – helping today to get others' help in future (Molam et al., 2000); (iii) saving time; (iv) building social networks (Ipe, 2003); (v) getting quicker promotion; and (vi) organisational loyalty.

6.4.3 Importance of management support. The management's active support is essential to encourage organisation members to engage in knowledge transfer activities and to create an atmosphere that is conducive to knowledge transfer (Gupta & Govindaranjan, 2000; Quinn et al., 1996). Encouraging its employees to participate in carrying out the transfer of knowledge among themselves is considered by respondents as an important initiative of management. New recruits are made aware of the importance of transferring knowledge to others. There is no direct financial incentive as a reward for knowledge transfer at the IBM. However, management recognises the value of knowledge sharing; one of the reported criteria for promotion at IBM is knowledge sharing.

6.4.4 Identification of mechanisms. There are various ways in which an organisation can engage in carrying out knowledge transfer activities, which fall into two categories: personalisation and codification approaches to knowledge transfer (Hansen et al., 1999). Strengths and weaknesses are identified in both approaches. The personalisation approach, in which F-2-F interaction is predominant, incorporates flexible mechanism which helps the actors to bounce their ideas around. At IBM, the most frequently used mechanism in transferring knowledge is F-2-F conversation. IBM also employs a codification approach encompassing a variety of computer-mediated systems to support its knowledge transfer activities, the most frequently used of which is a web-based software system, Lotus Notes.

6.4.5 Identification of determinants of selection of knowledge transfer mechanism. The IBM respondents report that the tacitness of knowledge is not the only *determinant* that exclusively influences the selection of a mechanism in carrying out knowledge transfer. Seven other key variables are identified as powerful determinants of choice of knowledge transfer mechanism: (i) the nature of the query (Gupta & Govindaranjan, 2000; Buchel & Raub, 2001; McEvily & Chakravarthy, 2002; Szulanski & Cappetta,

2003), (ii) the status of the actors, (iii) personal preference, (iv) social ties (Tsai & Ghoshal, 1998; Kraut et al., 1988; Newell et al., 2002; Hansen, 1999), (v) proximity (Choo & Auster, 1993; Constant et al., 1996; DeCarolis & Deeds, 1999; Carbonara, 2005), (vi) trust (Ashleigh, et al., 2003; Huemer et al., 1998; Keong & Al-Hawamdeh, 2002; Bouty, 2000; Nelson & Cooprider, 1996), and (vii) urgency (Markus, 1994). These variables often interact with one another in deciding a suitable mechanism for knowledge transfer. As an outcome of the interplay of the determinants, a '*decision tree*' is developed to illustrate an appropriate mechanism of knowledge transfer. Looking at the *decision tree*, no single approach or a specific mechanism is sufficient to accomplish knowledge transfer in IBM due to various different conditions and contexts. The *decision tree* supports this argument showing how different mechanisms appear to be suitable for tackling several different conditions. IBM acknowledges the needs for a *hybrid* approach to accomplish the transfer of knowledge effectively and efficiently.

6.4.6 Linkage between knowledge storage and knowledge transfer- deferred transfer of knowledge. At IBM, a knowledge repository ensures *win-win* situations for both the contributor and user of knowledge in the knowledge transfer process. Otherwise, as the interviewees report, without the storage of knowledge, the organisation is vulnerable (Gray & Chan, 2000; Stein, 1995; Douglas, 2002). Technology-assisted mechanisms are used to retain and retrieve knowledge at IBM, with respondents taking the view that knowledge transfer and knowledge storage are interlinked. They argue that whenever they carry out the transfer of knowledge using Lotus Notes, they can immediately store it away in their system for future reference and use (*deferred transfer of knowledge).*

6.4.7 Knowledge administration. IBM respondents feel the need to have an individual, whom they refer to as the *knowledge administrator,* to take the responsibility for preserving the stored knowledge so as to ensure it as correct, relevant and current (Davenport & Prusak, 1998; Liebowitz, 1999; Earl & Scott, 1999; Mckeen et al., 2002). Such a person needs to know the owners of the individual document rather than the details of all the knowledge resources available in a database. The respondents feel that such a role could be a full-time or part time responsibility.

6.4.8 The need for an integrated framework of knowledge transfer. A comprehensive framework is developed that supports the connectivity of knowledge storage and knowledge administration within the knowledge transfer process. The majority of the relevant literature focuses on the nature of knowledge, the actors involved in the knowledge transfer, and the mechanisms used to transfer knowledge as the important elements of the knowledge transfer process. Drawing on the empirical work at IBM, five components have been identified to explain the knowledge transfer process: (i) the actors; (ii) the typology of knowledge; (iii) the mechanisms (*hybrid approach*) by which the knowledge transfer is carried out; (iv) the knowledge repositories; and (v) the knowledge administration having a functional role. Knowledge transfer is embedded in these five elements and the various networks and sub-networks that are formed by combining the elements. The interplay among these elements may become complicated through dynamic interaction. Such a framework provides an integrated picture of the knowledge transfer process, which is an extension of the existing theories of knowledge transfer (e.g., Kalling, 2003; Albino et al., 1999; Hansen et al., 1999, Zack 1999a, b). The framework explains the dynamics of successful knowledge transfer practices, supporting the connectivity of knowledge storage and knowledge administration within the knowledge transfer process using the social and technological networks that might promise effective knowledge transfer.

6.5 Contributions of the research

This research has made several contributions to advance the current understanding of the theory and practice of knowledge transfer within KM. Since the research investigates some of the operational issues surrounding knowledge transfer, including the identification of the determinants of choice of knowledge transfer mechanism and description of a conceptual knowledge transfer framework, it contributes to the growing body of knowledge about knowledge transfer. These contributions are discussed below under three headings: theoretical, methodological, and practical.

6.5.1 Theoretical contributions

Whetten (1989, p. 492) argues that "most organisational scholars are not going to generate a new theory from scratch. Instead, they generally work on improving what already exists". The present research addresses some of the unresolved operational issues relating to knowledge transfer. As mentioned earlier (p. 2), the research provides theoretical insights into knowledge transfer within an organisation. Most specifically, it extends extant theory of knowledge transfer by adding additional components to a knowledge transfer process model. However, the result of the data collection and analysis process is 'substantive theory', as described by Strauss and Corbin (1998, p. 15) being "one developed from the study of one small area of investigation and from one specific population". This theory is subjected to further empirical testing. The theoretical contributions can be summarised as follows.

6.5.1.1 Typology of knowledge. While reviewing the existing theories of organisational knowledge, one important dimension is found to be neglected, i.e., the sources of knowledge. Several dimensions, such as tacitness, organisational levels and location, have received much attention (Polanyi, 1966; Nonaka, 1994; Blackler, 1995; Spender, 1996). It is argued that knowledge is not confined only within the organisation's boundary. Rather it is created and recreated in social interactions among people and organisations. Against this backdrop, an attempt is made to provide another classification of knowledge based on sources of knowledge. This typology of organisational knowledge makes a distinction between endogenous knowledge and exogenous knowledge. The fact is that an alternative typology of knowledge is proposed based on the two dimensions of tacitness of knowledge and sources of knowledge, categorising them into four types: *Endogenous—tacit knowledge, Endogenous—explicit knowledge, Exogenous—tacit knowledge,* and *Exogenous—explicit knowledge.* The ability to acquire and manage knowledge depends on the type of knowledge source. For example, endogenous–explicit knowledge can be easily acquired and managed because it is not only articulated but also resides within an organisation; whereas exogenous–tacit knowledge is the most difficult to acquire and manage because such knowledge is neither easily codified nor resides within the organisation's boundary. A summary of the typology has been published elsewhere (Jasimuddin, 2005a).

6.5.1.2 Contradictory arguments surrounding organisational memory. Although there is a recognised need to store knowledge in organisations, researchers still disagree on a number of issues relating to organisational memory. Drawing on the insights of the relevant literature, six disagreements within the literature regarding the notion of organisational memory are identified: (i) whether or not organisations have memories; (ii) whether organisational memory and KM are different fields or overlap; (iii) whether organisational memory resides in human brains or in other places; (iv) whether such memory should be viewed as a static storage bin or be treated as a dynamic socially constructed process; (v) whether approaches to knowledge storage can be described in the context of being either technically based or people focused; and (vi) whether such storage is functional or dysfunctional in terms of organisational performance and effectiveness.

This thesis provides some insights into those contradictions that challenge the notion of organisational memory. For instance, an organisation can learn and memorise knowledge of its past through its members via mental and structural artefacts. While KM deals with organisational knowledge holistically, organisational memory focuses on the storage of knowledge. With respect to the location of organisational memory, an organisation's knowledge resides both in people's heads and in artefacts. With regard to the contentious issue of whether organisational memory is a static storage bin, it is a storage bin but is dynamic in nature, because knowledge is preserved and updated regularly so that it may be made full use of. Despite the growing tendency to emphasise the role of technology in organisational memory, an equal importance is paid to human and technical elements in the sense that knowledge storage is a social-technical approach. Although there are various arguments against stored knowledge, making use of knowledge from past experience is functional particularly because it contributes to effective decision making. By addressing the contradictions, the thesis advances the understanding of the organisational memory concept within KM discourse. A summary of these ideas has been published elsewhere (Jasimuddin et al., 2005b).

6.5.1.3 Hybrid approach to knowledge transfer. The majority of the extant literature on knowledge transfer tends to focus on two very different approaches to knowledge transfer: personalisation and codification approaches. Given the pivotal importance of the approaches to knowledge transfer, it is remarkable that the relevant literature has attracted little and rather fragmented research interest in the *hybrid* approach. However, as is found at IBM, both people-focused and computer-assisted mechanisms are used alongside one another to carry out knowledge transfer. The present research provides empirical evidence that the *hybrid* approach to knowledge transfer is an approach that promises effective knowledge transfer, indicating the limitation of relying solely on the personalisation or the codification approach.

6.5.1.4 Determinants of selection of knowledge transfer mechanism. There are several studies (e.g., Kalling, 2003; Albino et al., 1999; Hansen et al., 1999; Zack 1999a, b) where researchers have stressed the importance of knowledge transfer mechanisms. However, there is no literature that exclusively deals with the determinants of selection of knowledge transfer mechanism or that emphasises the factors that influence the determination of the selection of knowledge transfer media. The interviewees report that knowledge transfer could be accomplished well when an appropriate mechanism is selected. Having knowledge of determinants eases the selection of a suitable mechanism of knowledge transfer within an organisation. The empirical work reveals eight factors, namely tacitness of knowledge, nature of the query, status, personal preference, proximity, social ties, trust, and urgency, which are identified as having a direct and positive influence together, independently and sometimes jointly, in determining mechanisms for knowledge transfer in an organisation.

6.5.1.5 The integration of knowledge transfer and knowledge storage. The majority of the literature on knowledge transfer has ignored issues concerning the storage of transferred knowledge and the transfer of stored knowledge (e.g., Albino et al., 1999; Szulanski, 1996). Although there is considerable literature in KM that has addressed knowledge transfer and knowledge storage issues independently of each other, only a few authors have considered the need for an understanding of the relationship in an organisation between knowledge transfer and knowledge storage (Gray & Chan, 2000; Argote & Ingram, 2000; Douglas, 2002; Connelly & Kelloway, 2001; Kalling, 2003).

From the insights of the relevant literature and the findings revealed from the empirical work, it is argued that there is a clear need for 'knowledge storage' to be incorporated within the knowledge transfer model. The study indicates that the knowledge transfer process is accomplished well when knowledge is transferred, stored and retrieved for future re-use in complementary ways. The research suggests that since there is a relationship between knowledge transfer and knowledge storage within an organisation, these issues are integrated, not separated from each other. This thesis is one of the first attempts to study and combine both knowledge transfer and knowledge storage under the same context. A summary of these ideas has been published elsewhere (Jasimuddin, 2005b).

6.5.1.6 The realisation of the importance of knowledge administration. The importance of having someone responsible for managing organisational knowledge has been noted (Ruggles, 1998; von Krogh, 2003; Davenport & Volpel, 2001; Raub & von Wittich, 2004). The research reveals the need or value of a knowledge administrator or equivalent. Such a person would have a potential role in helping the transfer of knowledge as well as in maintaining the knowledge repository. Accordingly, eleven functions of a knowledge administrator have been identified from the interviews, six of which confirm those found in the existing literature. As a result of this field work, the following additional functions are revealed: (a) acting as an informant in telling others about the knowledge contributor; (b) identifying the items available in knowledge repositories which need to be revised; (c) putting next review dates on documents; (d) informing and advising the owners of documents to archive, delete or change its expiry date; (e) helping others in finding the right information from the proper knowledge repository through: (i) identifying the exact location of stored knowledge, and (ii) navigating the correct, current and relevant knowledge.

6.5.1.7 An integrated and holistic framework for knowledge transfer. Existing theories of knowledge transfer emphasises the nature of knowledge, the actors involved in the knowledge transfer, and the mechanisms used to transfer knowledge. The present research explores the importance of having an integrated framework that incorporates knowledge storage and the knowledge administration as important components of the knowledge transfer framework. Using insights from the existing literature and inputs

derived from the empirical work, a knowledge transfer framework is developed, integrating knowledge storage and knowledge administration as part of the model to carry out effective knowledge transfer. Such a consolidated framework views knowledge transfer as an interactive, ongoing, and dynamic process that cannot rest on a particular type of knowledge, one particular mechanism to carry out knowledge transfer, or a single directional flow of knowledge.

As a result, the proposed framework encompasses five components: (i) the actors engaged in the transfer of knowledge; (ii) the typology of organisational knowledge that is transferred between the actors; (iii) the mechanisms by which the knowledge is transmitted; (iv) the repositories where codified knowledge is retained; and (v) the knowledge administrator who manages and maintains knowledge. The integrated framework characterises knowledge transfer by incorporating the key constructs and can be represented visually (Figure 5.4).

6.5.1.8 How the model relates to other knowledge management theories. In terms of overall contribution, the integrated knowledge transfer framework of this research also has potential to contribute to other models or aspects of knowledge management. One way in which it might be explained is by considering its impact on knowledge creation. Ipe (2003, p. 340) argues that knowledge transfer is imperative to the creation of knowledge at all levels within an organisation. The knowledge transfer framework developed in the research has implications on aspects of knowledge creation, particularly on the SECI model of Nonaka and Takeuchi (1995), for example. According to Nonaka and Takeuchi (1995), knowledge creation is defined as a spiralling process of interactions between tacit knowledge and explicit knowledge. They contend that the interactions between these two types of knowledge lead to the creation of new ideas and knowledge through four different modes of knowledge conversion: socialisation, externalisation, internalisation and combination. The proposed model of knowledge transfer helps to look at the SECI model from a different perspective. Although the SECI model is about knowledge creation and it is not necessarily about knowledge transfer, it incorporates knowledge transfer in it. The proposed framework does not appear to map directly on to the SECI model, and this would perhaps make interesting future work.

6.5.2 Methodological contributions

This section highlights two methodological contributions during data collection and interpretation: (i) use of the navigation map to explore the research gaps and to formulate research questions and (ii) use of procedure based on Miles and Huberman (1984) to analyse and present data.

First, while reviewing the existing literature in order to explore the research gaps and thereby to formulate research questions, the concept of a navigation map is developed. Exploring a researchable topic and narrowing it down sufficiently to make it workable is a formidable, but foremost, task in doctoral research (Jasimuddin et al., 2004). Saunders et al. (2003), for instance, cite an example to show how a relevance tree is used to explore the areas that need to be focused to address already formulated research question.

The navigation map developed in this thesis is a helpful method to explore a researchable topic and narrow it down to a specific topic. What the navigation map is doing is reversing the process of navigating literature as prescribed by some authors. Unlike Saunders et al.'s (2003) relevance tree, for example, the navigation map of the present research helps to formulate the research question after having identified constructs and areas through the review of the existing literature. Although the navigation map has been illustrated by means of an extended example in the area of KM, the demonstration of the development of such a navigation map may provide useful insights for prospective researchers in other disciplines (Jasimuddin et al., 2005c).

Second, this thesis contributes to methodology by providing an example, in the field of KM, of the application of some of the data analysis procedures suggested by Miles and Huberman (1994). Based on such procedures, the present research has both exploratory and confirmatory aspects in which it starts with exploration during the first phase of the interviews and ends with confirmation at the second phase of the interviews. Although some of the data analysis procedures suggested by Miles and Huberman (1994) has been applied in the area of KM, the demonstration of the application of such an approach may provide useful insights for prospective researchers in other disciplines.

6.5.3 Practical contributions

This research also provides practical insights for knowledge transfer within an organisation, which might help practitioners to carry out successful knowledge transfer within their organisations. Since the research deals with some of the operational issues surrounding knowledge transfer and subsequently proposes a knowledge transfer model, it also contributes to the growing body of knowledge about knowledge transfer processes in practical terms. The research findings might help other organisations in the following ways.

(i) Organisations can understand the mechanisms (including *hybrid* approach) that appear to be appropriate to transfer knowledge among organisation members;

(ii) Organisations can reflect on suitable mechanisms by looking at the determinants of choice of knowledge transfer media; and

(iii) Since the research indicates how the model supports the connectivity of knowledge storage and the knowledge administration within the knowledge transfer process using social and technological networks, practitioners can conceptualise how such an integrated approach to knowledge transfer can be implemented.

6.6 Limitations of the study

This section outlines the limitations of this research, which will, in turn, help to identify the areas and issues that require further research. The limitations are described below.

The research is based on a single research setting. Whilst all single-case studies have potential limitations in terms of generalisability and transferability, the present study is not free from this limitation.

IBM is representative of a typical, mature high-tech multinational industry. Inevitably, the character of IBM may have a strong influence on the results of the study. The study does not reveal any factors which might indicate that IBM operates in a notably atypical way for organisation of this sort. However, one notable aspect which typified IBM's

distinctiveness is its attitude to knowledge transfer, for example 'openness' and collaboration (see pp. 80-89).

As mentioned earlier, the knowledge transfer framework has been developed based on insights from the existing literature along with the findings drawn from the case organisation. The proposed framework does address the questions 'what is' by describing the knowledge transfer activities, and 'how to' by prescribing and suggesting ways for organisations to engage such activities. However, the proposed model has not been validated in any other organisation. Its wider application will help to judge the extent to which the hybrid framework is sound and robust.

As with other qualitative research approaches, the emphasis of this research is on the perceptions of the respondents and although every effort is made to validate these, such a research approach is always open to multiple interpretations.

6.7 Directions for future research

This dissertation has taken a step towards developing some arguments about the interaction between knowledge storage and knowledge administration in order to broaden the understanding of the notion of knowledge transfer in an organisation. Other organisations within the same industry and from several different industries need to be investigated in order to explore whether similarities and differences of knowledge transfer practices might affect the model's usefulness.

The knowledge transfer framework that emerged needs to be investigated to test its applicability and utility in other organisational settings so as to ensure its transferability and generalisability.

Determining the relationship between knowledge transfer and knowledge storage within an organisation appears to constitute an important area of KM research. The study reveals that there are problems, such as identification of the exact location of knowledge within a repository, navigation of the stored knowledge, and retrieval of the correct, current and relevant knowledge, associated with knowledge storage. This certainly

warrants some further research to explore how to resolve the problems relating to knowledge storage, for instance, concerning search engines.

As noted earlier, another important element of the integrated framework of knowledge transfer is the existence of the knowledge administration role. The study provides a list of functions that a knowledge administrator-equivalent is expected to perform. The question of how such functions will be implemented seems to be another potential area for further research to derive a more comprehensive picture of the role of a knowledge administrator.

This research also sheds some light in expanding the resultant theory of knowledge transfer to build on other models of organisational knowledge. Further empirical work needs to be done to deepen our understanding of the implication of the knowledge transfer framework within knowledge management models, such as the SECI model, for example.

Appendix A - Interview Information Pack

University of Southampton

Research-in-Progress

TOWARDS AN INTEGRATED FRAMEWORK FOR KNOWLEDGE TRANSFER PROCESS

by
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June, 2004

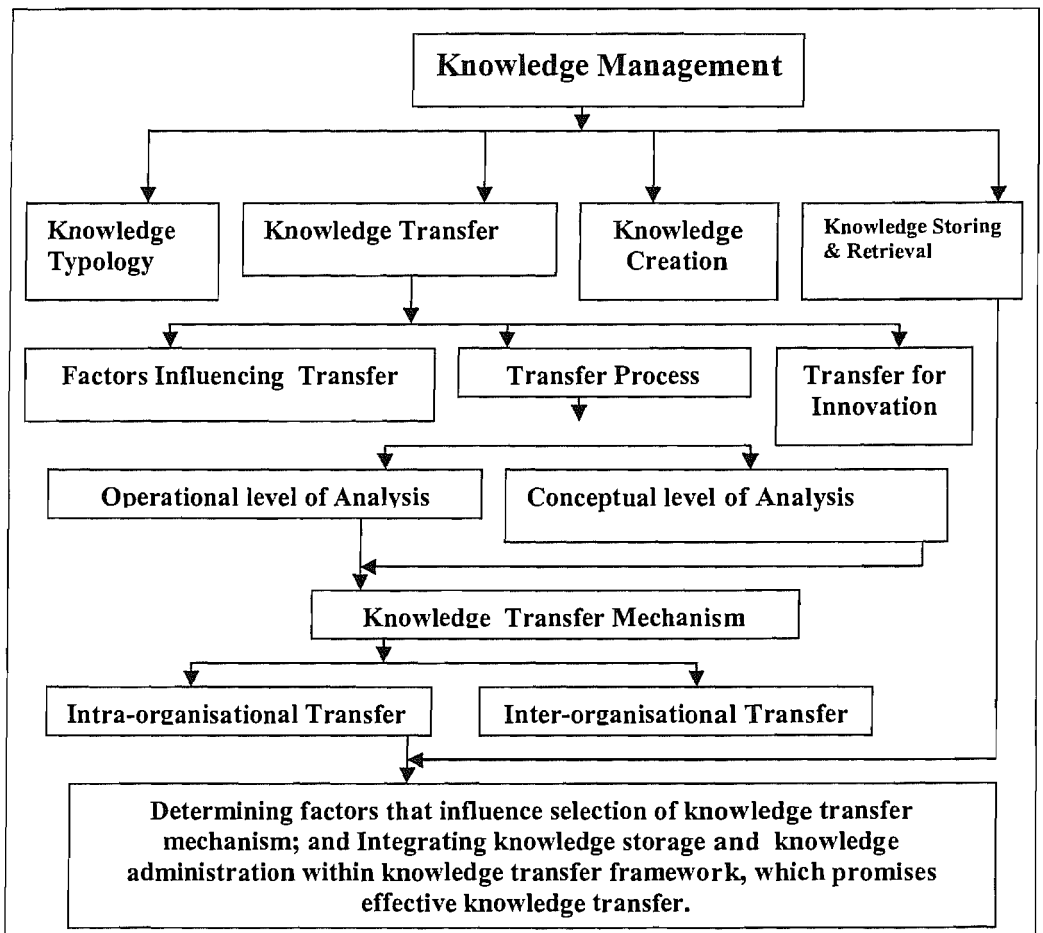


Figure 1 Navigation map of knowledge management research

Aim and objectives of the research

The aim of the present study is to investigate and advance the current understanding of the theory and practice of knowledge transfer within knowledge management in the context of a case organisation. Again to achieve the research aim, the following objectives have been defined:

- to review knowledge transfer and other related constructs within the KM literature;
- to empirically assess the transmission mechanisms by which employees transfer their knowledge and to explore factors that influence the choice of knowledge transfer mechanism;
- to discover the role of knowledge storage and the knowledge administrator within knowledge transfer processes as perceived by organisation members;
- to develop an integrated and holistic framework of knowledge transfer processes that might promote successful knowledge transfer in an organisation; and
- to identify issues and areas for further research.

Accordingly, the following research questions are set out:

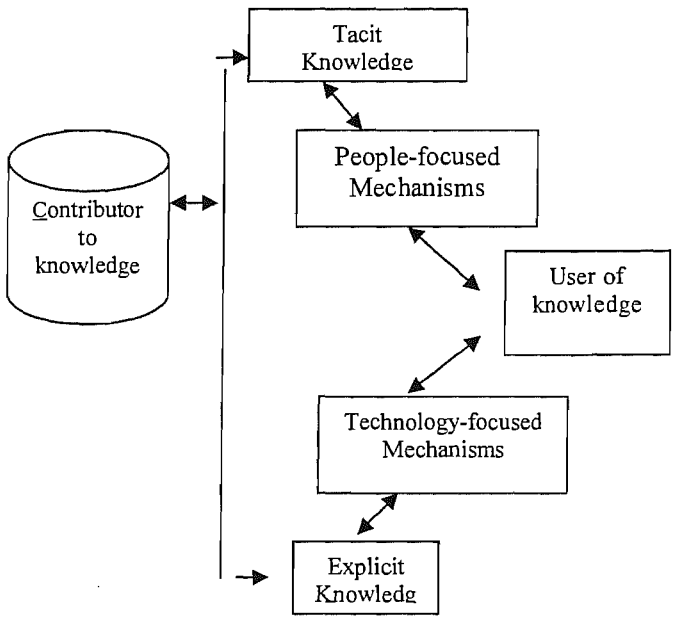
What are the perceived determinants of selection for knowledge transfer mechanism within an organisation?

How can a knowledge transfer framework be extended, incorporating the knowledge repository and the knowledge administrator, that may help carry out the effective transfer of knowledge?

Components of the knowledge transfer framework

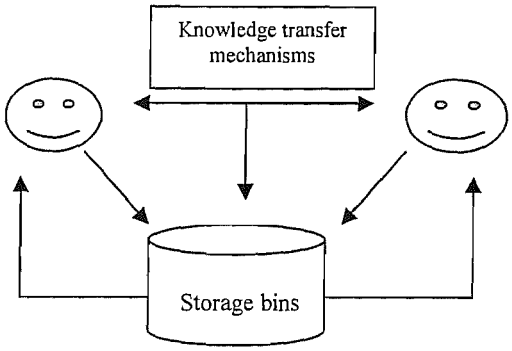
Reviewing the relevant literature, three components have been identified which are as follows.

- The **actors** involved in the knowledge transfer process;
- The **nature** of knowledge transferred between the actors; and
- The **mechanism** used by which the transfer of knowledge is carried out.

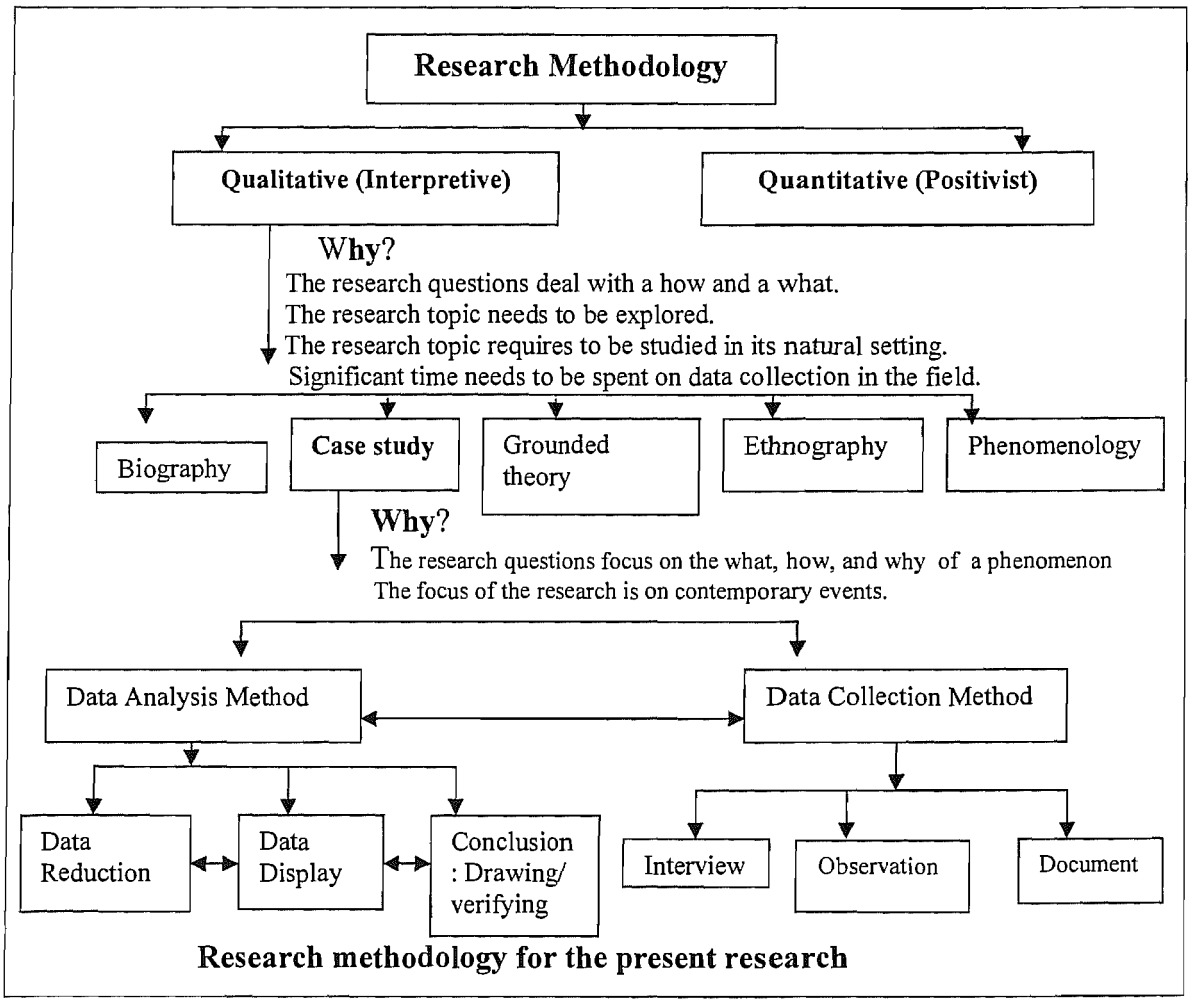


Knowledge Transfer Framework

The linkage between knowledge transfer and knowledge storage



The role of knowledge administrator to maintain knowledge storage and to facilitate knowledge transfer???



Research methodology for the present research

The Structure of Semi-structured interview

Part I Specific questions on the respondent and the case organisation

- Please do tell about your job here?
- The overall activities and functions of the case organisation

Part II Specific questions on Knowledge transfer

- Why do people transfer knowledge?
- Do you perceive any significance of knowledge transfer within an organisation?
- What motivates people at IBM to transfer their knowledge?
- Is there any incentive from management? Does knowledge transfer helps for promotion?

Part III Specific questions on Knowledge transfer mechanism (related to the first research question)

- What are the mechanisms that are used at the IBM to carry out the transfer of their knowledge?
- What mechanism(s) do you use?
- Why do you use one particular medium than others?
- Which one do you prefer? and Why?
- Which mechanism(s) do you perceive most effective and why do you think so?

Part III Specific questions on Knowledge transfer process (related to the second research question)

- Tell me about the knowledge transfer process and its components, i.e., actors involved, the nature of knowledge transferred and the mechanisms used?
- Why do people store knowledge? Do you perceive any role of knowledge storage to facilitate knowledge transfer at the IBM?
- Who maintains the knowledge repository in your organisation? Is there any person who facilitates knowledge transfer and/or tidies up knowledge storage? Do you perceive the role of someone like knowledge administrator to do such job?

Part IV General comments

- Is there any concern or issue you would like to raise or mention?

Appendix B - Interview Information Pack (Second Phase)

University of Southampton

Research-in-Progress

TOWARDS AN INTEGRATED FRAMEWORK FOR KNOWLEDGE TRANSFER PROCESS

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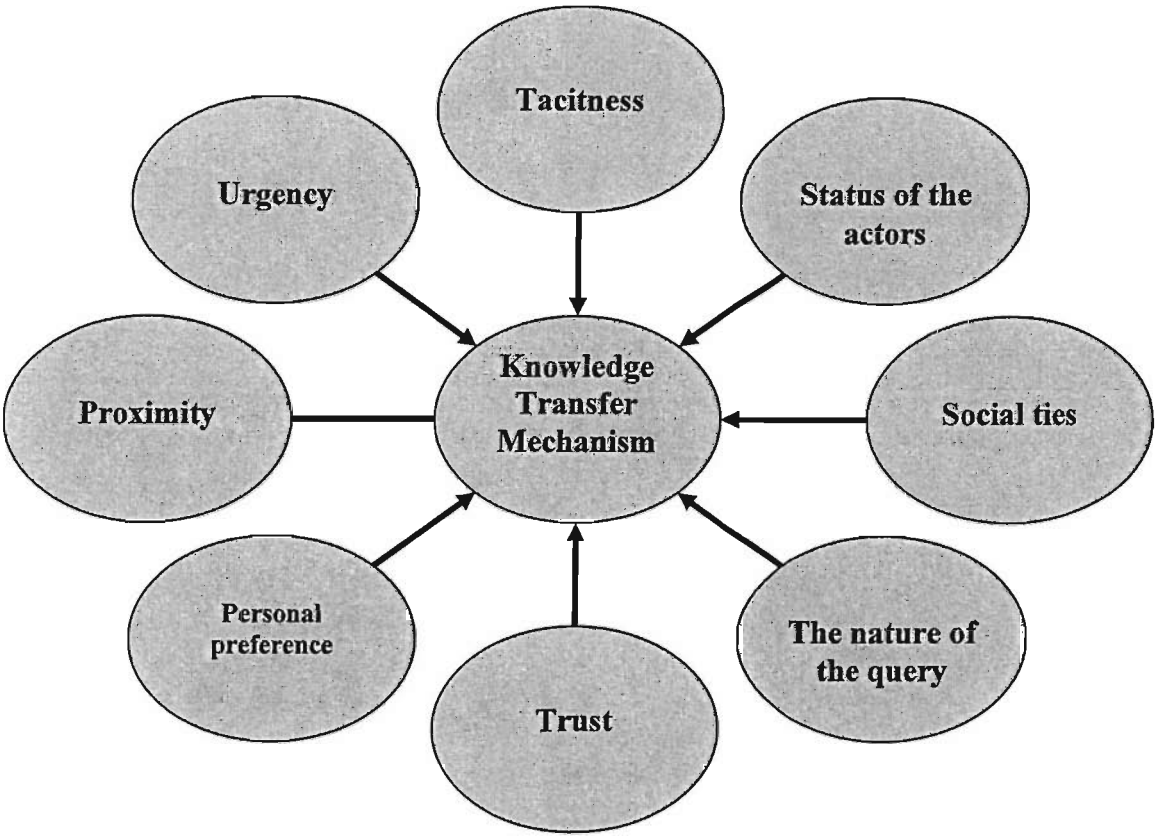
November, 2004

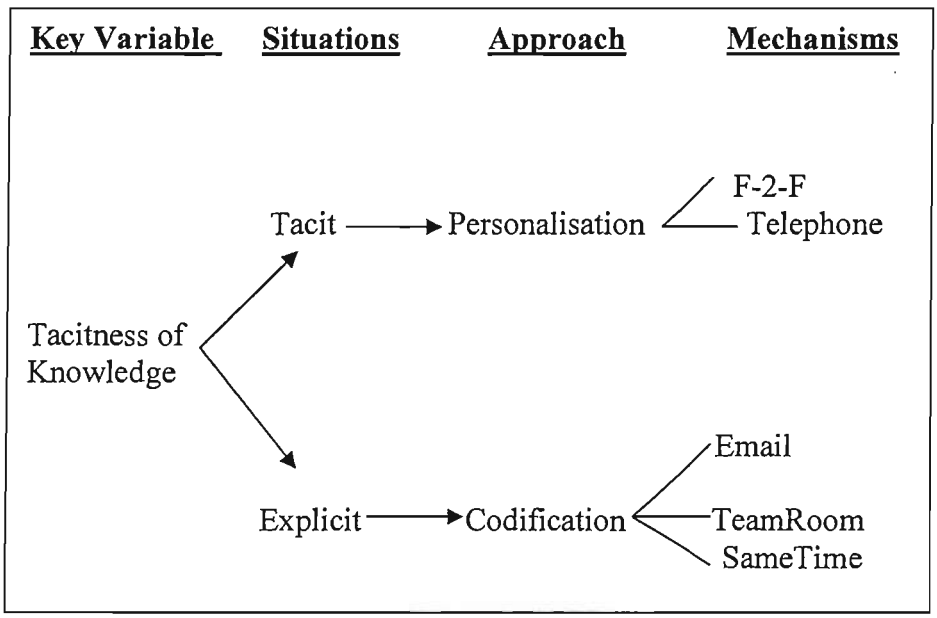
Semi-structured interview schedule (Second Phase)

- Do you think the eight key variables [(i) tacitness of knowledge, (ii) the nature of the query, (iii) the status of the actors, (iv) proximity, (v) social ties, (vi) trust, (vii) personal preference, and (viii) urgency] as powerful determinants of mechanism choice of knowledge transfer?
- As an outcome of the interplay of the above factors, a '*decision tree*' is drawn to link most of these variables in a sequence to select an appropriate mechanism of knowledge transfer?
- Do you perceive that the *decision tree* supports that different mechanisms, is suitable for tackling several different conditions?
- Do you perceive that an organisation needs to have a *hybrid* approach to accomplish the transfer of knowledge?
- Do you perceive that the knowledge transfer framework which incorporates five components, (i) the actors engaged in the transfer of organisational knowledge; (ii) the typology of knowledge that is transferred between the actors; (iii) the mechanisms (*hybrid approach*) by which the knowledge transfer is carried out; (iv) the repositories where explicit knowledge is retained; and (v) the knowledge administrator-equivalent having a functional role of managing and maintaining knowledge, provide actually an integrated and holistic picture of the knowledge transfer process.

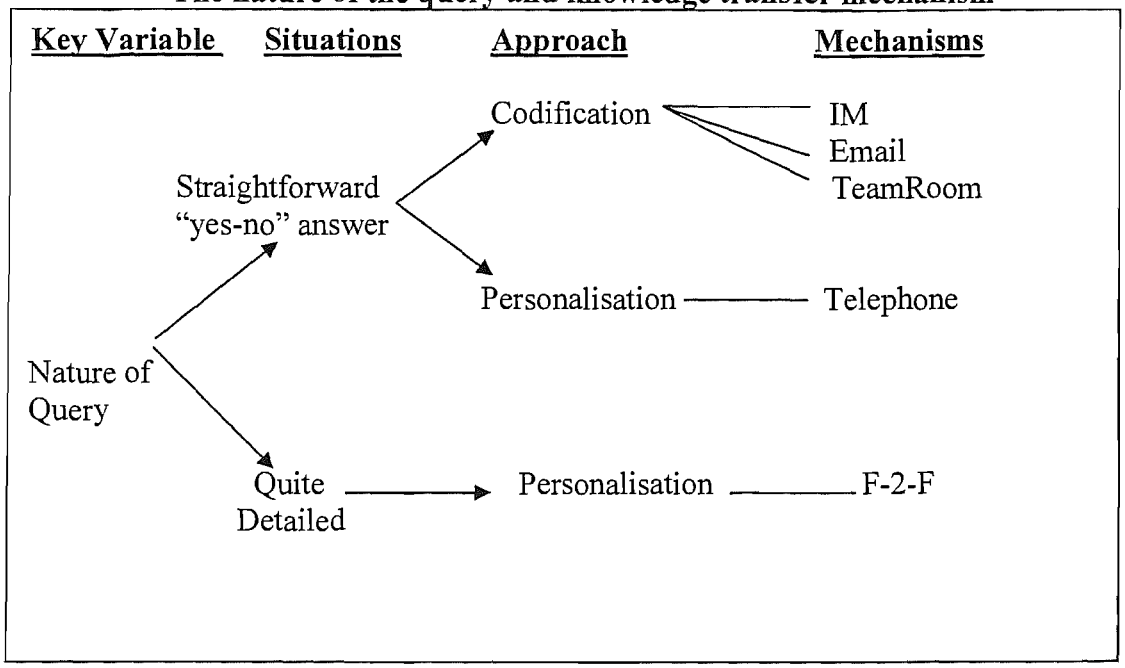
Factors emerged as determinants of knowledge transfer media



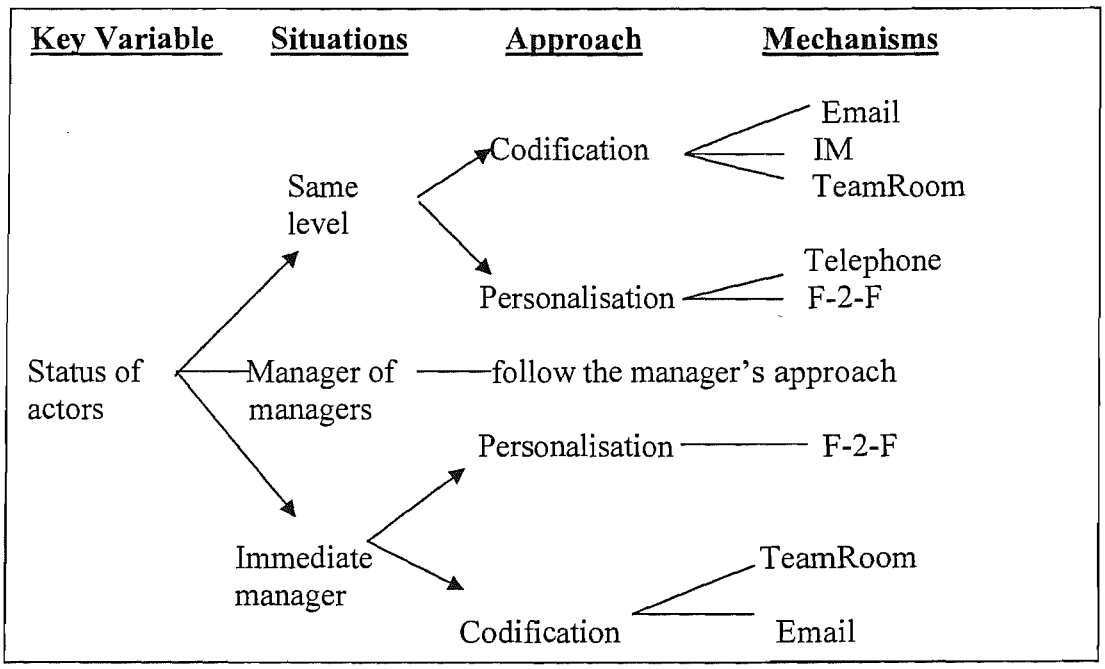
Tacitness of knowledge and knowledge transfer mechanisms



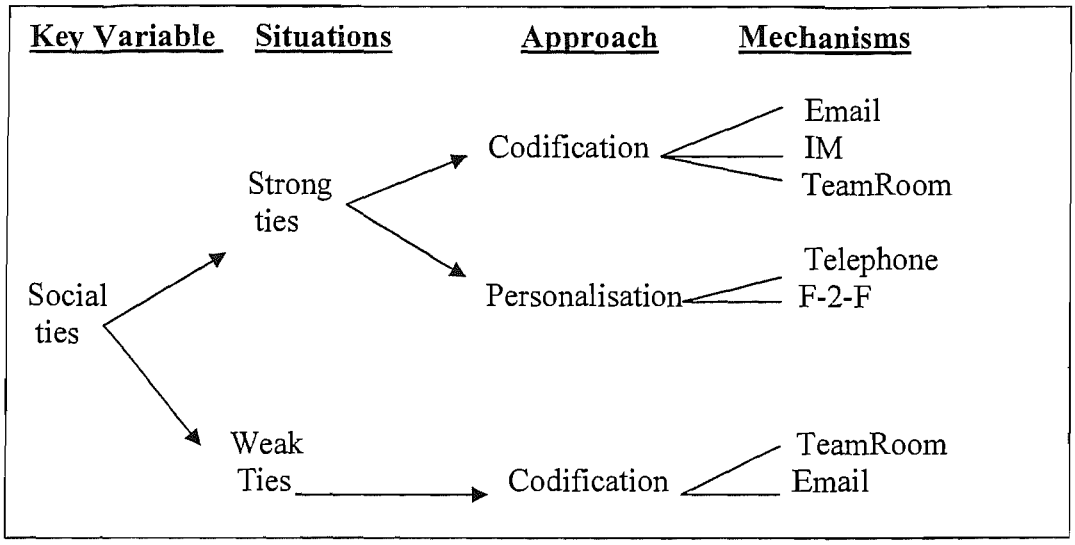
The nature of the query and knowledge transfer mechanism



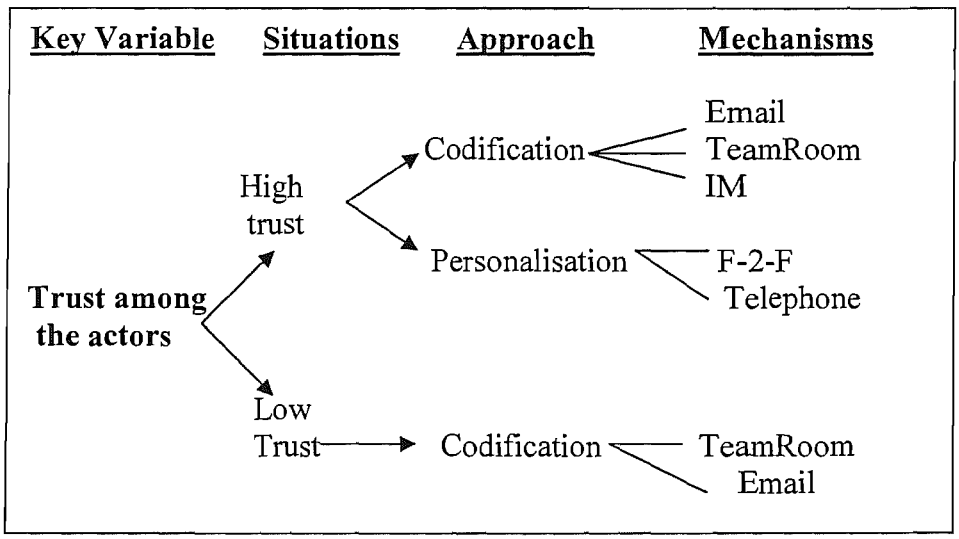
The status of the actors and knowledge transfer mechanism



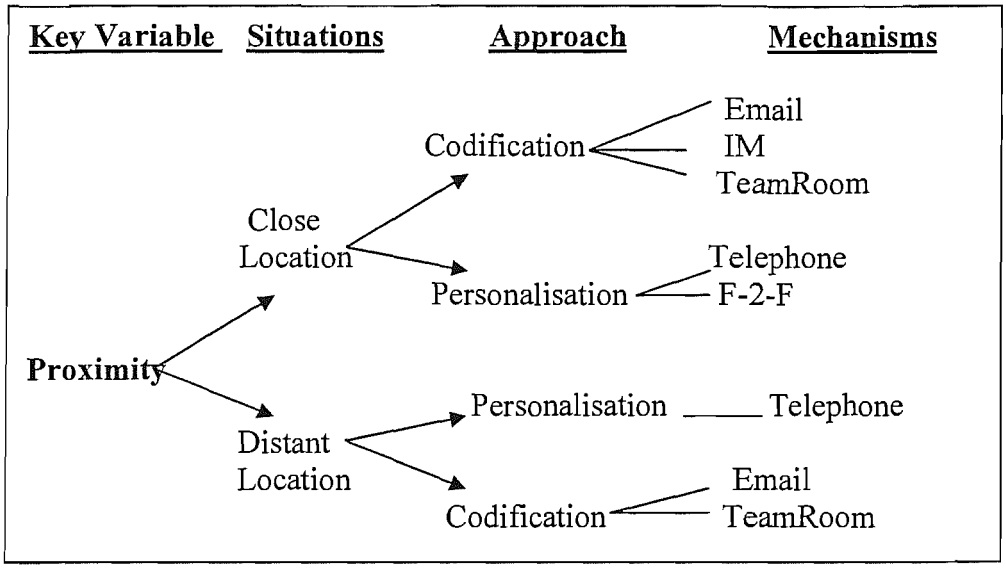
Social ties and knowledge transfer mechanism



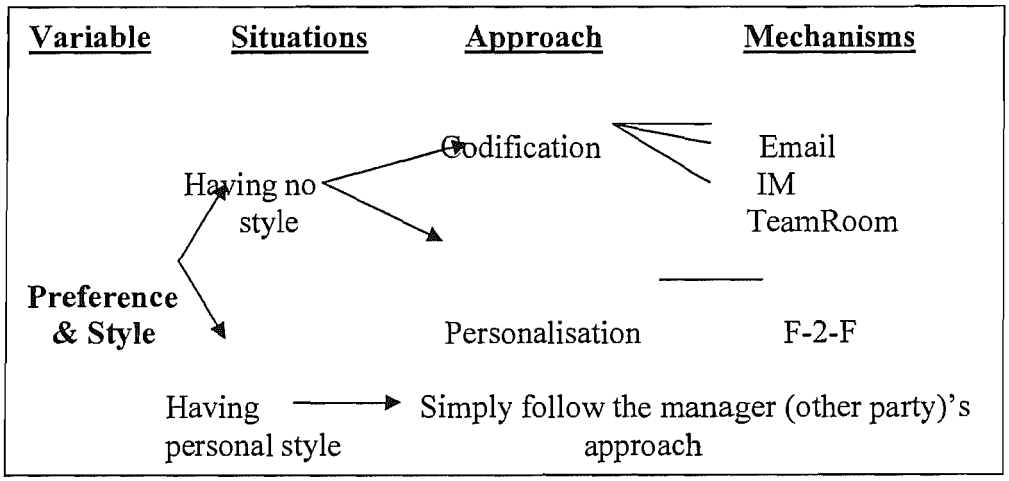
Trust among the actors and knowledge transfer mechanism



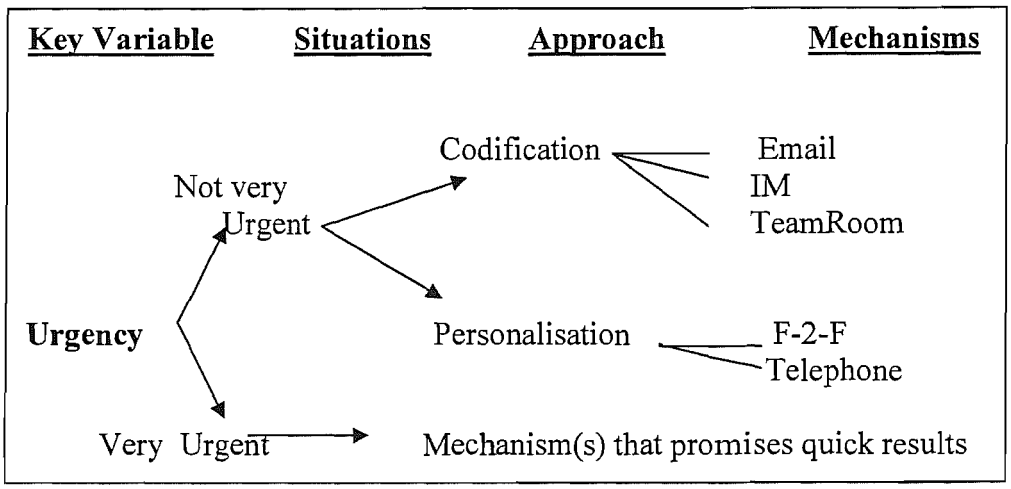
Proximity and knowledge transfer mechanism



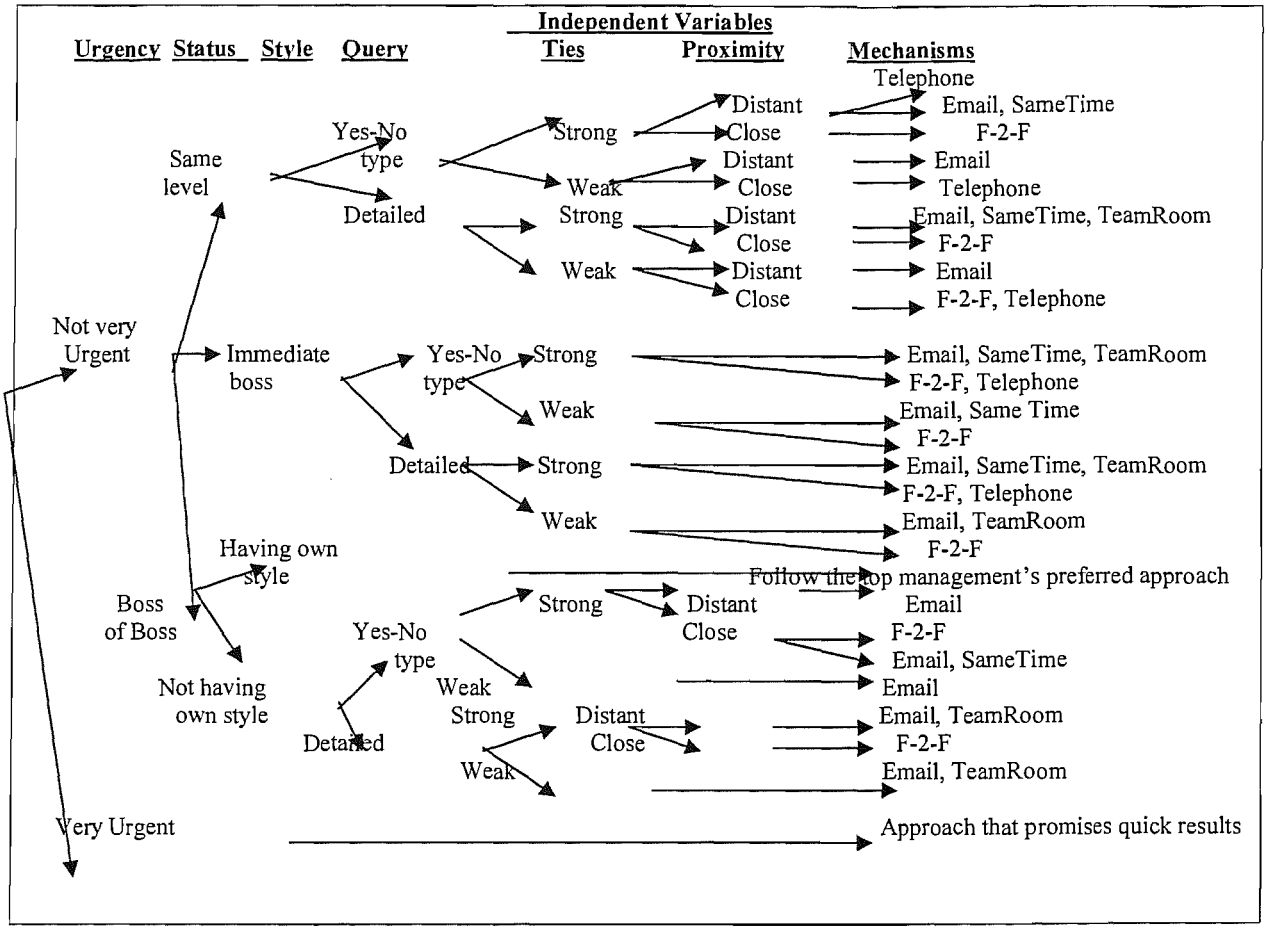
Personal style and knowledge transfer mechanism



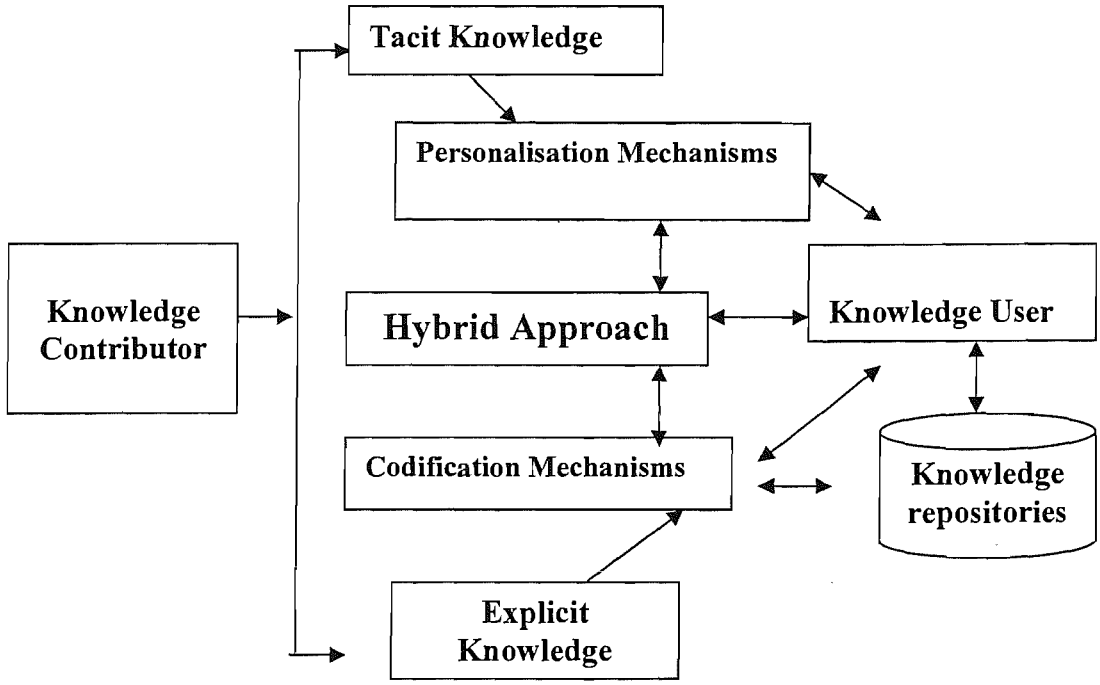
Urgency and knowledge transfer mechanism



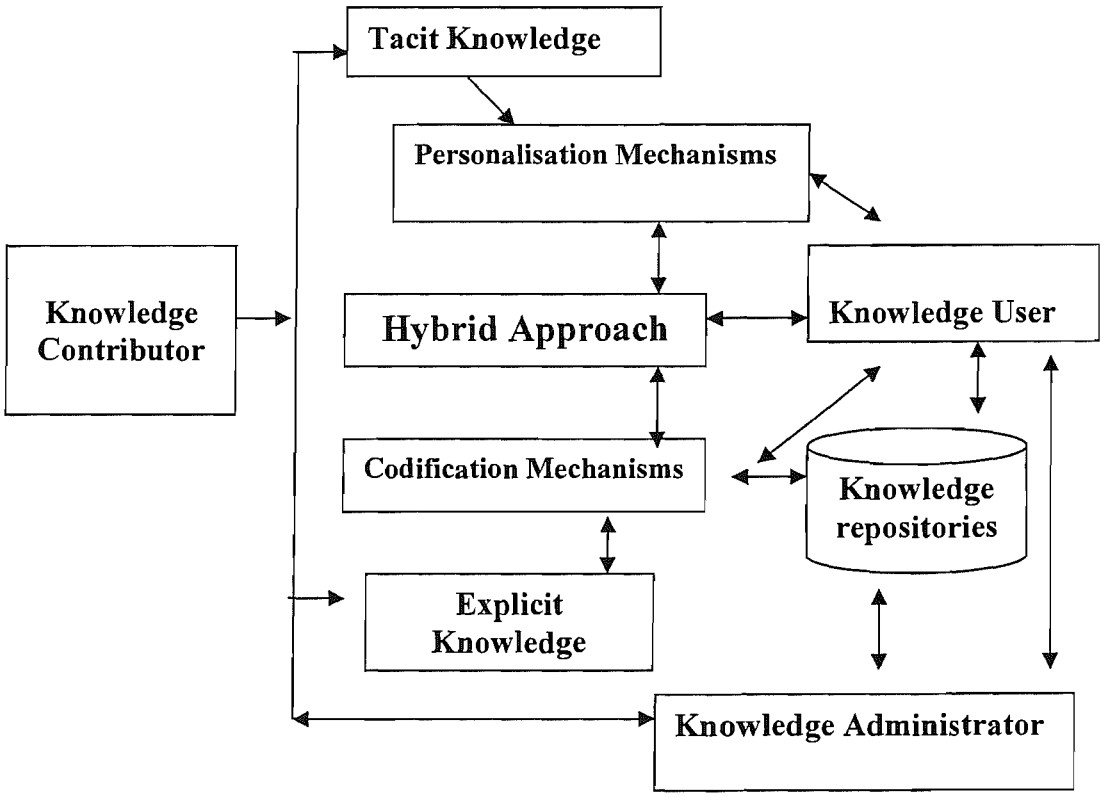
Factors perceived in determining a knowledge transfer mechanism



Extended mechanism of knowledge transfer



An integrated framework of knowledge transfer



Appendix C Transcripts of an Interview

The following coding framework is a part of the transcribed script of an interview of a manager taken at the IBM. It is shown here to demonstrate the coding process through the 'initial issues' as part of the Miles and Huberman procedure (1994) of data analysis. The complete transcribed script of the interview is not furnished here because it also contains materials which are confidential and personal in nature.

Personal and background information	
Why do people transfer knowledge? Do you perceive any importance of knowledge transfer within an organisation? What motivates people at IBM to transfer their knowledge?	
Well I mean it **is essential to share** knowledge because there is so much going on. It is **hard for any one person to know everything** he needs to know without talking to somebody else. Also if we know that what we know others may need to know to do their job things like that. Then definitely we do help them with our knowledge. We as a development team **write codes and then test the** codes which we have written, we then pass it on to a **functional verification team** who have to test it with the rest of the codes that we have written from different perspectives. So if all these teams **do not interact, none** of them **can really do their proper job.**	Role of knowledge transfer Self-sufficiency Voluntary Completion of job
I have not noticed any **knowledge hoarding** sort of thing. I guess wherever you go there might be an element of that [knowledge protection]. Among the developers and testers etc. I don't think so much of that. Where there is test I don't think so much of that. If they do not communicate their knowledge either due to lack of thought or lack of time. Somebody might find it very useful [to share knowledge] rather than 'that is my knowledge I am not going to share with anyone'. I think our process is set up as such that we do share our knowledge.	Knowledge hoarding Knowledge sharing culture Knowledge is power Mutual benefit
Is there any incentive from management? Does knowledge transfer helps for promotion?	
Yeah. There is. Our management assesses people annually; we also have regular **feedback sessions** with people obviously. If an employee is seen to interact well and help others to share his knowledge then he is more likely to get **recognition** and eventually **promotion**. So it is not only helping the people in his own group but also helping across the boundaries.	Feedback session Monitoring Recognition Promotion
I think there is still some **teaming elements** but it is less rigid. Now we had three sections: **Win, Execute and Team.** Now there are more on what are the objectives you are going to meet. It is more flexible. There is a focus on **teaming I mean 'people interaction'** Win Execute and team are still there.	Teaming element

They have to show that they could work with other. Helping them, nurturing them to grow helps to achieve the goals of the organisation. That is **the objective that I have as a manager.** It is now actually **part of the assessment process** at the end of the year they [employees] have to demonstrate that they have spent time in doing that [sharing knowledge].

Assessment process

We talk about **incentive**. People are encouraged to write and **publish articles o**utside the IBM or within IBM. I mean they are also incented to come up with big **patent** ideas. It is about **sharing rather than more about protecting.** But it is still pushing the boundary forward. Both Internet sites inside and outside: journal publications, posting on Internet, IBM sites, external conference. They [management] reward us for **publishing [scientific papers]**. It is seen as innovation. And there is a very keen **culture for innovation.** We want to be seen as innovative. We know that in order to keep moving forward we need to innovate. And publishing is counted amongst that.

Management support
Publication of papers

Sharing vs protecting knowledge

Reward for publication

Culture for innovation

[Materials ignored due to confidential]

What are the mechanisms that are used at the IBM to carry out the transfer of their knowledge? What mechanism(s) you use and why do you use one particular medium than others? Which mechanism(s) do you perceive most effective and why do you think so? Tell me about the knowledge transfer process and its components, i.e., actors involved, the nature of knowledge transferred and the mechanisms used?

When it is about the transfer of knowledge, it depends. **Multiple ways.** If it is **technical subject** then it may be via notes. It may be via **TeamRoom** [a Lotus Notes application]. May be via direct person to person [F-2-F] or in a meeting with several persons. I mean **multiple ways depending upon the nature of query. If it is technical subjects** then it may be via **Notes [using technology]. But when people need something more detailed,** that will normally be done **face to face.** I also **as a manager** have people reporting to me who don't need **technical knowledge** from me necessarily but need **development information** as how they could personally **develop themselves** [their skill]. That will normally be done **face to face** for that sort of knowledge. Isn't it?

Several knowledge transfer media

Nature of query
Machine focused
F-2-F

Status

Personal development
Learning via F-2-F

Something we put [explicit knowledge] in a **Team Room.** But what areas they are improving; what they have been doing; how do they improve it; how they could have done it better- things like that can be done **person to person.** Ah typically I as a manager have **monthly meeting** with all the people who report to me to convey where they are with their projects.

Progress meeting

Which one do you prefer ? and Why?

I think that there is **a time** and a **place factors** with each type of communication. I **like the social interaction.** And that's why I am **people manager. I enjoy helping the people who work** for me; perform the best they can and show their potential. But it is not right to do all through **interaction [F-2-F].** Because there is too much and they are **too busy as well.** Sometimes I have to communicate vie **notes.**

Location and time factors

Personal preference

Knowledge sharing culture
One mechanism can't meet all situations

Or I'll ask people to **update** for something via **Same**

Time [instant messaging] message. So we have an **ongoing dialogue** most days with a lot of people who work for me; But not all of them. I have **face to face contact with a lot of people.** Try to **walk around the area.** Time to time with people and ask 'how are you doing?' Because it is not always all about projects. Sometimes it is with 'Are they are ok?' **If they are ok, hopefully they will be working well.** If they are not ok then that is something I can help with. Otherwise their focus will be diverted if they are not ok.

Updating

Same Time for short message
Social interaction
Co-location

Personal relationship (business interests)

While **positioning apart,** it is difficult to work together face to face, we cannot have **ping pong ideas** and thoughts. We basically have only one or two mechanisms like Email, SameTime or whatever. As you know we are **split geographically** another sensible means of knowledge transfer with us is telephone conversation call. We do use all of these things [mechanisms].

Distant location
Flipside of technology

Flipside of f-2-f

Using more than one mechanism

I prefer **social interaction.** I like it. I think **it is essential.** I **hate to think** never actually face to face spoke anybody in my team. But I **recognise there are other mechanisms** that are appropriate as well.

Personal preference

Close proximity

I mean using both [approaches] is most appropriate. We may need the **Same Time or send a note** to somebody to help. Sometimes they need I may need to **have some clarification** of that. Because they lack background knowledge. Or they are less experienced. Due to their lower level of understanding they may need some f-2-f interaction. When we need some quick straight forward answer like 'Do we know when we fixed it?' we can do it using machine without **convening other meeting face to face;** I may do that **through machine.** Equally I can post to a Team Room and **I can go back and refer to it**

Hybrid

Same Time or send a note

straight forward query

Knowledge storage to refer back

But I may **wonder around corridor** and say 'how is it going' just **more informally. We can** ask the same question through the Same Time.

Close proximity

I think in the beginning it is actually **important to meet somebody** to have to **get to know somebody** face to face. Even with an employee from California if he got a **chance to meet people here** and he can go back to California and say others 'I had a very good time. They are really very good people And we will enjoy working together' So you **build** a **relationship.** Next time you **can do it remotely.** Because you have **already established relationship and rapport.** We can visualise at least one of the people in California. He can **visualise people here.** I think it helps to **build the team** because you **got two parts of the team** split by a long distance. And I think that's why they [people within Trigo project] did it that way to build the team. To start **building that trust** between the teams. And I think **that is important. Once you have started** then other mechanisms as **just as valid.** It saves our **cost** of bringing somebody over here. You are not taking their solid two weeks. But I **think initially** because they **didn't know** each other. Triggo [people in California] **did not know** what Hursley is, where it is, what that is all about. I think it is **actually important to see each other, meet each other.** Time to time they require **face to face contact** to **have skills transfer locally. For people from**

Initial approach

Distance location

Introduction and acquaintance

Social ties

Building trust

Technology focused tools are valid after having f-2-f

Initial approach (f-2-f)

different locations, to have interactions across countries boundary, I mean **time zone** has to be considered when booking for meeting.

Time zones

Why do people store knowledge ? Do you perceive any role of knowledge storage to facilitate knowledge transfer at the IBM?

You can **not keep everything in your head. Can you?** And people **need access to the same** information. So everybody is writing in their own note book Isn't it good? We also have **audit requirements** to keep some types of information. So they have to be written down. They have to be kept in certain places. They have **to be in right place.** So we have a **Team Room** which is for our use. We put stuff like local status of projects. Minutes of our local meeting. But we shift components into other larger products effectively. We own set of databases and we have own process to comply with audit purposes. So we have to **review** our codes, **check** it. We have to schedule that meeting in Notes book. We have to **record the results of meeting in** a certain format in project note book. So **auditors will know** that where they are.

Capacity of human brain
Accessibility to others

Audit requirements to comply

Location of storage repository

I think that's right because I can go to somebody and ask 'do you remember what we have decided.' The person I think as '**knowledge storage bin**' there is no guarantee that he is still around. He may have moved [to other department] or he has left [the IBM]. Or he may be on holiday at the time of our need. When it is in a **machine** [computer-assisted repository] I can hope it can be retrieved.

Knowledge contributor availability

Machine replaces human

Machine focused storage

Or they are available but **have forgotten; because they don't have super memory.** Then it is in machine you can hope that it can be backed up. It can be **archived** but you can **always get** to it. Sometimes you need to read data in data store or knowledge in data store; and then going **back to check it with any of the people** who are around 'Ok I have looked at this, but I am not quite sure why we came to this decision; can you remember?' and they **may or may not remember** or the people who would have remembered **may or may not available.** So I think it is good to document what you can because that is the **most reliable place** where you can go back.

Forgetting

Check stored knowledge with the original writer

Role of knowledge storage

You could see Team Room as a storage bin which is owned by CICS or owned by WMQ; owned by Sue's product centre area. Or you can say 'We have one huge storage bin for everybody in the Lab'. Then they would have to be referred to the author. It is just to validate what action has been taken. They are not expected to understand whether they [stored knowledge] are actually useful to anyone or not Or whether that is current or not.

Department based architecture

Project based architecture

We have Team Rooms not only for projects but for test community across the Lab, for example. So the tester who works on CICS [is] sharing ideas with the tester who works on Sue's product centre. A tester who works on WMQ or who works on Java because they are test community, they share their ideas about testing methodology rather than product related things. So you see both links are going on. They are also going

Discipline based architecture

on in separate Team Rooms. Because you set up Team Rooms dedicated for **test community**; you set up another Team Room dedicated for **CICS projects;** one set up dedicated for **WMQ release**. So you got lots and lots of online Team Rooms not physical Team Rooms. Some of them will be **product related**; some of them will be **discipline related.** I think it would be a huge overhead to try and put all activities in one storage bin Team Room. You can have **multiple storage bins** just a matter of working out whether some of them are related whether all totally dependent but managed separately.

Multiple storage bins

Well if you have storage bin for each of the product areas or projects. Then do you have the person within the team to manage the content? Or are you actually find someone at the IT department who has access to all of them? Who has the responsibility to make sure whether the contents are up to date and current?

Knowledge administrator

I guess knowledge available in storage helps others to use which is sort of '**deferred transfer of knowledge**' from the person who stored it in a repository for the person who retrieves it from the storage bins, Because If you **store** something, if **somebody needs it** then he can go back to it and read that. **That is 'transfer of knowledge to them'.** But I would also say that if somebody is available who originally stores the knowledge then you might go back to **him to check it with him.**

Integration of knowledge transfer and storage

Yes integrated. We do use mechanisms to transfer knowledge **beyond face to face most definitely**; We have **data base,** for example, where you can send out **requests** and information; Or you can **post** information.

Lotus Notes as a tool integrates knowledge storage and transfer

For us, Lotus Notes is **sharing and storing of knowledge.** Is that true? We use all **sorts of Team Rooms and data bases.** Ah I said earlier we have **audit requirements** to keep lots of information. What actions and how long we have to store it for **depends upon what it is**. Some information you keep only while it is current. Other Information you actually will have to be able to back it up, archive it and **Keep it for 7 or 10 years; again depends upon what it is.** But Lotus Notes **allows us to do** that. We can **archive documents** or we can archive whole data base.

Nature of knowledge

It also **depends upon how much commentary** you put in that. I mean **how much explanation** you put in there. Obviously it depends upon what we are talking about, for example, if you actually document why certain decision is taken. Or at what basis that decision was arrived at. Then it is not just data there is **explanation, there is commentary.** But you have not written everything. You are not **answering people's questions.** We just are trying **to give them information.** Whereas if you **are having face to face discussion. You might check** by **asking different questions.** So by putting it in a database you are taking out that ability to ask.

Explanation and commentary

Cross checking

Face to face discussion

[Materials ignored due to irrelevance]

Here people **transfer knowledge voluntarily** I think so. If I come across something which might **be interesting to others, probably send a note** to department with links; So I

Knowledge sharing culture

send to others, post it to others telling 'it might be interesting for you'. Genuinely they might be interested. It is what we say 'sharing knowledge is'; I had a problem recently, so put a request, I finally got a response and answer. I was being around **asking various people because it was quite urgent.** I put it in management Team Room. Because sharing that knowledge might **save peoples' time.** Help desk we **have seen, just send a request with that problem** and got the answer; sending an email and getting a reply save people time. Then storing in a Team Room. It is there they can go back to it later on. They don't have to keep it in their local note [brain]. When I send an email to a person. They can choose to store it in a folder or delete it . If they use it and then delete it that's great! It fixed their problem. **If the problem reoccurs and** they delete it now 'who sent it, what do I have to do'. If they know that it is available in Team Room they can go to Team Room and search for it.

Urgency

Using machine save peoples' time

Knowledge storage using Email

Benefits of knowledge storage

Who maintains the knowledge repository in your organisation? Is there any person who facilitates knowledge transfer and/or tidies up knowledge storage? Do you perceive the role of someone like knowledge administrator to do such job?

Well sometime ago when Jim was as my manager we looked at the volumes of information to sort out which were actually **current and which were not current** but needed to be kept and it was **quite a large job.** If you don't do anything about it and you **allow volume to grow** then it becomes a hard job whereas if you tackle it on a more **regular basis** then it is hoped then it never gets to that point where it is out of control. Trouble would be **finding the right person** to act as the **knowledge administrator**. Because they need to do it. And even if they **do not have some technical knowledge** to do it. But they have to know what the **requirements** are for **archiving something versus just deleting it** etc. and who to go to ask the question about it. You might have secretary to support that. You probably got people to do documentation. We all use several Team Rooms. You could be arguing that you should use one Team Room or we need two. Then question comes do you **need two administrators or one administrator could to do the job to manage different Team Rooms.** Now all of us are in **access control list.** We also have different management **data store.** Some of the information we the **managers need to store are confidential the professional are not allowed to see.** I think it makes sense to have somebody who is responsible. It is not like that he will be **necessarily responsible to going and doing all the actions.** But somebody at least **reminding others to look at** the content of the databases. However in doing that they also need to be **aware of what the requirement is to keep the data.** He has to make sure that **people are actually aware** of it and if they are aware, then tidying up things will be easier.

Tidying up stored knowledge

Knowledge administrator

Archiving vs just deleting

Role of knowledge administrator

Is there any concern or issue you would like to raise or mention?

Relating to knowledge storage. I think there is a number of data store we do have. We need to **make sure that everybody knows what the relevant storage is;** so they don't miss things. Because we store them rather than communicate them and **obviously maintaining those.** If you have so **many data store so you just get confused.** This one or That one! So I

Multiple knowledge repositories

Difficult to search knowledge

Problems in maintaining storage bins

think you have to draw lines. We have to make sure that it is clear for everyone where to go. And you [the researcher] are right, we need to make sure that we **administer that** knowledge to make sure that they are actually **current, relevant and where necessary for audit purposes** that is being treated properly.

Stored knowledge is current and relevant

I think we should not **forget to talk** to people **face to face.** Where we are **co-located** it is perfect opportunity to talk; We have people in the corridor; down the corridor We should go to them and work out. We should not **forget to see people** in the corridor. It helps to make things clearer if there is any scope of **misinterpretation of something through Email or Same Time message.** We **are collated here** as well. We can not do anything rather than perhaps phone occasionally; It is nice to **feel like team;** Talk to each other face to face and get together occasionally.

Due to technology, people may forget to interact F-2-F

You may think that people here are **afraid in sharing knowledge.** I don't think **people are frightened of sharing knowledge.** Sometimes they are concerned that they **don't have sufficient knowledge confidently** about something but might deter them claiming themselves expert and standing and talking about it before others. But generally people **want to help each other and very willing to help** each other by sharing knowledge.

Knowledge sharing culture

Knowledge managers type of person can tell you how to know who he is knowledgeable. Well, when we think somebody is knowledgeable I mean they have been working on something; so they will be intelligent. They will be able to find ways through something since they are experienced in some area. Our developers look through the codes; they can read the documentation; they can work out what needs to be done. They can find problem in it. They are certain people who worked on design, for example. They will be knowledgeable in design document. Because they design they can talk about; How the project is going to be implemented. However, we all feel guilty of thinking **knowledge comes with age and experience** but you don't have to be old **to become knowledgeable what you need is that you have to be keen in something, actually apply yourself.** I think all of my team are knowledgeable; But in varying degrees and in varying elements. I will go one or two people who knows whole of the product or components we developed or I may go somebody else who knows piece of it.

Knowledge administrator

Knowledge doesn't come with age and experience

As part of that, I also encourage people to come to me to get idea about something or to know the location where they can find things [knowledge]. I would **not say that I am knowledge administrator.** I don't **instruct anybody to delete** anything. When Jim was my manager we went through **an exercise and tried to tidy things up.** In that case Jim **instigated** that. But I think we need some knowledge administration. The person needs to understand what the **audit requirements** are. The more than knowledge itself we need to know the guidelines to do that. Who to ask whether knowledge is still current and relevant, etc. We need one stop shop.

[Materials ignored due to irrelevance]

Role of knowledge administrator

Appendix –D
A sample of coding framework

The framework depicts how the analyst moves from initial coding to second level of analysis (pattern coding)

Face to face conversation as a mechanism		
Qualitative data (from transcripts)	**Initial Coding**	**Pattern Coding**
The more tacit the knowledge is, the more likely it needs face-to-face interaction to transfer.	tacit knowledge needs F-2-F interaction	**Tacitness**
If it is tacit, I'll prefer to have a meeting with that person.	transfer of tacit knowledge with a meeting	
.....I could make some clarification about what he exactly wants to know. There might be some questions after.	make clarification	
.....I tend to find it easier to learn from someone else there saying things rather than me there reading things.	easier to learn from someone saying things	
.... it would be a great mistake to think that we could convert everything into explicit.	knowledge is less explicit	
....when people need something more detailed, that will normally be done face to face.	knowledge is more detailed	**Nature of knowledge**
.....If they are after experiential types of information, then they are quite likely to come and talk to you. It requires some sort of conversation.	experiential types of information	
.....for non technical complicated stuff I'll ask somebody who I know.	non technical complicated stuff	
While working with the same level of colleagues, I just welcome him.....	working with people of same level	**Status**
If he is a senior person then I will prefer to adopt the formal approach. .....If someone I know very well, I may employ more informal approach.	a formal approach with a senior person	
..... I like personally the face-to-face approach if I can because verbal interaction is more flexible and quicker, and I can allow them to ask me several questions.	personal liking F-2-F approach	**Personal preference**
..... it depends upon who you are and how you like to be approached. If you prefer Email, I'll also go with an Email.	who you are and how you like to be approached	
If they are my immediate boss or boss of my boss; if I know what their preference is then I'll definitely follow their approach	Knowing manager's preference follow his approach	
There are other people who prefer to have personal touch.	prefer to have personal touch	
I would prefer to allow people to ask me questions face to face. It is good to see people face to face.	prefer to ask in person	

...people who know me as an individual would probably come and see me personally.	people who know me	**Social ties**
..... Prefer to have direct contact. Even if knowledge is available in a place.	direct contact	
If I know them quite well it can be more informal.	know them quite well it can be informal	
..... face to face help build up a social relationship with people with whom we do have less acquaintance.	help build up a social relationship	
I certainly see them during lunch where we do social interaction as well as transfer knowledge.	social interaction during lunch	
While working with people around the world, actually meeting them face to face you build a better relationship, even electronically later on. You may have a better relationship with them than with somebody you have never ever met.	meeting F-2-F builds a better relationship	
.....we mostly work together in offices, we go to each other's offices and help each other when we need help.	knowledge transfer at each other's offices	**Close proximity**
....if they are in the locality they would come and ask 'what about this, do you know about it'?	people in the locality come for help	
.....my office is next to him – just around the corridor. Basically sit down together in my office, run the test and we both look through the results of it.	sit down together in my office to run a test	
.....If he is someone within my team or located nearby I will probably visit him and ask for technical help.	someone within team or located nearby probably visit	
.....a face-to-face conversation with a person who is two doors down ....works quite well. I can't do it with an individual who is in a different location.	a F-2-F conversation with a person who is two doors down	
.....it is an expensive way of doing because the person has to travel if he is not available around. So I'll send him an Email.	expensive way of doing because the person has to travel	
While positioned apart, it is difficult to work together face to face, we cannot have ping pong ideas and thoughts.	positioned apart, it is difficult to work together face to face	
After joining the company first thing we have to have is face-to-face interaction because we don't trust them and they don't trust us.	new entrants need to build trust	**Trust**
To start building trust among the team members, I think that is crucial. Once you have started with it then other mechanisms are appropriate to use.	trust among the team members is crucial.	
If I want to discuss something real urgent either I'll go to a person who really can help me or he will probably come to talk about that.	to discuss something real urgent	**Urgency**
If it is some customer-related problem and it is so crucial that you need a quick answer then you are allowed to go to any person whosoever, whether you have an intimacy with the person or not.	some customer-related problem is so crucial	

Appendix-E

Contact Summary Form

Illustration (excerpts)

Respondent's Name:
Position: Second line Manager
Gender: Male
Length of service: 11 years

Department: Operations, Hursley Lab
Contact date: Tuesday, July20 2004
Time: 13:00
Place: At the interviewee's room

1. **What are the main issues or themes that struck in this contact?**

Knowledge sharing culture
Keeping door open means inviting people
Knowledge hoarding versus knowledge sharing
Reward for publication
Blue page directory
Integration of knowledge transfer and storage

2. **Is there any item within the schedule that remains untouched (missed) during this interview?**

Everything has been covered.

3. **Is there any new issue that have come through this interview?**

Knowledge storage to meet Audit requirements to comply
Difficult to search knowledge
hybrid approach to knowledge transfer
Home work

4. **Is there any new (or remaining) target questions that I have in considering the next contact with this respondent?**

Architecture of knowledge storage
3G Third Generation (3G) videophone
Video conferencing facility
Role of Knowledge administration

5. **The researcher's perception about the respondent.**

Elite respondent
Found very supportive
Very busy but happy to provide more information (easily accessible)
Keen to listen (very much two-way communication)
Very knowledgeable person
Exceptionally experienced

Comment: It is worthy to have further contact with the respondent during second round of interview if possible.

Appendix F

A Sample of Interim Case Summary

Draft

IBM management and knowledge transfer

The management actively participated to encourage them to engage in knowledge transfer. As a result, the atmosphere of IBM was turned into a knowledge-sharing culture. The IBM Lab management paid special attention to understanding individuals' attitudes towards knowledge transfer during the recruitment and selection process. Along with other qualities, e.g. education, skills and experience, of the applicants, their willingness to work in a team and their attitudes towards knowledge transfer were also considered at the time of hiring.....

The management basically encouraged its members to carry out the transfer of knowledge for its own benefit. Because the person possessing the knowledge had transferred it to others, if he (she) was not available for any reason, e.g. on holiday or sick, others would not be stuck. .....

While asking about the management supports, a manager replied, *"In my experience there is no specific incentive. It is considered as a part of the culture and job, we try to share information [knowledge] as much as we can"*. Another software engineer stated, *"I think managers recognise people who help others"*. However, there were a number of things visualised in terms of management support which included indirect financial reward along with a couple of incentives. .....

It was well known that IBM was very proud of its patent rights, which were thought to be the outcome of its members' relentless efforts. So the software developers were encouraged to submit patentable ideas .....

The employees were also encouraged to give talks before audiences in a conference inside the organisation or outside. As a team leader stated, *"If I say 'I would like to present a paper in a conference', my manger will never say 'no'."*.....

Furthermore, publishing paper(s) in scientific journals received a lot of recognition. A manager stated, *"If you publish things, then [you] get some benefits"*. .....

The fact was that the majority of the interviewees reported that people at IBM were encouraged to share knowledge because it helped them in their career development. A team leader stated, *"Potentially if you are looking for senior posts, it [promotion] is a very big motivation for knowledge transfer"*. .....

Final version

Management actions that support knowledge transfer

The management actively participates to encourage employees to engage in knowledge transfer (Nielsen & Ciabuschi, 2003; Gupta & Govindaranjan, 2000; Quinn et. al., 1996). Interviewees perceive management actions support to have a strong knowledge-sharing culture. The IBM Lab management pays special attention to understand individuals' attitudes towards knowledge transfer during the recruitment and selection process. Along with other qualities, e.g. education, skills and experience, of the applicants, their willingness to work in a team and their attitudes towards knowledge transfer are also considered at the time of hiring. .....

From a managerial perspective, the respondents identify six aspects of management actions which influence knowledge transfer.

Active encouragement. The management basically encourages its members to carry out the transfer of knowledge for corporate benefit (e.g., Nielsen & Ciabuschi, 2003). Interviewees report that the management does not want to see one person emerging as the only expert in a particular field. Because there is no guarantee that the person will stay forever. If the person possessing the knowledge is not available for any reason, e.g. on holiday or sick, others will be stuck.

Incentives. Respondents have mixed views on incentives. One manager reveals, *"In my experience there is no specific incentive. It is considered as a part of the culture and job, we try to share information [knowledge] as much as we can."* Another software engineer states, *"I think managers recognise people who help others"*. However, there are indirect financial rewards as incentives. .....

Patent rights. IBM is very proud of its patent rights, which are thought to be the outcome of its members' relentless efforts. So the software developers are encouraged to submit patentable ideas which are seriously taken into consideration for promotion to senior positions.

Supporting conference attendance. The employees are also encouraged to give talks at conferences, both inside the organisation or outside. As a team leader states, *"If I say 'I would like to present a paper in a conference', my manger will never say 'no'."* Rather the management provides logistic and financial support .....

Publishing papers. Furthermore, publishing paper(s) in scientific journals receives high recognition. A manager states, *"If you publish things, then [you] get some benefits [career progression]."* .....

Career progression. The majority of the interviewees report that managers promote those employees who transfer knowledge to other colleagues. A team leader states, *"Potentially if you are looking for senior posts, it [promotion] is a very big motivation for knowledge transfer."* .....

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